The proof of the campaign is in the testing : towards evidence based health education practice

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THE PROOF OF THE CAMPAIGN IS IN THE TESTING

Towards evidence based health education practice

Colophon

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THE PROOF OF THE CAMPAIGN IS IN THE TESTING

Towards evidence based health education practice

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de
Universiteit Maastricht, op gezag van de Rector Magnificus,
Prof. Mr. G.P.M.F. Mols, volgens het besluit van het College
van Decanen, in het openbaar te verdedigen op vrijdag
21 december 2007 om 14.00 uur

door

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Dikke zoen,
Jill Whittingham
December 2007, Maastricht

CHAPTER 1

General introduction

Yearly millions of euros are spent on the development and implementation of mass media public campaigns that target risky health behaviours. A popular example of this kind of campaign in the Netherlands and Belgium is the BOB-campaign. Channelled through TV, radio and billboards, it targets the combination of alcohol use and driving. The campaign started in Belgium a few years ago, and is built on the character BOB, who is a responsible person, who does not drink alcohol when he has to drive. Research has shown that a large part of the target population is familiar with the concept of BOB, and actually applies the concept (Prigogine, 2001). The campaign is considered a great success and is adopted by other European countries, for example the Netherlands.

One would assume that the dissemination of a campaign to other countries was preceded with experimental tests that prove the effectiveness of the campaign on reducing alcohol use in traffic before the campaign was broadcasted. The opposite is true, however; no such reports seem to exist. The only information that could be found were measurements after the campaign ran (Prigogine, 2001). As this type of evaluation lacks a pretest as well as a control group, it is difficult to draw valid conclusions about the effectiveness of the campaign as its success could be easily attributed to external factors, for example a higher intensity of traffic controls during the campaign periods. This thesis elaborates on the above-illustrated lack of evidence-based public health campaigns (e.g., mass media campaigns) to which large proportions of people are exposed.

Both governmental and non-governmental organizations increasingly develop mass media campaigns as a reaction to pessimistic statistics of continuing increases in drugs taking, alcoholism, smoking, AIDS, and other health-related problems to which no effective treatment exists except promoting behavioural change through providing persuasive information. Consequently, various campaigns attempt to help us keep fit, maintain a healthy diet, or quit smoking. Rogers and Storey define a campaign as follows: "a campaign intends to (1) generate specific outcomes or effects, (2) in a relative large number of individuals, (3) usually within a specified period of time, and (4) through an organized set of communication activities" (Rogers & Storey, 1987, p. 821).

In general, public health campaigns combine a mass media component (e.g., TV commercials) with more tailored and individualized components (e.g., brochures for specific target populations). Mass media campaigns in the form of TV and radio commercials and posters on billboards are popular media as they have the advantage over more individualized interventions of reaching a large population at once, and are capable of increasing knowledge and awareness about health-related problems (Miles, Rapoport, Wardle, Afuape, & Duman, 2001).

Although the advantages of mass media campaigns are clear, research has shown however that mass media campaigns do not always succeed in reaching presupposed goals (Fishbein, Hall Jamieson, Zimmer, von Haeften, & Nabi, 2002; Hardeman et al., 2002; Michie & Abraham, 2004; Noar, 2006). Different meta-analyses on the effectiveness of mass media health campaigns have been reported in the literature (Derzon & Lipsey, 2002; Fisher, Fisher, Misovich, Kimble, & Malloy, 1996; Jemmott & Jemmott, 2001; Snyder et al., 2004). This thesis will further elaborate on principles leading to effective mass media materials. Decades of experience and research in health education practice has lead to identifying conditions which should be met in order to create effective, evidence-based campaign materials. In particular, this thesis will focus on the necessity of experimental pretesting when developing new campaign materials.

Avoiding the boomerang: The need for experimental pretesting

Considering the budgets and amount of effort that is spent on developing mass media materials, it is important to know which effects are elicited by the materials. The essential purpose of an evaluation study is determining the worth of something (Rossi, Freeman, & Lipsey, 1999). In the case of public health campaigns, the worth is defined by the extent that the campaign materials attain presupposed changes in the target population. Examples of changes are reductions in risky health behaviours by raising awareness of risks of unsafe sex, raising knowledge about negative consequence of alcohol abuse, and the promotion of health promoting behaviours, such as going for a medical check-up, HIV testing, and seeking early medical treatment. Measuring the extent to which these expected changes are met can be done in different ways, at several times during the development and implementation of public health campaigns.

Different types of evaluation

The most frequently applied evaluations are process and effect evaluations (Rossi et al., 1999). *Process evaluation* (Green & Kreuter, 1992) has the purpose of making the program work more efficiently by evaluating decisions that have been made during the development and implementation of the campaign. This information helps to interpret the results of the campaign evaluation. That is, when there is a lack of intervention effects, the process evaluation can help determine reasons why the campaign failed. An example of a process evaluation component is questioning the extent to which the campaign is imple-

mented and received as planned (Bartholomew, Parcel, Kok, & Gottlieb, 2006).

Effect evaluation, on the other hand, focuses on the direct effects or impact of the campaign on the objectives set, for example by measuring changes in knowledge, attitudes or awareness after the campaign ran in a sample of the target population. Effect and process evaluations thus focus on the questions, respectively, whether the intervention was effective in reaching its objectives and why the intervention was or was not successful. This thesis will focus on the effect evaluation of mass media campaign materials before the campaign has been fully broadcasted. This way, adjustments still can be made to the tested materials in an attempt to attain more positive effects.

As illustrated in the example in the beginning of this chapter, and in contrast to what one would expect from national and regional governments and related agencies that want to see more and more results from their investments, there is a lack of knowledge about the expected effectiveness of developed health education materials, either because effectiveness studies are not carried out beforehand or because the study designs that are employed do not meet the quality criteria that are set in scientific evaluation research to guarantee causal conclusions about the effectiveness of campaigns on selected outcome variables (Michie & Abraham, 2004; Noar, 2006).

Pretesting in practice: Restraints of qualitative research

In practice, most pretesting is done using qualitative research methods such as semi-structured interviews, focus groups and likeability measures. Often, new materials are discussed with small groups that represent the target population. In these groups, participants are asked to convey their opinions on the new material materials. In this sense qualitative research methods are highly effective in answering “how” and “why” questions. Qualitative research aims to obtain individual attitudes, beliefs and feelings. These semi-structured research methods have many advantages, for example, Kitzinger (1994, 1995) argues that interaction is the crucial feature of focus groups because the interaction between participants highlights their view of the world, the language they use about an issue, and their values and beliefs about a situation. As with all research methods there are also some limitations (Kitzinger, 1994, 1995). Firstly, the presence of others (social influence) can influence the kinds of opinions conveyed by participants and thus not fully reflect participants’ actual opinions (Brenner, Billy, & Grady, 2003; Steckler, McLeroy, Goodman, Bird, & McCormick, 1992; Wilson & Dunn, 2004; Wilson & Nisbett, 1978). Secondly, qualitative methods are semi-structured and, consequently, lack a reliable control group. Qualitative research is suitable and necessary for assessing the acceptability,

comprehensibility and personal relevance of newly developed materials as well as the feasibility of future implementation. However, due to the above mentioned limitations, we contend that the sole use of qualitative research methods to appraise public health campaign materials is insufficient as it cannot provide valid estimates of the effectiveness of the materials in changing targeted outcome variables. Therefore, we argue that process evaluation research methods should be complemented with effect evaluation research methods in order to optimize the decision making process in the developmental phase of campaign materials.

Experimental pretesting

There is a need for more powerful research methods to supplement the existing focus on qualitative research methods in pretest research. In clinical medicine, randomized controlled trials have been widely considered as the most reliable method of determining the effectiveness of interventions because of its ability to minimize bias and avoid false conclusions (Stephenson & Imrie, 1998). This research method should not be limited to evaluate medical interventions, but also used to evaluate more complex interventions, for example behavioural interventions.

An experimental study on the effect of campaign materials is characterized (Michie & Abraham, 2004; Rossi & Freeman, 2004) : a) a control group that has not been exposed to the materials; b) appropriate outcome measures that are directly related to the objectives established by the campaign designers; and c) random allocation of participants to different conditions.

Experimental research would provide a more rigorous test of the possible effectiveness of new health education materials in changing outcome variables (Strahan et al., 2002). However, if evaluation is done after implementation of the campaign, isolation of a control group and random assignment of individual respondents to either the treatment or the control condition is difficult, as a large part of the population has already been exposed to the campaign (Lipsey & Cordray, 2000; Yzer, Siero, & Buunk, 2000). In contrast, experimental pretesting allows for the inclusion of a control group and random allocation of participants without running the risk that participants have already been exposed to the materials. Additionally, experimental pretesting makes it possible to adjust and improve materials prior to final production and distribution in accordance with the results of the pretest. It is the explicit aim of the present dissertation to illustrate the merits and feasibility of experimental pretesting.

Despite the advantages of experimental pretesting, we are aware that certain practi-

cal limitations exist. For example, it is almost impossible to use the most optimal effect evaluation, a randomized controlled trial of final campaign materials in practice. To reduce on traditional limited resources of money and time, the use of unfinished materials is advised. Also, campaign exposure in an experimental setting differs from exposure to the campaign in real life settings. Despite these limitations, we argue that a well designed experimental study allows us to ascertain causal relationships between exposure to the campaign materials and their expected effects on targeted outcome variables. Additionally, an experimental study establishes a more “quantifiable” effect size.

Implementation of experimental pretesting

As mentioned above, we plead for experimentally pretesting new campaign materials before they are being broadcasted. In addition to being able to make reliable conclusions about the effects of the campaign materials, there is also the possibility to compare different versions of materials or to test whether the effectiveness of materials has improved after applying theoretical principles.

Theory-based campaigns

Although being one of the most critical conditions for effective campaign materials, theoretical methods are easily overlooked. That is, designers of health campaign materials are often times unaware of the choices they make concerning the content and design of health education material (Kools, Ruiter, van de Wiel, & Kok, 2004). Research has shown that theory-based health campaign materials contribute positively to the effectiveness of campaign materials (Fishbein, Cappella et al., 2002; Fishbein, Hall Jamieson et al., 2002; Fishbein & Yzer, 2003; McGuire, 1985; Michie & Abraham, 2004). Theories on behavioural change and prediction are valuable as the more is known about how a specific behaviour is established; the better a campaign can be developed to change the behaviour (Fishbein & Cappella, 2006).

Theories for understanding and changing behaviour

Numerous studies have identified important psychosocial determinants of health behaviour. These studies provide significant empirical support for explanatory models of behaviour such as the theory of planned behaviour (Ajzen, 1991), the protection motivation theory (Rogers & Prentice Dunn, 1997); the social-cognitive theory (Bandura, 1986, 1998), and the transtheoretical model of behaviour change (Prochaska, Redding, & Evers,

1996). Each theoretical framework delivers factors that explain behaviour, giving different weights to these factors. Based on a review of major theories of health behaviour, Fishbein (2006) proposed an integrative model that attempts to transcend the different theoretical perspectives. Three primary determinants of intention to perform the behaviour are: 1) attitude toward performing the behaviour; 2) perceived norms concerning performance of the behaviour; and 3) self-efficacy with respect to performing the behaviour (Fishbein & Cappella, 2006; Fishbein & Yzer, 2003).

Translating theoretical behaviour models into effective strategies

Despite the vast array of research on psychosocial determinants of health behaviour and on the effectiveness of psychosocial health interventions in creating behavioural change, little is known about successful determinant-specific behavioural change methods to create effective health campaign materials. According to the framework of Intervention Mapping (Bartholomew et al., 2006), which provides a systematic six-step approach to intervention development, designing a new campaign consists of the following steps: (1) a needs assessment, that is assessing the health problem, its related behaviour and environmental conditions, and their associated determinants for the at-risk population; (2) formulating clear goals and objectives that are derived from a systematic needs assessment procedure; (3) selecting appropriate theory-based methods aimed at changing psychosocial determinants, which are translated into practical strategies; (4) designing and organising the intervention and its components; (5) specifying implementation plans; and (6) generating an evaluation plan (Kok, Schaalma, de Vries, Parcel, & Paulussen, 1996; Kok, Schaalma, Ruiter, van Empelen, & Brug, 2004). In order to develop evidence-based materials (step 3 and 4), research should be done on developing successful theory-based behaviour-change techniques (Michie & Abraham, 2004).

Instead of focusing on developing campaign materials in line with theoretical notions on the optimal use of the materials, program designers often times focus on the actual and concrete campaign materials, such as a health brochure or a TV commercial (Kok et al., 2004). It is important to consider both the theoretical method and the practical strategy. The conditions or parameters of the method should be fulfilled if the strategy is to be effective (Bartholomew et al., 2006). For example, if the main objective of an intervention is to increase risk perceptions related to alcohol abuse in undergraduate university students, a possible theoretical method could be modelling (Kok et al., 2004; Slovic, 2000). An example of a strategy could be a video that shows the story of a student who explains that he has been going to parties a lot, which did not always include alcohol use, and still had a

good time. It is important to note that the parameters of the method should be fulfilled if the strategy is to be effective. Returning to the example of the video, according to the Social Cognitive Theory, it is important that the role model has the following features: a) the target population is able to identify with the role model used; b) the role model exhibits a coping model rather than a mastery model; c) the role model receives reinforcement; and d) the role model demonstrates feasible subskills (Bandura, 1986).

Another example is the use of the Elaboration Likelihood model (Petty & Cacioppo, 1986). The ELM distinguishes between two routes, central and peripheral route, to process persuasive communication. The central route is the most favourable and involves careful processing of the persuasive communication to determine the merits of the arguments. When this results in favourable thoughts, the message will most likely be accepted, and if unfavourable thoughts are generated while considering the merits of presented arguments, the message will most likely be rejected. In order to promote the central processing route, good arguments are necessary. That is, arguments which are new and evaluated as convincing. However, within the field of health promotion the general population already has a great deal of knowledge about the consequences of risk behaviour (e.g., smoking causes lung cancer). For this reason, campaign developers attempt to provide new arguments, for example, that smoking reduces your fertility. But the extent to which these 'new' arguments are indeed persuasive is often not appropriately tested.

In this thesis, examples of studies will be presented in which experimental pretesting is used as a method to test different versions of campaign materials, for example after applying theory-based changes to improve readability of written material, and to test for possible counterproductive effects of materials, for example when using a harm reductive approach. The emphasis is therefore on testing the feasibility of experimental pretesting and the process of programme development rather than contributing to the theoretical and empirical knowledge base of behaviour change.

New technologies in pretesting

As said before, in practice most pretesting is done using qualitative research methods such as interviews, focus groups and likeability measures. Alternatively, when quantitative measures are used, effect evaluations are most often based on self-report measures, for example questionnaires. Self-report measures have some restrictions. First, a limitation of these explicit measures is that they require introspection from the participants even though people may not be aware of the motives that drive their behaviour (Wilson & Dunn, 2004; Wilson & Nisbett, 1978). An example is illustrated in a study by Kools and

colleagues; their results showed a substantial discrepancy between subjectively reported and objectively measured knowledge in the experimental condition (Kools, van de Wiel, Ruiter, Cruts, & Kok, 2006). Second, participants may respond with socially desirable statements. For example, Ruiter and Kok (2005) argued that self-reported campaign effects of fear arousal on smoking behaviour do not match at all with objectively measured effects. For these reasons, one should be cautious with interpreting self-report measures.

As outcome measures are essential for a good evaluation, it is essential to select appropriate and objective outcome measures. The value of objective dependent measures is for instance demonstrated when studying attention processes. In persuasion research it is generally believed that attention is a necessary condition for effective communication (Donohew, 2006; McGuire, 1985). Self-report measures are not capable of reliably measuring attention allocation processes, which was also demonstrated in a study by Ruiter and colleagues (Ruiter, Kessels, Jansma, & Brug, 2006). They evaluated the effects of individually tailored health communications on processes of attention allocation by recording event-related brain potentials (ERP), which are generated from a continuous measure of brain activity by means of an electroencephalogram (EEG). This high temporal resolution method enables assessment of attention processes during message exposure. ERP findings reflected the expected attention advantage of tailored health messages over non-tailored messages, but this advantage was not seen on the self-report measure on which participants estimated the extent to which they had read the presented information carefully.

Another technology to measure attentional processes when evaluating campaign materials, is eye tracking. That is, measuring which parts are viewed by participants. The technique is often used in marketing research to measure the amount of attention that goes out to the brand name. In the field of health education practice this technique could be used to evaluate for materials that are visually presented, and often are only viewed for a short period of time, for example posters. We will use eye tracking to evaluate the effectiveness of health education posters, that is, whether enough attention goes out to the most important areas on the poster. In conclusion, accurate measurement of the predicted effects is necessary to obtain reliable conclusions about the effects of the materials.

Outline of this thesis

Knowing which strategies and materials are effective prior to the large scale introduction of a campaign is highly beneficial given the significant expenditures associated with campaign implementation. We thus contend that an experimental pretest of public health materials, or specific practical strategies used, in their developmental phase is both wise and advantageous. Additionally, an experimental pretest can be easily integrated into the development stage of campaign materials and thus is economical in terms of time.

The present thesis will elaborate on the implementation of experimental pretesting. In this thesis, six experimental studies in which experimental pretesting is demonstrated and investigated will be presented. These studies report on different types of campaign materials (e.g., TV commercial, brochure, leaflet), promoting different behavioural goals (e.g., safe sex, safe drug use, moderate alcohol use), and using different research methods (e.g., open-ended questionnaires, eye tracking) each designed to evaluate the specific materials on their effectiveness.

In the first study of this thesis (**chapter 2**) we evaluated campaign material that was still in the developmental phase. The material was part of a national STI/AIDS prevention campaign in the Netherlands. The campaign material tested was the storyline of a planned television commercial on safe sex. A storyboard that consisted of drawings and text was presented to members of the target population, namely students between the ages of 14 and 16 enrolled in vocational schools. The campaign designers wanted to test their new materials before they are being broadcasted. If the expected outcomes were not reached, the designers were able to make changes to the storyboard, before making the actual TV commercial. This way, the effectiveness of the materials can be optimized. Also, the feasibility, advantages, practical implications and limitations of experimental pretesting were explored.

The following chapter (**chapter 3**) presents two studies in which the use of a harm reduction approach in campaign materials is evaluated. Written health education materials provided information about how to minimize the potential hazards associated with party drug use rather than solely discouraging the use of these drugs. Because the materials are distributed in different nightlife settings, where the materials might come to the notice of non-users, the potential aversive effects of the effects of these materials were examined not only among users of party drugs, but also among non-users. In this case, the campaign designers were particularly interested in investigating possible counterproductive results, that is, more positive attitudes and outcome expectancies towards drug use after exposure to the materials. Also, the effects of different types of materials (e.g., infocard vs. leaflet)

and acquaintance with drug type (e.g., ecstasy vs. GHB) were investigated.

The fourth study (**chapter 4**) demonstrates the usefulness of experimental pretesting to develop health education materials with a theoretical and empirical research basis. With specific focus on increasing knowledge, the authors utilized well-researched principles in cognitive psychology to increase the message comprehension of an existing health education brochure. The brochure used was produced by a Dutch national campaign office for preventing alcohol abuse among undergraduate students. In two experimental studies, the original version of the brochure was compared with the theory-based modified version on measures of knowledge and psychosocial determinants of alcohol use among undergraduate university students.

In the last study (**chapter 5**) we explored the use of eye tracking as a technique to evaluate new campaign materials. The general idea was to come up with an accurate measurement of the predicted effects that is necessary to obtain reliable conclusions about the effects of the materials. The posters used in this study were originally produced by a Dutch national campaign office to promote visiting of a website about the prevention of alcohol abuse. In a randomized controlled trial, the original posters were compared with modified versions of the posters on self-report measures of recall of the website and motivation to visit the website (i.e., attitude and intention). In addition to these self-report measures, eye movements were recorded when viewing the posters to measure attention to relevant parts of the posters.

Finally, because the general purpose of this research project is to promote experimental pretesting as a method to develop evidence-based campaign materials, the last chapter (**chapter 6**) aims to summarize and discuss the main findings of the empirical studies. Furthermore, the findings are translated into practical guidelines and recommendations for practitioners in order to create evidence-based campaign materials.

CHAPTER 2

Experimental pretesting of public health campaigns:

A case study

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Abstract

The aim of the present study is to demonstrate the merits of evaluating new public health campaign materials in the developmental phase using an experimental design. This is referred to as experimental pretesting. In practice, most new materials are only tested after they have been distributed using non-experimental or quasi-experimental designs. In cases where materials are pretested prior to distribution, pretesting is usually done using qualitative research methods such as focus groups. Although these methods are useful, they cannot reliably predict the effectiveness of new campaign materials in a developmental phase. Therefore, we suggest when pretesting new materials, not only qualitative research methods but also experimental research methods must be used. The present study discusses an experimental pretest study of new campaign materials intended for distribution in a national STI/AIDS prevention campaign in the Netherlands. The campaign material tested was the storyline of a planned television commercial on safe sex. A storyboard that consisted of drawings and text was presented to members of the target population, namely students between the ages of 14 and 16 enrolled in vocational schools. Results showed positive effects on targeted determinants of safe sexual behaviour. The advantages, practical implications and limitations of experimental pretesting are discussed.

Introduction

On a daily basis, we are exposed to billboards, brochures, and television commercials that promote a healthy lifestyle. Mass media campaigns are a popular means of conveying public health messages as they have the advantage of reaching a large population at once. Despite the large reach of mass media campaigns, such campaigns are not always effective in changing determinants of behaviour or intention to change behaviour. Research has shown that one cannot simply assume that campaign materials are effective and that the materials will elicit positive effects on behavioural determinants (Atkin, 2002; Fishbein, Hall Jamieson, et al., 2002; Michie & Abraham, 2004). Some studies have even reported counterproductive effects and that some materials cause more harm than good (Fishbein, Hall Jamieson, et al., 2002). Effective campaign materials are the result of a systematic process in which theoretical and empirical evidence are used in the delineation of the problem and development of the intervention. Doing this increases the likelihood that campaign materials be effective in changing determinants of behaviour, such as awareness, knowledge and attitudes (Atkin, 2002; Bartholomew et al., 2006; Fishbein, Hall Jamieson, et al., 2002; Hardeman et al., 2002; Michie & Abraham, 2004; Noar, 2006; Snyder et al., 2004; Vrij & Smith, 1999).

Empirical research is necessary if we want to avoid the pitfalls of creating ineffective campaign materials, and thus should guide future initiatives (Atkin, 2002). Over the years, the health education literature has reported extensively on a) identified risk behaviours and their associated psychosocial determinants; and b) evaluation studies of implemented health campaigns. However, few scientific papers on the pretesting of campaign materials prior to large-scale implementation are available. This does not mean that pretesting is not done. Advisory and funding boards of health organizations responsible for public health campaigns in the Netherlands have indicated that most public health campaigns are indeed pretested (ZonMw, 2000). Unfortunately, results are seldom published in peer-reviewed journals. More important is the fact that most of the pretesting done fails to utilize the experimental designs that make it possible to establish causal links between exposure to public health campaigns and effects on relevant outcome variables despite the fact that these links are the very essence of pretesting.

In practice, most pretesting is done using qualitative research methods such as interviews, focus groups and likeability measures. Often, new materials are discussed with small groups that represent the target population. In these groups, participants are asked to convey their opinions on the new material materials. In this sense, qualitative research methods are highly effective in answering “how” and “why” questions. Indeed,

focus groups and one-on-one interviews are good methods to obtain attitudes, beliefs and feelings. Furthermore, focus groups have the advantage of utilizing group dynamics. For example, Kitzinger argues that the idea behind the focus group method is that group processes can help people to explore and clarify their views in ways that would be less easily accessible in a one-to-one interview (Kitzinger, 1994, 1995). However, the presence of others in focus groups can influence the kinds of opinions conveyed by group participants and thus not fully reflect participants' actual opinions, for example when discussing sensitive subjects such as sex (Brener et al., 2003; Steckler et al., 1992; Wilson & Dunn, 2004; Wilson & Nisbett, 1978). In addition, focus group and other qualitative methods are semi-structured and, consequently, lack a reliable control group against which to compare and interpret the found effects. Given these restrictions, we contend that the sole use of qualitative research methods to appraise public health campaign materials is insufficient as it cannot provide valid estimates of the effectiveness of the materials in changing psychosocial determinants of behaviour.

As a result, we advocate for the complementary use of experimental methods to determine the effectiveness of new campaign materials. Let us be clear about our intentions. Qualitative research is suitable and necessary for assessing the acceptability, comprehensibility and personal relevance of newly developed materials as well as the feasibility of future implementation. However, we argue that formative research methods should be complemented with summative research methods in order to optimize the decision making process in the developmental phase of campaign materials. A well designed experimental study allows us to ascertain causal relationships between exposure to the campaign materials and their effects on targeted determinants of health behaviour. For example, Kools and colleagues showed that for participants in the experimental condition the discrepancy between subjectively reported and objectively measured knowledge was substantial, while that discrepancy was not found in the control group (Kools, van de Wiel, Ruiter, Cruts, et al., 2006). Ruiter and Kok (2005) argued that self-reported campaign effects of fear arousal on smoking behaviour do not match at all with objectively measured effects. In both these cases, the presence of a control group was essential in order to be able to understand the effects in the experimental conditions and draw these specific conclusions. Additionally, an experimental study establishes a more "quantifiable" effect size.

Experimental research would provide a more rigorous test of the possible effectiveness of new health education materials in changing outcome variables (Strahan et al., 2002). An experimental study on the effect of campaign materials is characterized by the following (Rossi & Freeman, 2004): a) a control group that has not been exposed to the

materials; b) appropriate outcome measures that are directly related to the objectives established by the campaign designers (Michie & Abraham, 2004); and c) random allocation of participants to different conditions. If evaluation is done after implementation of the campaign, isolation of a control group and random assignment of individual respondents to either the treatment or the control condition is difficult, as a large part of the population has already been exposed to the campaign (Lipsey & Cordray, 2000; Yzer et al., 2000). In contrast, pretesting allows for the inclusion of a control group and random allocation of participants without running the risk that participants have already been exposed to the materials. Additionally, experimental pretesting makes it possible to adjust and improve materials prior to final production and distribution in accordance with the results of the pretest.

Knowing which strategies and materials are effective prior to the large scale implementation of a campaign is highly beneficial given the significant expenditures associated with the implementation of a large scale campaign. We thus contend that an experimental pretest of public health campaign materials in their developmental phase is both wise and advantageous; of course, only if the pretest is planned well-ahead of the scheduled implementation deadline so changes to the materials can still be made if findings of the experimental pretest suggest to do so. The financial, capital and organizational costs of experimental pretesting are relatively small in comparison with the implementation of ineffective campaign materials that have not been tested. Additionally, an experimental pretest can be easily integrated into the development stage of campaign materials and thus is economical in terms of time. Despite the advantages of experimental pretesting, we are aware that certain practical limitations exist. For example, it is almost impossible to use the most optimal summative test, namely a double blind randomized control trial (RCT) of final campaign materials in practice. As a result, the use of unfinished materials and quasi-experimental designs is advised. Despite this limitation, we argue that experimental pretesting is advantageous in that it provides more certainty about the effects of specific strategies and can serve to ensure that the significant costs associated with a large scale public health campaigns are well-invested.

The present study

The present study provides an example of an experimental pretest. It discusses an experimental pretest of the storyline of a television commercial intended to be used in a national safe sex campaign launched by the Dutch National Institute for STI & AIDS Control. The target population for the commercial was young people between the ages of 13 and 19. The main aim of this campaign was the prevention of sexually transmitted infections (STI's). The campaign material was designed to do this by stimulating condom use, increasing risk perception, and emphasizing the importance of taking personal responsibility when it comes to the use of condoms. The importance of taking responsibility was emphasized by the use of the following slogan: "Wie laat zich dan ook naaien zonder condoom?", or in English, "Who gets screwed without a condom anyway?". It is important to note that by directly translating the Dutch slogan, the context, meaning and intonation are partially lost. However, the message was essentially, "Who is dumb enough to get screwed without a condom?" As illustrated, the language used was straightforward, direct, and explicit about taking personal responsibility for STI protection.

In order to measure the effectiveness of the storyline, the predetermined targets of the campaign were converted into measures of risk perception, intention to use condoms, taking responsibility for the use of condoms, and anticipated regret. Measures of knowledge, attitude and self-efficacy towards condom use were also included given the campaign's aim to attain a general positive effect on other determinants of safe sex as well (Abraham et al., 1999; Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Sheeran, Abraham, & Orbell, 1999). Furthermore, due to the direct, confrontational and controversial formulation of the slogan, an alternative slogan was included in the pretesting. Participant's attitude towards the alternative slogan, namely "Who does it without a condom anyway?" was also measured.

Method

Participants and design

Given that the target population of the campaign was young people with a low to moderate level of education, the experimental pretest study was conducted in two intermediate-level vocational schools. Formal permission to perform the study was obtained from the principal of each school.

In total, 185 volunteer students, with a mean age of 15.24 years, participated ($SD = 1.08$). In this group, 53% were male and 47% were female. Most participants were Cauca-

sian and had a Christian background. All eligible participants agreed to take part in the study. In both schools, classes were randomly assigned to the two conditions, namely the experimental condition or the control condition. The conditions were varied within each school to control for differences between the schools.

Participants were tested in their normal classroom setting during a regular 50-minute lesson. The persuasive effects of the storyline were tested by comparing an experimental group that was exposed to the storyline prior to filling in a questionnaire and a control group that did not see the storyline before filling in the questionnaire. We opted not to use a pretest/post-test format in our study as this could generate priming effects of the pretest. One could claim that priming effects can be avoided by conducting the measurements over a long period of time. Unfortunately, due to space and time restraints, this was not possible. The study was approved by the Ethics Committee of the Faculty of Psychology at Maastricht University.

Campaign material

The campaign material designed for the national safe sex campaign included billboards, television commercials and radio commercials, both government-owned and commercial. Our experimental pretest was restricted to the television commercial component of the campaign, in particular the storyline of the commercial. The storyline was presented on a storyboard that consisted of drawings and text that were part of essential frames of the television commercial. The storyboard thus conveyed the same message as the commercial but with less financial costs.

The storyboard of the television commercial was displayed on a large white screen in the classroom by means of a laptop and beamer. In total, 20 slides were used to convey the following: A young couple kissing for the first time, dating, doing fun stuff, sending text messages, going out, and then having sex. The visual tone then changes and becomes aggressive and furious when the girl finds out she has a sexually transmitted infection. The slogan, "Who gets screwed without a condom anyway?" was then presented followed by a referral to the 'www.safesex.nl' website for further information and instructions on how to practice safe sex.

Given the explicit and controversial nature of the primary slogan, participants were asked to evaluate the two slogans using qualitative likeability measures.

Procedure

Participants in both conditions were first asked to complete a few demographic questions about age, gender, and level of education. This was followed by a 14-item self-reported questionnaire measuring knowledge about safe sex. Participants in the experimental condition were then exposed to the television commercial storyboard and asked to complete a self-reported questionnaire that measured the outcome variables. Participants in the control condition completed the questionnaire measuring outcome measures without viewing the commercial storyboard. Following this, all participants viewed the storyboard and the slogans again and likeability measures were conducted.

Measures

Knowledge. Knowledge about safe sex, STIs and HIV was measured using a 14-item questionnaire. Three sample items were: “You can get HIV by kissing someone”, “You do not get HIV if you wash yourself after having sex”, and “Some STIs can make girls infertile”. The response options were “*true*”, “*not true*”, and “*don’t know*”. These were later recoded into 1 = *correct* and 0 = *incorrect / I don’t know*. For each participant, the item scores were totalled to generate a knowledge index ranging from 0 to 14.

Outcome measures. In order to measure the effects of the storyboard in the context of the goals set by the campaign team, the following self-reported outcome items were included: risk perception, intention to use condoms during sex, intention to discuss condom use with partner prior to having sex, perceived personal responsibility with respect to the use of condoms, and anticipated regret. In addition, we included items that measure attitude and self-efficacy towards condom use. A summary of sample items and reliability scores is presented in Table I.

Likeability of the television commercial storyboard. Likeability was measured by having participants indicate the extent to which the television commercial was *appealing to peers, credible, good, and successful* in warning people about the consequences of unsafe sex. These items were measured separately using a five point scale (1 = *fully disagree*, 5 = *fully agree*). Additionally, a single item provided a general evaluation score by asking participants to mark the television commercial on a ten point scale (1 = *poor*, 10 = *excellent*).

Attitudes towards the two slogans. Attitudes towards the slogans were measured for each slogan by compiling the scores of four 5-point semantic differential items, namely *aggressive-friendly, bad-good, incomprehensible-comprehensible, and unpleasant-pleasant*.

ant. The scores were coded from 1 to 5 and a higher score indicated a more positive attitude. For both item sets, the Cronbach's alpha was satisfactory with scores of .74 and .76, respectively. Furthermore, participants were asked to mark each slogan on a ten point scale (1 = *poor*, 10 = *excellent*).

Table I: Sample items of outcome measures and associated scale reliability (Cronbach’s alpha)

	α	Nr. of items
Risk perception:	.79	10
How small/large is your chance of contracting a STI or HIV (1 = <i>very small</i> , 5 = <i>very large</i>)		
Compared to others of your own age, my chances of contracting an STI or HIV are (1 = <i>much smaller</i> , 5 = <i>much bigger</i>)		
I could end up in bed with somebody who has and STI or HIV (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Intention to carry condoms:	.72	2
Do you intend to buy condoms in the coming three months? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Do you intend to carry condoms in the coming three months? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Intention to use condoms with a new partner:		1
Do you intend to always use a condom when you have sex with a new partner? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Intention to use condoms with a known partner:		1
Do you intend to always use a condom with a known partner? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Intention to discuss condom use prior to having sex:		1
Do you intend to discuss condoms use with your partner when you want to have sex?		
(1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Perceived personal responsibility:		1
I think it is my personal responsibility to use condom (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Anticipated regret:		1
If I use a condom during sex, I will feel less worried afterwards about contracting HIV or another STI (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Attitude towards condom use with a new partner (7 point scales):	.75	5
Difficult - easy; bad - good; unimportant - important; dumb - smart; unpleasant - pleasant		
Attitude towards condom use with a known partner (7 point scales):	.87	5
Difficult - easy; bad - good; unimportant - important; dumb - smart; unpleasant - pleasant		
Self-efficacy to carry condoms:	.44	2
Do you think you are able to buy condoms? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Do you think you are able to carry a condom when you go out? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Self-efficacy to use condoms:	.77	9
Do you think you are able to use condoms when you are excited? (1 = <i>strongly disagree</i> , 5 = <i>strongly agree</i>)		
Do you think you are able to put on a condom properly? (1 = <i>certainly not</i> , 5 = <i>certainly yes</i>)		
Do you think you are able to use condoms when you are under the influence of alcohol or drugs? (1 = <i>certainly not</i> , 5 = <i>certainly yes</i>)		

Results

Preliminary analyses

Preliminary analyses showed that knowledge about sex, STIs and HIV did not differ significantly between the experimental ($M = 11.40$, $SD = 2.04$) and control group ($M = 11.36$, $SD = 2.65$), $F < 1.00$, *ns*. However, participants in the experimental condition were significantly older ($M = 15.61$, $SD = 1.18$) than participants in the control condition ($M = 14.87$, $SD = .78$), $F(1, 183) = 25.10$, $p < .001$. Age was therefore included as a covariate variable in the analyses below. The number of boys and girls in the two conditions was evenly distributed, $\chi^2(1, N = 185) = 2.80$, $p = .09$. However, given that other studies have reported that gender impacts important determinants of safe sex behaviours (Campbell, Peplau, & DeBro, 1992), the variable gender was included in the analyses as a moderator variable of the effect of the experimental condition on the outcome measures. In cases where a significant interaction effect between gender and the experimental condition was found, the effect of the experimental condition was analyzed separately for boys and girls. Only significant effects ($p < .05$) are reported.

Outcome measures

Two-way analyses of variance (ANOVA), using gender and the experimental condition as covariates, were conducted to measure the effects of exposure to the television commercial storyboard on the outcome measures (see Table II for the mean scores). A significant effect was found for the experimental condition on risk perception, $F(1, 180) = 8.00$, $p < .01$, which was qualified by a significant interaction effect with gender, $F(1, 180) = 6.32$, $p < .05$. For boys, exposure to the television commercial did not significantly influence risk perception, $F(1, 95) = 0.09$, $p = .77$. For girls in the experimental condition, an effect was found, $F(1, 84) = 12.24$, $p < .001$. When compared to the control condition, girls in the experimental condition estimated their own likelihood of contracting a STI and/or HIV infection higher.

On the variable intention to carry condoms, a main effect of the experimental condition was found, $F(1, 180) = 3.79$, $p = .05$. Participants who had seen the television commercial storyboard indicated a greater positive intention to carry condoms ($M = 2.90$, $SD = 1.02$) than participants in the control condition ($M = 2.44$, $SD = 0.98$). Furthermore, there was a significant effect of gender, $F(1, 180) = 6.57$, $p < .05$. Boys had a more positive intention to carry condoms ($M = 2.89$, $SD = 0.88$) than girls ($M = 2.44$, $SD = 1.13$). On the variable intention to use condoms with a new partner, the only significant effect was a gender effect, $F(1, 180) = 11.81$, $p < .001$. Girls had a more positive intention to use

condoms with a new partner ($M = 4.42, SD = 0.71$) than boys ($M = 4.01, SD = 1.02$). Likewise, on the variable intention to use condoms with a known partner, a significant effect of gender was found, $F(1, 180) = 8.98, p < .01$. Girls had a more positive intention to use condoms with a known partner ($M = 3.74, SD = 1.00$) than boys ($M = 3.34, SD = 0.92$).

On the measures of taking personal responsibility for discussing condom use, a significant effect of the experimental condition was found on the variable intention to discuss the use of condoms with partner prior to having sex, $F(1, 180) = 4.89, p < .05$. Participants who had seen the television commercial storyboard were more likely to start discussing condom use prior to having sex ($M = 3.98, SD = 0.91$) than participants in the control condition ($M = 3.64, SD = 1.02$). This effect was not replicated on the variable perceived personal responsibility to use condoms, $F < 1.00, ns$.

On the variable anticipated regret, no effects were found ($ps > .26$). High mean scores indicated that participants across conditions agreed that the use of condoms prevent worries later on.

On the variable attitude towards condom use with a new partner, the only significant effect was related to gender, $F(1, 180) = 9.98, p < .01$. Girls had a more positive attitude ($M = 4.41, SD = 0.71$) than boys ($M = 4.15, SD = 0.70$). This effect was replicated on the variable attitude towards condom use with a known partner, $F(1, 180) = 10.35, p < .01$. Girls had a more positive attitude towards condom use with a known partner ($M = 3.98, SD = 0.91$) than boys ($M = 3.55, SD = 0.83$).

On the measure of self-efficacy to carry a condom, a main effect of gender was found, $F(1, 180) = 24.06, p < .001$. This was qualified by a significant interaction effect with the experimental condition, $F(1, 180) = 4.44, p < .05$. However, for both boys and girls, the effect of condition did not reach significance ($ps > .09$). On the variable self-efficacy to use a condom, a significant effect of gender emerged, $F(1, 180) = 5.98, p < .05$. Girls reported a higher self-efficacy to use condoms ($M = 4.05, SD = 0.66$) than boys ($M = 3.81, SD = 0.74$).

Table II: Mean scores (SD) on outcome measures as a function of experimental condition and gender

	Experimental		Control	
	Boys	Girls	Boys	Girls
Risk perception	3.22 (0.55)	3.34 (0.55)	3.18 (0.55)	2.88 (0.60)
Intention to carry condoms	3.05 (0.89)	2.68 (1.16)	2.68 (0.82)	2.24 (1.07)
Intention to use condoms with a new partner	4.15 (1.07)	4.47 (0.68)	3.82 (0.92)	4.38 (0.73)
Intention to use condoms with a known partner	3.29 (0.85)	3.66 (1.05)	3.42 (1.01)	3.81 (0.96)
Intention to discuss condom use prior to having sex	3.91 (0.82)	4.08 (1.04)	3.49 (0.83)	3.77 (1.15)
Perceived personal responsibility	4.21 (1.23)	4.38 (0.85)	4.14 (0.87)	4.56 (0.92)
Anticipated regret	4.65 (0.87)	4.69 (0.66)	4.78 (0.42)	4.56 (0.85)
Attitude towards condom use with a new partner	4.27 (0.62)	4.59 (0.48)	4.00 (0.78)	4.25 (0.83)
Attitude towards condom use with known partner	3.59 (0.77)	3.92 (0.81)	3.50 (0.91)	4.03 (0.99)
Self-efficacy to carry condoms	4.04 (0.71)	3.68 (0.82)	3.98 (0.58)	3.15 (0.97)
Self-efficacy to use condoms	3.90 (0.79)	3.98 (0.73)	3.69 (0.65)	4.11 (0.61)

Likeability of TV Commercial

Across experimental and control conditions, participants rated the television commercial storyboard with a mean score of 6.89 on a ten point scale ($SD = 1.40$). The storyboard was also positively evaluated on the specific measures of likeability. The following results were found: *credible* ($M = 3.68, SD = 0.87$), *good* ($M = 3.37, SD = 1.14$), *provides a warning* ($M = 3.98, SD = 0.96$) and *appeals to peers* ($M = 3.17, SD = 0.87$). Independent samples t-test showed that girls evaluated to television commercial storyboard higher on the good scale ($M = 3.59; SD = 1.02$) than boys ($M = 3.17; SD = 1.21$), $t(183) = 2.52, p < .05$. Girls also gave the storyboard a higher general evaluation score than boys ($M = 7.32; SD = 1.08$ vs. $M = 6.53; SD = 1.53$, respectively), $t(183) = 3.93, p < .001$.

Likeability of slogans

Due to the length of the questionnaire and time restrictions (50 minutes per class), 67 participants were unable to evaluate the last two slogans. Using the responses of the remaining 118 participants (71 boys, 47 girls), a repeated measures analysis on attitude towards both slogans, with gender as a between-subjects factor, showed that the slogan "Who gets screwed without a condom anyway?" was evaluated more positively by both boys and girls ($M = 3.65; SD = 0.63$) than the slogan "Who does it without a condom anyway" ($M = 3.47; SD = 0.63$), $F(1, 116) = 5.81, p < .05$. This preference for the explicit and potentially controversial slogan was also reflected in the general evaluation score ($M = 7.24; SD = 1.67$ vs. $M = 6.23; SD = 1.71$, respectively), $F(1, 112) = 33.70, p < .05$.

Discussion

Over the years, research has emphasized the importance of using campaign materials with a strong theoretical and empirical basis (Bartholomew et al., 2006; Michie & Abraham, 2004; Sheeran et al., 1999). The present study supports this framework but also extends this proposition. To illustrate the practical feasibility of *experimental* pretesting, a television commercial was tested during its developmental phase on predetermined objectives. Objectives included an increased motivation to engage in safe sex, a greater sense of personal responsibility with respect to the use of condoms and increased risk perception for STI and HIV infection. The results show that exposure to the storyline of the television commercial produced a positive effect on risk perception. Unfortunately, this effect was restricted to girls. The storyline also had a positive effect on the intention to buy and carry condoms and on the intention to take initiative in discussing condom use before having

sex. These findings suggest a positive effect of the exposure of the television commercial on important determinants of safe sex behaviour among young people. It is likely that the positive effects are the result of an effective material design in which real life situations, with which young people can identify, are presented. Studies have shown that the degree to which one can imagine themselves in the same situation facilitates the effect of scenario information on risk perception and motivation to act (Broemer, 2004).

Despite the above-mentioned positive effects, the storyline failed to elicit a positive effect on the following outcome variables: perceived personal responsibility, intentions to use condoms with new partners, and anticipated regret. The lack of significant effects on these outcome measures could be the result of possible ceiling effects. High average scores across conditions suggest that the participants were already aware of the fact that safe sexual behaviour is a personal matter and that unsafe sex can affect their mental and physical well-being, especially when it comes to sex with a new partner. The storyline appeared to be ineffective in promoting the motivation to consistently use condoms with known partners. Higher average scores on attitude and intention towards condom use with new, as compared to known, partners suggests that safe sex is considered more important when having sex with a new partner. Given the high turnover rates of relationships among young people (Corbin & Fromme, 2002), it would be advantageous to address this issue more specifically in future campaigns. The lack of significant effects of exposure on measures of self-efficacy corresponds with previously reported studies that claim that self-efficacy and skills can best be developed using individual, hands-on training programs in instructive settings where the provision of feedback is possible (Bandura, 1997).

Likeability measures are helpful in determining the degree to which participants approve of campaign materials and, in this case, participants evaluated the commercial positively. Likeability measures have even more value when alternative versions are compared. The present study compared two slogans that differed with respect to word usage. One was more explicit and controversial than the other. Our findings clearly showed that young people preferred the slogan with the directly formulated text ("Who gets screwed without a condom anyway") as opposed to the less offensive text ("Who does it without a condom anyway?").

Our findings in this experimental pretest study have important practical implications. One of the most interesting effects of this experimental pretest is that the campaign designers decided to create two different scenarios for the TV commercial to accommodate the gender differences reported in the pretest. That is, two different TV commercials were

developed and broadcasted, one in which a girl gets an STI, and another version in which a boy ends up with a STI. Also, as a result of participants' support for the more explicit slogan, the campaign team decided to keep the direct slogan but sought a means by which potential controversy could be avoided. In the end, the auditory and visual presentation of the word "screwed" was replaced with a beep sound and three dots ("...") in broadcasts on general TV channels. However, the original and explicit slogan was broadcasted without any censorship on channels that have young people as the primary audience, such as music channels. Finally, this experimental pretest promoted greater trust in the effectiveness of the television commercial among the campaign team. The positive effects of the storyline on determinants of safe sex behaviour, as demonstrated by this experimental pretest, motivated the campaign team to complete production by turning the storyboard into an actual television commercial. In contrast to previous campaigns, this commercial was released with strong empirical support for the effectiveness of the commercial in changing predetermined objectives.

Although experimental pretesting is important and offers empirical support for a campaign, some limitations of experimental pretesting do exist. Firstly, it is difficult to gauge the degree to which campaign materials have to be finalized before pretesting. The ideal, of course, would be to pretest materials in their final and definite form but this may be imprudent given the cost considerations and the chance that the materials may show negative results in the pretest. Finalizing a television commercial is a costly endeavour and thus the pretesting of the final product is, most often, not a feasible option. This was the case in our experimental pretest where the television commercial was presented in the form of a storyboard. Although the storyline was clear, no real characters were presented. It is possible that identification with the characters in the commercial could generate different effects than the storyboard. Nevertheless, knowledge about the effects of public campaign materials, even in an unfinished form, is essential and an experimental pretest is the only means by which causal links between the campaign material and outcome variables can be made.

A second practical consideration is the presence of time and financial constraints on the evaluation of campaign materials. The development and evaluation of new materials must often be conducted in a relatively short time frame and often with a limited budget. This was definitely the case in the present study and thus the reason why the pretest was only done in two schools with a limited number of participants. This limitation, unfortunately, reduces the generalizability of our findings.

We recommend that developers carefully plan evaluations during the development

stage in order to optimize campaign material evaluation results. According to the framework of Intervention Mapping (Bartholomew et al., 2006), which provides a systematic approach to intervention development, designing a new campaign begins with formulating clear goals and objectives that are derived from a systematic needs assessment procedure. Appropriate theory-based methods aimed at changing psychosocial determinants should be selected and translated into practical strategies. Consequently, these strategies should be pretested using both formative and summative research methods to get a reliable and valid indication whether the intervention works as intended in terms of, respectively, the communication process (e.g., acceptance, personal relevance, implementation feasibility) and the predetermined impact of the intervention on targeted outcome variables. In the phase of pretesting, formative research methods should precede summative methods so that the former can inform the latter, but also to avoid extra investments on the testing of materials that are not considered feasible by members of the target population and program implementers anyway irrespective of their effectiveness. We acknowledge that pretesting materials is not always easy to organize considering the time and financial management. For this reason, we suggest that campaign designers take this into consideration when planning and estimating new projects. Finally, the pretest results should be integrated in the final design and production of the intervention materials and the implementation and evaluation of the intervention program should be carefully planned.

Given the problems associated with drawing conclusions about the effects of campaigns, we argue that an experimental design is necessary. However, the plea to use an experimental design to evaluate campaign materials is not restricted to formative work (i.e., pretesting), we argue that experimental designs are also appropriate when planning outcome evaluations. It is far more difficult to satisfy the needs of an experimental design when the campaign has been broadcasted (e.g., selecting a suitable control condition, selecting an appropriate lag before expecting effects, matching populations; Hornik, 2002; Myhre & Flora, 2000; Yzer et al., 2000). The need to evaluate campaigns remains however. Next to the ideal experimental design, we suggest a pretest – posttest design. To control for possible so-called testing effects, a posttest-only group could be included. When both groups appear to have equal posttest means, the pretest – posttest differences can be attributed to the effect of the campaign instead of mere participation in the pretest assessment, under the assumption that both groups do not differ on other relevant factors. Another acceptable outcome evaluation strategy is a time-series design with various pretests and posttests (Yzer et al., 2000).

In summary, we recommend additional endeavours to further investigate the complementary role of experimental pretesting in the evaluation of campaign materials generated in the developmental stage of a campaign. There is a need for powerful research methods (i.e., experimental studies) to supplement the existing correlational and focus group research to guide the development of new effective materials (Strahan et al., 2002). This way, more accurate tests of the effectiveness of campaign strategies are established.

The present study has demonstrated that knowledge about the actual effects of materials, albeit in an unfinished form, offers valuable information for campaign developers. Despite the extra investment, in terms of time, money and organizational efforts, the practical and financial advantages of determining the effectiveness of materials prior to full implementation are significant. Experimental pretesting allows us to approximate the effectiveness of campaign materials and establish counterproductive or non-results prior to the investment of time and money in the final production and implementation of large-scale multimedia public health campaigns.

CHAPTER 3

Avoiding counterproductive results:

An experimental pretest of a harm reduction intervention
on attitude toward party drugs among users and non-users

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Abstract

In two experimental studies, the authors tested written health education materials on the personal acceptance of party drug use. Following a harm reduction strategy, the materials provided information on minimizing potential hazards associated with drug use. Among users and nonusers, potential aversive effects of these materials were examined on measures of attitude, intention, and outcome expectancy towards party drug use. Participants were recruited in the city centre of Maastricht, the Netherlands, in nightlife settings that were popular among young people. In the first experiment, a leaflet on ecstasy use was evaluated among ecstasy users and nonusers. Results showed no health promoting effects, nor counterproductive results on the outcome measures. In the second experiment, the effects of two different formats (leaflet vs. infocard) about two different kinds of party drugs (ecstasy vs. GHB) were compared within a nonusing population. Again, results showed no positive changes on the outcome measures towards ecstasy use as a result of exposure to the ecstasy materials. However, exposure to the GHB materials resulted into a more negative attitude towards GHB use (leaflet and infocard) and lower estimates of the likelihood of positive outcomes of use (infocard). The study's limitations and implications are discussed, including the need for experimental pretesting.

Introduction

Young people increasingly experiment with drugs in nightlife settings (Van Laar, Cruts, Verdurmen, & Van Ooyen, 2004). Party drugs include ecstasy (MDMA), cocaine, speed (amphetamine), LSD and GHB. The use of party drugs involves serious health risks. For example, in high doses ecstasy can interfere with the ability to regulate the body temperature. This can lead to an increase in body temperature, resulting in liver, kidney, and cardiovascular system failure (Roper-Miller & Goldberger, 1998). Despite legislation and policy regulations to prevent the use of party drugs, large proportions of young people circulating in party scenes are regular party drug users. Ecstasy use is the most popular party drug use. Studies in the Netherlands have shown prevalence of ecstasy use up to 64% at big dance events (ter Bogt & Engels, 2005; van de Wijngaart et al., 1997).

Strict regulations do not seem able to restrain young people from having access to party drugs, whereas health communications about the negative health consequences of party drugs do not seem sufficient to prevent their use. An alternative approach that has been suggested, therefore, is to inform drug users about how to minimize the potential hazards associated with drug use rather than solely discourage the use of drugs. These harm reduction approaches (Marlatt, 1998) are often met with public resistance. Political stakeholders and members from the lay community point at the seemingly hidden message in this type of health programmes, namely that 'drug use is tolerated' (Friedman & Touze, 2006; Sherman, 2006; Stopka, 2006). To date, most harm reduction strategies have been tested and implemented in the domain of HIV/AIDS by studying, for example, the effectiveness of negotiated safety agreements among gay men (Davidovich, de Wit, & Stroebe, 2004, 2006) and the prevention of HIV infections among injection drug users by syringe sharing (Wodak & Cooney, 2006).

Although harm reduction programmes have been repeatedly introduced as an effective means to provide users control over the health risks associated with party drug use (Duncan, Nicholson, Clifford, Hawkins, & Petosa, 1994; Uitermark & Cohen, 2005), no empirical tests to date are available of the effectiveness of programmes that tackle unsafe party drug use. Various promising interventions have been implemented, such as pill testing facilities at dance events and education on safer drug use (Benschop, Rabes, & Korf, 2002), but these have not been rigorously tested for effectiveness (Hunt, Trace, & Bewley-Taylor, 2003; Loxley et al., 2004). In addition, the little empirical evidence that is available is mainly garnered among people that are directly at risk, and not among those that are standing on the sideline and are indirectly confronted with the risk behaviour, such as visitors of dance events who do not use party drugs, but see many peers who do. The present study specifically addressed this latter question.

Avoiding counterproductive results

The health education materials tested in the present study are aimed at users of party drugs. The material is intended to be distributed within a wide range of nightlife settings where drug use can be expected. Because the materials are also presented on open display racks, nonusers might read the information. Therefore, developers of the materials intended to pretest the materials also among nonusers to investigate possible counterproductive results – in particular, results that would indicate a more positive attitude towards party drugs after having been exposed to the materials.

The fear for counterproductive effects is not without reason. In an experiment by Brewer (2003), participants either searched the Internet for information on party drugs (searchers) or for information on an unrelated topic (non-searchers). Comparing searchers to non-searchers, Brewer found increases in knowledge about ecstasy and speed, while attitudes towards these drugs became more permissive in the sense that benefits of these drugs (e.g., party drugs can be fun and safe, they enhance social events and help you to fit in) were less negatively evaluated. No effect of searching was found on intended drug use. Importantly for the present study, the reported effects on attitudinal beliefs were stronger for participants with no history of drug use than for those with a history. These findings point at the need to precede interventions with a careful analysis of their potential effects, also in populations that are not at direct risk.

Experimental pretesting

Empirical pretest research is necessary if we want to avoid the pitfalls of creating ineffective campaign materials, and thus should guide future initiatives (Atkin, 2002). In practice most pretesting is done using qualitative research methods such as interviews, focus groups and likeability measures. However, often these methods are semi-structured and, consequently, lack a reliable control group against which to compare and interpret the found effects. We therefore advocate for the complementary use of experimental methods to determine the effectiveness of new campaign materials (see Whittingham, Ruiter, Zimbile, & Kok, in press) which allows us to ascertain causal relationships between exposure to the campaign materials and their effects on targeted outcomes. In addition, knowing which strategies and materials are effective prior to the large scale implementation of a campaign is highly beneficial.

In the harm reduction literature, however, it is repeatedly argued that randomized

controlled trials of the effectiveness of harm reduction strategies are neither feasible nor ethical (Parsons et al., 2005; Wodak & Cooney, 2006). This criticism mainly concerns the experimental testing of alternative interventions on their effectiveness in reducing future harm. Ethical considerations may indeed limit such experimental tests as is the case when, for the study's sake, participants would be asked to take drugs in order to examine, for example, the effects of drinking extra amounts of non-alcoholic fluids on the number of those that are in need of medical help after ecstasy use. These objections do not hold for the testing of materials that are to be implemented as standard practice, which is the case for the materials tested in the present study.

The present study

The main goal of the present studies was to evaluate intervention materials aimed at minimizing potential negative health consequences associated with the use of party drugs. Specifically, we were interested whether exposure to the campaign materials resulted in more personal acceptance of the use of party drugs among young people with and without a history of drug use. Two randomized, controlled studies were conducted in which we tested the effects of exposure to the campaign materials on the attitude and intention towards party drug use and the perceived likelihood of positive and negative outcomes of use. The findings were intended to assist future implementation decisions on whether adaptation to the materials is necessary and how the education materials should be distributed. The present studies were approved by the Ethical Board of the School of Psychology at Maastricht University.

Experiment 1

In this experiment we tested the effect of a harm reduction leaflet on the level of personal acceptance of ecstasy use. To evaluate the leaflet on possible counterproductive results intention and outcome expectancies towards ecstasy use were tested among youngsters with and without a history of ecstasy use.

Method

Participants

Three female research assistants recruited participants in the city centre of Maastricht (the Netherlands) in nightlife settings that were popular among young people (bars and discotheques). Those who agreed to participate in “a study on testing health education materials” received a reminder on paper that mentioned the date and time of the appointment, and provided instructions on how to get to the laboratory and where to report upon entrance in the building. In total, 87 youngsters (49 male and 38 female) participated in the study. The mean age of the participants was 21.49 years ($SD = 2.45$, *range* 18 - 30). Furthermore, 9% of the participants had a low education level, 31% had an average level of education, and 60% had a high level of education. There is no information available on the number of people refusing study participation.

Procedure and design

Participants were visually separated from each other by means of panels. Participants started with signing an informed consent form that stated that they participated voluntarily, could stop at any moment during the study without providing a reason, and would be informed about the objectives of the study at the end of the session. Next, they were asked to fill out the first part of the questionnaire that measured demographic variables (e.g. sex, age), previous drug use, and attitudes and intention towards the use of ecstasy.

Then participants were randomly assigned to either the experimental condition or the control condition. In the experimental condition, participants were asked to thoroughly read a leaflet about ways to reduce health hazards as a result of ecstasy use. In the control condition, participants read a neutral text about going out in which drug-related words or themes were avoided. To provide sufficient time for reading, but to control for the time spent on reading, participants were given a maximum time of 20 minutes for reading¹. After reading the materials, the second part of the questionnaire was administered with measures of attitude and intention towards ecstasy use, and of beliefs about the expected outcomes of ecstasy use (outcome expectancies), which for ecstasy have been found related to actual use (Engels & ter Bogt, 2004). Participants received a gift voucher of 12 Euros for their participation.

¹ A pilot test was performed to measure the time it would take participants to read the text. This was in average 15 to 20 minutes. Consequently, we decided give each participant the opportunity to read the text in 20 minutes. This way, we control for the time spent reading.

Materials

The test material was a newly developed leaflet about ecstasy use that is part of the national campaign “Uitgaan & Drugs” of the Trimbos Institute (the Netherlands). The leaflet contained just above 1200 words and was folded to credit card format. On eight double-sided pages, the leaflet provided elaborate information about the effects and risks related to ecstasy use and specific tips about how to use the drug in a safer way. The text includes information about physiological effects (e.g., “Ecstasy stimulates substances in your brain that give you more energy”); psychological benefits (e.g., “The positive effects of ecstasy are feeling happy and feeling less inhibited”); and health risks in the short- and long-term (e.g., “You can’t see from the outside what the content of the pill is”; “Ecstasy use can result in brain damage”). Furthermore, the leaflet includes specific recommendations on how to use drugs in a safer way (e.g., “Make sure to drink enough water while using ecstasy”) and how to react in emergencies (e.g., “Is the person unconscious? Call 112 and turn the person on his side to prevent choking”). At different places in the leaflet the text explicitly states that drug use always implies risks and safe use of drugs can never be guaranteed.

Measures

Drug use. Drug use was measured with a single question (“Have you used ecstasy or MDMA) within the last six months?” *yes – no*).

The measures used for the selected psychosocial determinants together with their inter-item reliability scores are described in Table I. Scores on related items were averaged to a mean score. Attitude and intention towards ecstasy use were measured at both the pretest and posttest. Participant’s beliefs about the effects of ecstasy use (i.e., outcome expectancies) were derived from qualitative and quantitative studies among young people into the reasons for drug use (Boys & Marsden, 2003; Boys et al., 1999; Engels & ter Bogt, 2004; ter Bogt & Engels, 2005) and measured in the post-test only.

Scores were recoded such that higher scores represent a higher perceived likelihood of the outcomes to occur.

Table I: Summaries of sample items and the reliability scores of Study I and II

Experiment 1			
Sample items	Items	Cronbach's alpha pretest	Cronbach's alpha posttest
Attitude (1 = <i>very negative</i> , 5 = <i>very positive</i>)	4	.83	.95
I consider ecstasy use when I go out: bad–good, unsafe–safe, negative-positive, stupid-smart			
Intention (1= <i>surely not</i> , 5 = <i>surely yes</i>)	3	.97	.96
I expect to use party drugs within the coming month			
Outcome expectancies (1 = <i>very likely to occur</i> , 4 = <i>very unlikely to occur</i>)			
Negative: After using ecstasy you have a hangover	7	-	.85
Positive: After using ecstasy you can dance all night long	5	-	.67
Experiment 2			
Attitude (ecstasy) (1 = <i>very negative</i> , 7 = <i>very positive</i>)	7	.83	.95
I consider ecstasy use when I go out: bad–good, unsafe–safe, negative-positive, stupid-smart			
Intention (ecstasy) (1= <i>surely not</i> , 7 = <i>surely yes</i>)	1	-	-
I intend to use ecstasy within the coming month			
Outcome expectancies (ecstasy) (1 = <i>very likely to occur</i> , 4 = <i>very unlikely to occur</i>)			
Negative: After using ecstasy you have a hangover	11	-	.91
Positive: After using ecstasy you can dance all night long	11	-	.93
Attitude (GHB)	7	.75	.81
I consider GHB use when I go out: bad–good, unsafe–safe, negative-positive, stupid-smart			
Intention (GHB)	1	-	-
I intend to use GHB within the coming month			
Outcome expectancies (GHB) (1 = <i>very likely to occur</i> , 4 = <i>very unlikely to occur</i>)	3	-	.93
Negative: GHB use may cause loss of consciousness	10	-	.96
Positive: GHB use makes you feel good			

Results

Drug use. In total, 37 participants indicated to have used ecstasy within the last six months. These participants were entered in the following analyses as users. There were no differences in the distribution of users (19 in the experimental condition and 18 in the control condition) and nonusers (27 experimental condition, 23 control condition) across the experimental conditions, $\chi^2(1, N = 87) = .02, p = .88$.

Attitude. A 2 (condition) x 2 (use) analysis of variance on the attitude towards ecstasy use with the pretest measure included as a covariate (ANCOVA) revealed no significant main effect of condition, $F < 1$, nor a significant interaction of condition with use at a significance level of $p < .05$, $F(1, 82) = 1.27, ns$ (see Table I for the mean scores). Not surprisingly, a significant effect of use was found $F(1, 82) = 9.41, p < .05, \eta_p^2 = .10$. That is, users showed a more positive attitude towards ecstasy use ($M = 3.41, SD = 0.64$) than non users ($M = 1.88, SD = 0.88$).

Intention. An ANCOVA on the intention towards ecstasy use with the pretest measure as covariate revealed no significant support for the effect of condition and its interaction with use, $F_s < 1.52, ns$ (see Table II). The main effect of use suggested that users had a more positive intention to use ecstasy in the future ($M = 3.72, SD = 1.23$) than nonusers ($M = 1.24, SD = 0.67$).

Outcome expectancies. An univariate ANOVA on positive outcome expectancies found no significant effects of condition, use and their interaction, $F_s < 1.56, ns$ (see Table I). On the measure of negative outcome expectancies a main effect of use was found, $F(1, 83) = 24.57, p < .001, \eta_p^2 = .23$, that was qualified by an interaction with condition, $F(1, 83) = 5.55, p < .05, \eta_p^2 = .06$ (see Table II). Simple effect analyses revealed that the only significant effect was that of use in the control conditions, $F(1, 85) = 25.06, p < .001$. Within these conditions, ecstasy users believed the occurrence of negative outcomes after ecstasy use as less likely than nonusers. The effect of use was not significant in the experimental condition, nor was the effect of condition in both use conditions, $F_s < 2.65, ns$.

Table II: Mean scores (SD) on attitude, intention and positive and negative outcome expectancies towards ecstasy use as a function of experimental condition and use at pretest and posttest

	Control				Experimental			
	Nonusers		Users		Nonusers		Users	
	N = 27		N = 19		N = 23		N = 18	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Attitude	1.81 (0.81)	1.75 (0.84)	3.43 (0.52)	3.33 (0.66)	2.16 (1.00)	1.98 (0.90)	3.33 (0.54)	3.47 (0.63)
Intention	1.21 (0.77)	1.23 (0.84)	3.72 (1.26)	3.52 (1.37)	1.19 (0.38)	1.25 (0.50)	3.81 (1.07)	3.88 (1.09)
Positive outcome expectancies	-	4.35 (0.42)	-	4.36 (0.43)	-	4.44 (0.45)	-	4.50 (0.43)
Negative outcome expectancies	-	4.36 (0.36)	-	3.60 (0.42)	-	4.11 (0.55)	-	3.84 (0.55)

Discussion

The findings provided no evidence for aversive effects of extensive harm reduction information. In addition, there were no health promoting (e.g., having a more negative attitude towards ecstasy use) after reading the leaflet for users, nor nonusers. One reason for this lack of a health promotion effect for users might be that preventing future harm rather than preventing future ecstasy use was the main objective of the health education information. Secondly, youngsters, especially users, are already aware of the effects and possible risks of ecstasy use (Krosnick & Petty, 1995; Petty & Cacioppo, 1984). Thirdly, the lack of results might be due to the presentation format. The lengthy presentation of the leaflet might be too elaborate, which causes readers to read less carefully and thus lowers the persuasive impact the provided information can have (Kools et al., 2004; Kools, Ruiter, van de Wiel, & Kok, in press; Kools, van de Wiel, Ruiter, Cruts et al., 2006; Kools, van de Wiel, Ruiter, & Kok, 2006).

For these reasons, we designed a second experiment in which we tested the effect of a shorter format version of the campaign material (i.e., infocard) and included information on a less known party drug (i.e., GHB).

Experiment 2

In this experiment we tested the effect of the leaflet against that of the infocard on personal acceptance of a well-known party drug (ecstasy) and a less known party drug (GHB). Furthermore, the materials were evaluated among nonusers only ¹.

Method

Participants

Similar to Experiment 1, three research assistants recruited participants in the city centre of Maastricht (the Netherlands) in nightlife settings that were popular among young people. In total, 161 youngsters (71 male and 89 female) participated in the study. The mean age of the participants was 20.61 years ($SD = 3.29$, *range* 16 - 30). Of the participants 13% had a low education level, 38% had an average level of education, and 48% had a high level of education. There is no information available on the number of people refusing study participation.

Material

Of each material format (leaflet vs. infocard) two versions were used, one about ecstasy use and one about GHB use. For ecstasy use, the same leaflet was used as in Experiment 1. The leaflet about GHB use contained similar information, except that the information was adapted to GHB use. The infocards about ecstasy and GHB use also provided information about the risks of the specific drug and general tips for safe clubbing and safer drug use, however the text length was significantly reduced to approximately 400 words (vs. approximately 1200 words for the leaflets). The infocards further referred to a website where more specific information could be found.

Design

Participants were randomly assigned to one of three material conditions: 1) infocard, 2) leaflet; and 3) neutral information (control)². In the infocard and leaflet conditions, half of

1 We planned to evaluate the materials also among users, but were not able to recruit sufficient users of ecstasy ($n = 44$) and particularly GHB ($n = 7$) to do reliable statistical tests on both users and nonusers. Therefore we decided to remove all participants with experience with drug use from the data analyses.

2 Participants in the control condition received a neutral text about going out in which drug-related words or themes were avoided, and answered questions that measured the personal acceptance of both ecstasy and GHB use.

the participants read information about ecstasy use, whereas the other half read information about GHB use.

Procedure and Measures

The same procedure as Experiment 1 was used. Depending on the condition to which the participants were assigned to, participants were then given either the leaflet or infocard about either ecstasy or GHB, or received the neutral text. Also, depending on the condition the questionnaire consisted of ecstasy or GHB related items. The measures used for the selected psychosocial determinants together with their inter-item reliability scores are described in Table I.

Results

Ecstasy

On the attitude measure, no significant effect of material condition was found, $F(2, 91) = 1.12$, *ns*. Nor were there differences found between the materials conditions on the measure of intention to use ecstasy, $F < 1$, positive outcome expectancies, $F(2, 93) = 2.30$, *ns*, and negative outcome expectancies, $F < 1$. Tables III and IV present the mean scores on the outcome variables for respectively ecstasy and GHB use.

GHB

A strong significant effect of material condition was found on the attitude towards GHB use, $F(2, 98) = 11.70$, $p < .001$. Post-hoc comparisons revealed significant differences between the infocard condition and the leaflet condition, and between the infocard and the control conditions ($p < .001$). Participants who read the infocard reported a more negative attitude towards GHB use than those who read the leaflet or the neutral text. There was no difference in the control condition, $p = .98$. In addition, differences between the material conditions were found on positive outcome expectancies, $F(2, 100) = 8.29$, $p < .001$. Post-hoc comparisons revealed significant differences between the infocard condition and the leaflet condition ($p < .01$), and between the infocard and the control conditions ($p < .001$). Participants who read the infocard estimated that positive outcomes after GHB use were less likely than participants who read the leaflet or the neutral text. There was no difference between participants who read the leaflet and those in the control condition ($p = .56$). Finally, no differences among the conditions were found on the intention to use GHB, $F < 1$, or on the measure of negative outcome expectancies, $F(2, 100) = 2.27$, *ns*.

Table III: Effects of materials on attitude, intention and positive and negative outcome expectancies towards ecstasy use (means and standard deviations at pretest and posttest)

	Infocard		Leaflet		Control	
	N = 31		N = 27		N = 38	
	Pre	Post	Pre	Post	Pre	Post
Attitude	1.38	1.46	1.55	1.93	1.99	2.09
	1.40	1.73	1.10	1.12	1.21	1.31
Intention	1.55	1.55	1.22	1.22	1.43	1.51
	0.81	1.85	0.51	0.42	0.77	0.87
Positive outcome expectancies	-	2.85	-	3.05	-	3.02
	-	0.32	-	0.43	-	0.39
Negative outcome expectancies	-	3.06	-	2.98	-	3.13
	-	0.34	-	0.46	-	0.43

Table IV: Effects of materials on attitude, intention and positive and negative outcome expectancies towards GHB use (means and standard deviations at pretest and posttest)

	Infocard		Leaflet		Control	
	N = 32		N = 35		N = 38	
	Pre	Post	Pre	Post	Pre	Post
Attitude	1.97	0.94	2.10	2.11	1.83	1.92
	1.25	1.14	1.45	1.65	1.10	1.11
Intention	1.53	1.37	1.77	1.66	1.32	1.32
	0.90	0.76	0.91	0.84	0.71	0.67
Positive outcome expectancies	-	2.72	-	3.05	-	3.11
	-	0.54	-	0.32	-	0.37
Negative outcome expectancies	-	3.46	-	3.18	-	3.31
	-	0.54	-	0.57	-	0.50

General discussion

As in Experiment 1, the second experiment did not show any counterproductive effects of exposing young people to health education material that provided information about how to minimize the potential hazards associated with drug use rather than solely discouraging the use of drugs on the personal acceptance of party drug use – not for an unknown drug (GHB) and not for a well known drug (ecstasy). These findings thus once more confirm that harm reduction materials do not likely result into more acceptance of undesired or risky behaviours.

With regard to ecstasy use, no health promoting effects of the materials in Experiment 2 were found as compared with the condition that received a neutral text about going out. However, when providing information about GHB use, significant differences between the material conditions on measures of attitude and positive outcome expectancies occur. People who read the infocard reported a more negative attitude towards GHB use and thought positive outcomes of GHB use as less likely than those who read the leaflet or the neutral text.

The findings of both experimental studies thus suggest that infocards might indeed have more persuasive impact than leaflets, presumably due to a more concise wording of the same message, and that in case there is a lot of knowledge present in the target population, which is true for ecstasy and not for GHB, it becomes more difficult to elicit differences. However, the lack of health promotion effects on the measures of intention for both ecstasy use and GHB use, might indeed suggest that harm reduction information serves the goal of preventing future harm rather than preventing future use.

The findings of both experimental studies thus suggest that infocards might indeed have more persuasive impact than leaflets, presumably due to a more concise wording of the same message, and that in case there is a lot of knowledge present in the target population, which is true for ecstasy and not for GHB, it becomes more difficult to elicit differences. However, the lack of health promotion effects on the measures of intention for both ecstasy use and GHB use, might indeed suggest that harm reduction information serves the goal of preventing future harm rather than preventing future use.

Our findings in these experimental pretest studies have important practical implications for the implementation of the tested materials. First, as there were no counterproductive results found, the campaign team gained more certainty about possible distribution of the materials, which could also be in locations where nonusers have access to the materials. However, because we are still uncertain about possible long-term (side-) effects caution seems to be warranted and therefore distribution should preferably take place in

nightlife settings where drug use is a common phenomenon. A second important finding is the distinct effects for the infocard and the leaflet. The infocard elicited more pronounced effects than the leaflet. A simple explanation for this effect is that more lengthy information is not necessarily more effective. We suggest that future research should include more specific measures that are capable of testing the relative impact of compact vs. elaborated information formats on persuasion and tracking the cognitive processes mediating these effects (e.g., extent of systematic information processing).

A limitation of the present study is that there was no (follow-up) measurement of actual behaviour. However, the lack of effects on the intention measures suggests that a possible effect on behaviour would only be weak. Another limitation is that the materials were evaluated in a laboratory setting. Therefore, we are not able to draw clear conclusions on the effects of the materials in real life settings (e.g. when materials would be spread on venues and parties). Finally, future studies may test specific theory-based strategies to further improve the materials, for example to test theory-based methods for changing specific proximal determinants of health behaviour, among which risk perceptions and people's confidence in performing health promoting behaviour. These concepts have been found important, for example, in a recent study into the determinants of ecstasy use among users, nonusers and ex-users (Peters, Kok, Abraham, & Bartholomew, 2006), and generally in promoting health behaviour (Conner & Norman, 2005).

In conclusion, experimental pretesting allows us to approximate the effectiveness of campaign materials. These insights may provide important information to campaign developers about the further development and implementation of health education materials, and thus contribute to the effectiveness of campaign strategies on reducing risk behaviour.

CHAPTER 4

Designing effective health education materials:

Experimental pretesting of a theory-based brochure to increase knowledge

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Abstract

The aim of this study is to demonstrate the usefulness of developing health education materials with a theoretical and empirical research basis. With a specific focus on increasing knowledge, the authors utilized well-researched principles in cognitive psychology to increase the message comprehension of an existing health education brochure. The brochure used was produced by a Dutch national campaign office for preventing alcohol abuse among undergraduate students. In two experimental studies, the original version of the brochure was compared with the theory-based modified version on measures of knowledge and psychosocial determinants of alcohol use among undergraduate university students. The results show significant differences in knowledge uptake between the two versions. In both experiments, the modified version elicited higher scores on knowledge uptake than the original version. These findings underscore the importance of theory in the design of health education brochures. Despite these positive findings, no differences in more proximal psychosocial determinants of behaviour could be found. As a result, the authors conclude that principles in cognitive psychology should be complemented by determinant-specific theory-driven change methods if behaviour change is to occur.

Introduction

Numerous studies have identified important psychosocial determinants of health behaviour. These studies provide significant empirical support for explanatory models of behaviour such as the theory of planned behaviour (Ajzen, 1991), the protection motivation theory (Rogers & Prentice Dunn, 1997) and social-cognitive theory (Bandura, 1986, 1998). Additionally, many studies have investigated the effects of psychosocial health interventions on both determinants of behaviour and on actual health behaviour. Despite the vast array of research on psychosocial determinants of health behaviour and the effectiveness of psychosocial health interventions in creating behavioural change, little is known about the determinant-specific behavioural change methods that have been used in effective health interventions. In many cases, we do not know which specific determinants actually impact health behaviour.

In this paper, we focus on the determinant of knowledge as knowledge is the central foundation of more proximal psychosocial determinants of precautionary motivation and self-protective action, such as attitude, subjective norm and self-efficacy (Conner & Norman, 2005). In two experimental studies, we test specific theory-based methods on their effectiveness in increasing knowledge levels of undergraduate university students following the reading of health information. On a more fundamental level, this paper aims to illustrate the merits of combining theory and experimental research in developing effective health education materials. This was attempted by bridging a gap between two general areas of research, specifically that of the persuasion domain and then specifically health education, and cognitive-psychological research regarding cognitive ergonomics (for a similar approach, see recent work by Kools and colleagues (Kools et al., 2004; Kools, Ruiter, van de Wiel, & Kok, 2007; Kools, van de Wiel, Ruiter, Cruts et al., 2006; Kools, van de Wiel, Ruiter, & Kok, 2006).

Systematic intervention development

Research has shown that theory-based health campaign materials contribute positively to the effectiveness of campaign materials (Fishbein, Cappella et al., 2002; Fishbein, Hall Jamieson et al., 2002; Fishbein & Yzer, 2003; McGuire, 1985; Michie & Abraham, 2004). According to the framework of Intervention Mapping (Bartholomew et al., 2006), which provides a systematic approach to intervention development, designing a new campaign begins with formulating clear goals and objectives that are derived from a systematic needs assessment procedure. Appropriate theory-based methods aimed at changing psychosocial determinants should be selected and translated into practical strategies, which

are then combined to form the final intervention program (Kok et al., 1996; Kok et al., 2004).

Theoretical methods in health interventions are easily overlooked. Instead of focusing on developing campaign materials in line with theoretical notions on the optimal use of the materials, program designers often times focus on the actual and concrete campaign materials, such as a health brochure or a TV commercial (Kok et al., 2004). It is important to consider both the theoretical method and the practical strategy. That is, the conditions or parameters of the method should be fulfilled if the strategy is to be effective.

Experimental pretesting

It is important that reliable conclusions about the potential effectiveness of the developed materials in influencing predetermined objectives be established prior to the final production of health education materials and the large-scale implementation of the intervention program. Although a) measures of acceptability with respect to the chosen strategies; and b) knowledge about the effectiveness of theoretically designed change strategies on predetermined determinants are important, these considerations alone are insufficient. It is thus essential that a well-designed experiment be conducted, wherein sufficient controls for the influence of uncontrolled 'third' variables (Foxcroft, Lister-Sharp, & Lowe, 1997; Rossi et al., 1999) are present. Internally valid measures of outcome variables are also necessary (Kools, van de Wiel, Ruiter, Cruts, et al., 2006; Michie & Abraham, 2004). Conducting such an experiment provides program designers with the information and tools necessary to make evidence-based decisions for the further creative development and implementation of the intervention program.

Increasing knowledge by optimizing information processing

The present study concentrates on methods aimed to improve knowledge levels using a health education brochure. Knowledge is often the core determinant of health education campaigns. Knowledge as a determinant is of additional importance as proximal determinants of health behaviour, such as attitude, subjective norm, risk perception, and self-efficacy, often begin with knowledge (Bartholomew et al., 2006; Conner & Norman, 2005). Although brochures are a widespread campaign medium in health education practice, little systematic research has been done with respect to the effectiveness of brochure design in increasing comprehension levels (for exceptions, see Kools et al., 2004; Kools, van de Wiel, Ruiter, Cruts, et al., 2006). Program designers are thus poorly informed with respect to which methods for designing brochures are effective and which are not. It is

imperative that we understand which design methods are effective and which specific methods optimize information uptake in readers. Evidently, a more systematic approach to health education brochure design is necessary.

Many cognitive psychological theories describe the way new information is processed. Many also describe techniques for improving the processes by which new information is added to the existing knowledge base of the reader (Kintsch, 1988). Principles such as text coherence (Kintsch, 1998), the integration of text and pictures (Paivio, 1971; Sweller, van Merriënboer, & Paas, 1998), and highlighting of important features of the text (Treisman & Gelade, 1980) all positively contribute to text comprehension and might thus be useful in designing an information brochure. These principles will be briefly introduced below. The actual changes made to the health education brochure will be described later.

Text coherence

Text comprehension is related to the degree to which the information in the text becomes part of the readers personal knowledge base (Kintsch, 1988). Readers attempt to comprehend a text by seeking links between the new information and their own prior knowledge. This is a process of inference which takes place in working memory. Unfortunately, working memory has a limited capacity. However, when readers understand the information, a successful connection is made between the new information and prior knowledge and this link is then stored in the personal knowledge base in long term memory (Baddeley, 1986). It is important to note that inference processes are assumed to make relatively heavy demands on the cognitive resources of the reader, and, hence, interfere with text comprehension.

Text coherence is the logical and consistent structure of a text (Kintsch, 1988). A text can be coherent on two levels, namely the macro-level and micro-level (McNamara, Kintsch, Songer, & Kintsch, 1996). A text is coherent at the macro-level when the topics in the text follow a logical order. Headings, for example, can facilitate coherence at the macro-level because the structure of the text is made clear and easy to follow. A text is coherent at the micro-level if, within a paragraph, each sentence is explicitly related to the next. This can be done by inserting connections between sentences, by starting a sentence with previously mentioned information, and by mentioning the author of the verbs explicitly (for an overview, see Kools et al., 2004).

Illustrations

According to the dual code theory (Paivio, 1971), there are two cognitive subsystems that process information, namely a verbal and a visual system. The dual code theory claims that readers are best able to build connections between these two systems when the corresponding text and picture are in the working memory at the same time (Baddeley, 1986). Further, written materials can differ with respect to how easily information can be processed in the working memory. This is called working memory load (Sweller et al., 1998). Material that can be easily held in the working memory is also easy to understand. A principle derived from this theory is that information is better recognized or recalled when presented in both a verbal and a visual manner. Research has shown that combining text with illustrations increases recollection and comprehension of the information (Gyselinck & Tardieu, 1999). The extent to which an illustration is comprehended depends also on the properties of the illustration (Vekiri, 2002). An important property of an illustration is a clear reference, in the text, to the illustration.

Pop out effects

In order to be comprehended and remembered, an item or text should receive sufficient attention. Research has shown that when the mind conducts a visual search, such as the scanning of a text, items that do not match the specific features of the surrounding environment, such as color, shape or form, pop out and draw attention (Treisman & Gelade, 1980). This implies that important headings or pieces of text should be different from the rest of the text. These parts of the text should pop out. A practical example of this is a website address. When the address 'pops out' of the regular text, by means of a different size and/or font, it is more likely to get attention and thus be remembered.

The present study

The main goal of the present study is to show the merits of designing health education materials that are aligned with theoretical notions about the conditions under which health information is effective in influencing determinants of behaviour. To do this, two randomized experimental studies were conducted to compare the effects of a) an existing brochure; b) a modified, theory-based version of the same brochure; and c) no brochure (control group). Conclusions presented here are based on these randomized experiments and on objective measures of the main outcome variable, namely knowledge uptake.

Our expectation was that the theory-based brochure would generate better uptake of information than the original brochure. We thus expected that readers of the modified

brochure would show higher knowledge scores on open-ended questions than readers of the original brochure, and that both brochure groups would score higher than the control group. The original brochure provides undergraduate university students information on the health consequences of alcohol abuse. Given that the original brochure not only aimed to increase knowledge but also to increase risk perception and promote attitudes and intention to moderate alcohol use, we decided to include measures of psychosocial determinants of moderate alcohol use in the present study as well.

Further, the present study was approved by the Ethical Board of the Faculty Psychology at Maastricht University.

Experiment 1

Method

Participants and design

In total, 75 first-year university students participated in the study (61 female; 14 male). Participants were recruited using sign-up forms located on campus. The mean age of the participants was 20.11 years ($SD = 1.81$). Participants were randomly assigned to one of three conditions: a) the original brochure; b) the modified brochure; or c) the control condition. Participants received course credits or a gift voucher of 12 Euros for their participation.

Material

The test material was an existing health education brochure on moderate alcohol use among undergraduate university students. The brochure was developed by the Netherlands Institute for Health Promotion and Disease Prevention (NIGZ). This national organization is responsible for developing public health campaigns that aim to prevent alcohol abuse in different segments of the national population, among which the undergraduate student population. The brochure is distributed among all first-year undergraduate students in the Netherlands at the beginning of the academic year. As a general rule, the original brochure provides factual information on the health consequences of alcohol abuse. Different chapters describe, for example, the effects of alcohol on the brain, body and health in general. The final chapter advises students to use alcohol moderately. Specifically, students are advised to consume less than 6 glasses of alcohol on a given night out. Due to the length of the original brochure (28 pages), specific chapters were selected for

testing. The chapters selected were the chapters considered most informative. In total, 19 pages of text were selected and redesigned in an effort to optimize comprehension of the presented information. In doing this, we expect to see an increase in knowledge uptake.

Prior to modification of the original brochure, a small sample of undergraduate students (N=10) were approached and asked to read all 28 pages of the original brochure. We asked this group to identify the passages they did not understand or found to be unclear. In doing this, sections of the original brochure in need of revision were identified. The information gathered from this sample corresponded significantly with the authors' own ideas about what needed to be revised.

Changes were made to the original brochure in accordance with the theoretical principles for increasing text comprehension mentioned earlier. It is important to note that the length of the brochure sections were not modified as that would have made it difficult to determine whether effects demonstrated were due to changes in the length of the brochure or due to changes made based on theoretical concepts. The following changes were made: First and foremost, text coherence was optimized by applying specific writing techniques (Britton & Gulgoz, 1991; Kools et al., 2004; Rudd, Kaphingst, Colton, Gregoire, & Hyde, 2004). This was done on the basis of the construction-integration theory (Kintsch, 1988) and was imperative as the brochure consisted of large sections of text. In order to increase text coherence, ambiguous pronouns were replaced by nouns. For example, "it is dangerous" was replaced with "alcohol is dangerous". Additionally, argument overlap was increased by using words or terms from a previous sentence in the subsequent sentence. This makes it easier for readers to relate new information to old information. We also inserted connections between sentences, such as words like "following" and "consequently", to explain relations between sentences. Further, sentences were revised in such a way that many sentences presenting new information were prefaced with information mentioned earlier in the brochure. Lastly, in the modified version of the brochure, sentences were changed so that the subject of verbs was stated explicitly. This means that sentences such as "it causes a hangover" were rewritten in following manner: "alcohol causes a hangover".

In addition to increasing text coherence, we also integrated illustrations and text as research has shown that information is better comprehended when these two are combined (Sweller et al., 1998). We thus inserted pictures into the brochure section that discusses the effects of a hangover on the brain, with a clear reference to the picture in the text (see Figure I).

Figure I: Illustration of the integration of image and text.

Original brochure	
	A muzzy feeling; listlessness; pounding headache; tendency to vomit; dry tongue and the enormous thirst after a night out are familiar symptoms of a hangover. A hangover is caused by different factors. Dehydration due to alcohol is the main factor. Alcohol dispels fluid. Alcohol promotes the production of Anti Diuretical Hormone. As a result, the kidneys are required to work harder, and this causes the body to loose more fluid than normal. Also, between your brain and your skull there is thin layer of fluid. When alcohol is consumed, this fluid is withdrawn resulting in a pounding headache, which you feel the following day. This is your brain bumping against the skull.
Modified brochure	
Production of anti-diuretical hormone	A muzzy feeling; listlessness; pounding headache; tendency to vomit; dry tongue and the enormous thirst after a night out are familiar symptoms of a hangover. A hangover is caused by different factors. Dehydration due to alcohol is the main factor. Alcohol dispels fluid. Alcohol promotes the production of Anti Diuretical Hormone. As a result, the kidneys are required to work harder, and this causing the body to loose more fluid. Also, between your brain and your skull there is thin layer of fluid. When alcohol is consumed, this fluid is withdrawn resulting in a pounding headache, which you feel the following day. This is your brain bumping against the skull.
Kidneys have to work harder	
Urine production increases	
Loss of fluid	

Following modifications to increase text coherence and the integration of text and illustrations, important sections of text were highlighted in accordance with the feature-integration theory (Treisman & Gelade, 1980). For example, in the original version of the brochure a link to a website was incorporated in the text and presented in the same font as the rest of the text. In the revised version, the link was presented in a larger and bolder font. By doing this, more attention was drawn to the website link, thereby increasing the likelihood that the link would be remembered by readers. This example is illustrated in Figure II.

Figure II: An illustration of the pop-out effect of the website address

Original brochure
<p>The alcohol quiz is part of the student campaign. We invite every first-year student to do the quiz. The questions can be found on the participant form on the cover of this brochure. Mark your answers and send the form (postage is already paid). This brochure will help you to answer the questions. If the form is missing from your brochure you can participate by going to www.ikbenzatenwiebenjij.nl. The quiz ends on December 1, 2004.</p> <p>If you have answered all the questions correctly, you are eligible for a national first prize of 1000 euros. The recipient of this prize will be determined by a raffle. Among the other participants that have answered correctly, 1000 T-shirts with the text "I am drunk... and who are you?" will be raffled. The prize winners will be notified before January 1, 2005.</p>
Modified brochure
<p>The alcohol quiz is part of the student campaign. We invite every first-year student to do the quiz. The questions can be found on the participant form on the cover of this brochure. Mark your answers and send the form (postage is already paid). This brochure will help you to answer the questions. If the form is missing from your brochure you can participate by going to:</p> <p style="text-align: center;">www.ikbenzatenwiebenjij.nl</p> <p>The quiz ends on December 1, 2004.</p> <p>If you have answered all the questions correctly, you are eligible for a national first prize of 1000 euros. The recipient of this prize will be determined by a raffle. Among the other participants that have answered correctly, 1000 T-shirts with the text "I am drunk... and who are you?" will be raffled. The prize winners will be notified before January 1, 2005.</p>

Procedure

Once participants were recruited, they were invited to come to the laboratory where they were informed about the experiment and asked to sign an informed consent. Participants of all three groups were asked to first fill in a questionnaire that measures their actual alcohol drinking behaviour. Following this, participants in the original and modified brochure conditions were required to read either the original or the modified brochure, depending on the group in which they were assigned. To control for the time spent on reading, each participant was given a maximum of 20 minutes to read the text. After reading the brochure, participants of the original and modified brochure conditions completed a second questionnaire that consisted of two parts: a) close-ended questions intended to measure psychosocial determinants of alcohol behaviour; and b) open-ended questions

that measure knowledge on alcohol use and the possible effects of alcohol abuse. We measured knowledge at the end of the experiment to avoid pure information reproduction. By creating time between the reading of the brochure and the open-ended questions on knowledge, we decreased the likelihood that the information was still in the working memory. In this fashion, actual knowledge uptake could be measured. Participants of the control condition were only required to fill out the first questionnaire on alcohol drinking behaviour, psychosocial determinants and knowledge. They did not view either the original or the modified brochure.

Measures

The behavioural goal of the campaign office producing the brochure was to moderate alcohol use in such a way that binge drinking is avoided. Given that binge drinking is considered to be the consumption of more than six glasses of alcohol on an evening out, we considered the recommended alcohol consumption behaviour in the questionnaire to be the consumption of less than six glasses of alcohol on an evening out with friends (Wechsler, Dowdall, Davenport, & Rimm, 1995).

Alcohol use. Alcohol use was measured with a self-report questionnaire based on the timeline follow-back method (Sobell & Sobell, 1990; Wiers, Hoogeveen, Sergeant, & Gunning, 1997). Participants indicated on grids how many standard units they consumed of different types of alcoholic drinks during each day on a typical week. To assist participants they were provided with information in which each kind of consumption was rescaled to standardized units. For example, participants were explained that one glass of wine equals to 1.5 consumptions and one glass of beer equals to 1 consumption.

Psychosocial determinants. The measures used for the selected psychosocial determinants together with their inter-item reliability scores (Cronbach's alpha) are described in Table I. For each outcome variable, scores on related items were averaged to a mean score. The questionnaire was based on previous research into determinants of alcohol behaviour (Marcoux & Shope, 1997; Wiers et al., 1997) and on general explanatory models of behaviour, in particular the protection motivation theory (Rogers & Prentice Dunn, 1997) and the theory of planned behaviour (Ajzen, 1991). Response scales ranged from 1 to 7. Higher scores represent more positive views with respect to alcohol moderation.

Comprehension. Subjective comprehension was measured by asking participants to rate the extent to which they felt they had understood the given information. This was done on a scale from 1 = *very poor* to 7 = *very good*. Objective comprehension was measured using 34 open-ended questions on the information presented in the brochure. Questions

included: a) "What are five ways to avoid a hangover?"; b) "Why do women have a higher blood-alcohol level than men?"; c) "How does alcohol cause a hangover". Questions were asked on all modified sections of the brochure. For each question, a correct answer was developed and, on the basis of this answer, an independent rater corrected the answers. Participant's total score could range on a scale of 0 to 90 points. The open-ended questions formed a reliable index of objective comprehension (Cronbach's alpha = .77).

Table I: Summaries of sample items and the reliability scores of Study I and II

Sample items	Study 1		Study 2	
	Items	Cronbach's α	Items	Cronbach's α
Intention (1 = <i>surely not</i> , 7 = <i>surely yes</i>)	3	.89	3	.90
"The next time I out, I will drink less than six glasses of alcohol"				
Attitude (1 = <i>very negative</i> , 7 = <i>very positive</i>)	8	.91	8	.87
"I think that drinking less than six glasses of alcohol when going out is... dumb-sensible, unpleasant-pleasant, negative-positive, bad-good, harmful-healthy, boring-exciting, irresponsible-responsible, dangerous-safe				
Subjective norm (1 = <i>totally disagree</i> , 7 = <i>totally agree</i>)	2	.46	2	.30
"People, who I consider to be important, think that I should drink less than six glasses of alcohol when I go out"				
Perceived behavioural control (1 = <i>very difficult</i> , 7 = <i>very easy</i>)	4	.77	4	.81
"I find drinking less than six glasses of alcohol when I go out..."				
Self-Efficacy (1 = <i>totally disagree</i> , 7 = <i>totally agree</i>)	5	.84	5	.87
"The celebration of an event makes it more difficult for me to drink less than six glasses of alcohol when I go out"				
Risk perception Short Term (1 = <i>very small</i> , 7 = <i>very large</i>)	6	.83	3	.65
"What is the likelihood that you will wake up next to someone the morning and regret it after consuming too much alcohol?"				
Severity Short term (1 = <i>very severe</i> , 7 = <i>not severe</i>)	6	.94	3	.71
"How severe would you consider waking up next to someone in the morning and regretting it after consuming too much alcohol?"				
Risk perception Long term (1 = <i>very small</i> , 7 = <i>very large</i>)	6	.73	3	.89
"How small/large is your chance of getting liver problems from alcohol abuse?"				
Severity Long term (1 = <i>very severe</i> , 7 = <i>not severe</i>)	6	.81	3	.49
"How severe would you consider getting liver problems from alcohol abuse?"				

Discussion

The main objective of the original brochure was to promote moderate alcohol use by increasing knowledge levels with respect to the health consequences of alcohol abuse. Compared with the control group, the original brochure was indeed successful in increasing objective comprehension. However, the modified version of the brochure resulted in even higher scores on this measure. Evidently, these findings provide support for using cognitive psychological theories to communicate factual written information. Although participants in the brochure conditions claimed to comprehend the text reasonably well, some weaknesses in comprehension were found when actual comprehension of the text was measured. This finding is in line with previous research indicating that individuals think they read and understand better than they actually do (i.e., illusion of knowing, (Glenberg, Wilkinson, & Epstein, 1982)).

Although a substantial higher level of comprehension was found in the two brochure groups when compared to the control group, on measures of psychosocial determinants participants in the brochure groups did not score differently. This may be due to the fact that the participants in the present study were not abusive drinkers. Abusive drinkers are defined as individuals who indulge in more than three binge drinking evenings per week (Berkowitz, 2005; Dijkstra, Sweeney, & Gebhardt, 2001; Wiers et al., 1997). It is possible that participants did not feel that their drinking behaviour was abusive and were thus less inclined to change their opinions with respect to their own drinking behaviour.

A second possible reason for the lack of results on the psychosocial determinants of alcohol behaviour may relate to the timing of the experiment. Normally, the brochure is distributed at the beginning of the academic year. In contrast, this study was conducted in the final months of the academic year. It is possible that distribution of the brochure at the beginning of the academic year has a different effect than distribution at another point in time in the academic year. The beginning of the academic school year is a period characterized by numerous social events and parties where a fair amount of alcohol is consumed. In the first few months of the academic year, students create their personal alcohol consumption routines. As a result, distribution of the brochure at the beginning of the academic year is more likely to make students aware of the risks of alcohol abuse and can thus prevent alcohol abuse. Later in the year, when routines are established, the brochure would have to aim to change behaviour. As a general rule, preventing certain behaviours is easier than changing behaviours. The brochure may thus be more effective at the beginning of the academic school year. As a result, we decided to repeat the experiment during the introduction period at the beginning of the following academic school year.

Experiment 2

Method

Participants

This study was conducted during the introduction period for new university and higher education students at the beginning of the academic school year. For this reason, we expected to recruit more heavy drinkers. In total, 80 undergraduate students (49 female, 31 male) from different faculties at Maastricht University volunteered to participate in the study after being approached by research assistants during an introduction party. The mean age of the participants was 19.03 years ($SD = 1.42$).

Design, Materials, Procedure, and Measures

The same design, materials and procedure used in Experiment 1 were applied in Experiment 2. However, due to time constraints, the questionnaire had to be shortened (see Table I). In addition, the open-ended questionnaire was shortened from 34 questions to 20 questions as this component was the most time consuming part of the experiment (Cronbach's $\alpha = .74$; range total score: 0 - 65).

Results

Alcohol Consumption

Participants had an average weekly consumption of 21 glasses of alcohol ($SD = 17.26$, range 0 - 70). No significant differences on this measure were found between the three conditions, $F < 1$.

Subjective Comprehension

An independent samples t-test found, on the measure of perceived knowledge, no significant differences between participants who read the modified brochure ($M = 5.69$; $SD = 0.85$) and those who read the original brochure ($M = 5.81$; $SD = 0.61$), $t(54) = .63$, $p = .54$. Again, both brochure groups reported to have understood the given information well as indicated by the high mean scores.

Objective comprehension

Again, there was support for the predicted effect of condition on knowledge uptake, $F(2, 77) = 142.63$, $p < .001$. The planned contrasts revealed that participants who read the

modified brochure ($M = 47.02$; $SD = 6.18$) had higher levels of comprehension than participants who read the original brochure ($M = 42.87$; $SD = 8.27$), $t(77) = 2.36$, $p < .05$, who in turn scored higher than participants in the control condition ($M = 18.25$; $SD = 4.73$), $t(77) = 13.21$, $p < .001$ (see also Table III).

Table III: Summary of effects on objective comprehension for Experiment 1 and Experiment 2

	Experiment 1		Experiment 2	
	Maximum score = 90		Maximum score = 65	
	Mean	SD	Mean	SD
Modified	73.72 ^a	11.34	47.02 ^a	6.18
Original	61.64 ^b	10.89	42.87 ^b	8.27
No brochure	39.10 ^c	8.56	18.25 ^c	4.73

^{a b c} Means in a column that have different superscript differ significantly at $p < .05$.
 Note: For Experiment 1, the pattern of results did not change when including in the analyses only the items that were used in both Experiment 1 and 2.

Changes in determinants of alcohol consumption

A MANOVA did not show significant differences between the conditions on the different psychosocial determinants, $F < 1$. The mean scores of the experimental conditions on the psychosocial determinants are summarized in Table IV.

Table IV: Experiment 2: Summary of mean scores and standard deviations on the psychosocial determinants of alcohol consumption

	Condition						F	p
	Control		Original		Modified			
	N = 25		N = 25		N = 25			
	M	SD	M	SD	M	SD		
Intention	4.92	2.22	5.44	1.83	5.18	1.77	0.44	.64
Attitude	5.45	1.00	5.62	0.89	5.64	1.03	0.28	.76
Subjective norm	4.60	1.53	5.18	1.39	4.98	1.06	1.21	.30
Perceived behavioural control	6.17	0.97	6.18	0.87	6.24	0.079	0.04	.96
Self Efficacy	2.94	1.40	2.75	1.37	2.53	1.13	0.61	.54
Risk perception ^a short term	17.78	7.75	18.23	7.75	17.76	9.34	0.03	.98
Risk perception ^a long term	18.38	11.01	15.90	11.47	16.67	10.55	0.33	.72

^a Risk perception equals the perceived vulnerability multiplied by the perceived severity of the risk (Kools, van de Wiel et al., 2006a; Slovic, 2000).

Note: The pattern of results did not change when including analyzing the items that were used in both Experiment 1 and 2.

General discussion

Although it seems logical to use both a theoretical and empirical approach when designing new health campaign materials, designers of health campaign materials are often times unaware of the choices they make concerning the content and design of health education materials (Kools et al., 2004). The aims of the present study were: a) to show the merits of designing materials using theory; and b) to demonstrate how carefully selected and applied theory-based methods can positively influence knowledge levels in a target population.

With respect to knowledge levels, the results of both experimental studies show significant differences between the three conditions. Not surprisingly, knowledge on the negative health consequences of alcohol abuse was significantly higher among participants who read the original or modified version of the brochure than among participants who were not given any information. However, we also found significant differences in knowledge between the group who read the original material and the group who read the modified version where cognitive psychological writing principles aimed to increase information uptake were used. This pattern of findings was consistent across the two experimental studies, despite distinct differences between the two studies related to tim-

ing of the study in the academic year and samples that, on average, consume different amounts of alcohol. As a result of these differences, the two experiments also differed on several other aspects, including recruitment method, questionnaire length, and gender balance. The consistency in results between the two experiments, despite these differences, builds to the empirical evidence for using a systematic and theoretical approach in designing effective health education materials. In short, using cognitive learning theories, small changes were made in the brochure that resulted in significant effects on objective measures of knowledge.

The theory-based improvements made in the brochure led to significant improvements in information uptake. However, these improvements did not result in changes in the psychosocial determinants of alcohol behaviour. An explanation for this finding may be that the material was primarily intended to increase knowledge and that the design was done in accordance with this primary goal. Nonetheless, the material was successful in attaining its primary goal but unsuccessful in influencing more proximal determinants of health behaviour such as risk perception, attitude, and intention. Our findings suggest that specific determinants should be targeted with specific methods and strategies that are grounded in theory and empirical research (Bartholomew et al., 2006; Conner & Norman, 1996, 2005; Glanz, Lewis, & Rimer, 1990; Norman, Abraham, & Conner, 2000). In general, to be effective, health education needs to be specific with respect to not only the behaviour that needs to be changed but also the target population and the methods for change (Bartholomew et al., 2006; Michie & Abraham, 2004).

We also contend that, to find objective measures of dependent variables, significant time and research has to be invested. Health education materials must be pilot tested. Most often, non-experimental, qualitative research designs, using methods such as focus groups, are employed. Despite the merits of non-experimental research designs, few reliable conclusions can be drawn from such designs as, often times, these evaluations are based only on speculations about the effects of the proposed materials (Rossi et al., 1999). Objective measures are thus necessary if we are to draw reliable conclusions. A prime example was found in this study. Perceived knowledge, which indicates the extent to which participants think they comprehend the given information, did not differ between the two brochure conditions. However, significant differences were apparent when we evaluated the actual responses to the open-ended questions.

Our study is not without limitations. Firstly, the knowledge level was measured shortly after participants had read the brochure. As a result, we cannot determine whether the knowledge level results can be maintained over a longer period of time. It is thus unclear

what kind of effect the materials will elicit after a month, six months or a year. Secondly, due the low number of men included in Experiment 1 it was not possible to check for interaction effects of gender and the experimental conditions on the outcomes measures. In Experiment 2 more men were included making it possible to study the potential moderation effect by gender differences. However, no significant support for such an interaction effect was found. This finding also supports the general assumption in cognitive psychology that cognitive activities, such as comprehension, work similarly for men and women. Thirdly, we did not include a measure of actual alcohol use at a point in time after participation in the study. However, it is unlikely that effects on a behavioural measure will be found given the lack of effects found on the psychosocial determinant measures. Finally, the external validity of the present findings may be limited to some extent. The sampling procedures we used in both experiments may have attracted especially those participants that are generally more willing to participate in research and be more motivated to perform well. This may also explain why we did not find a difference between the modified and original brochure groups on the subjective measure of comprehension, and thus provides an extra argument for the use of objective measures of targeted cognitive processes. Furthermore, our findings may not generalize to other members of the general public. Although basic cognitive theory about people's information processing applies to everyone, students may typically be more experienced users of written materials. This may cause them to use different strategies than people who read and study less (see, e.g., Sanchez, Lorch, & Lorch, 2000). Nonetheless, the finding that even with such experienced readers, the systematic application of cognitive writing-principles had effects on knowledge levels, strengthens our conviction of the potential value of this approach. Novice or less experienced readers may be expected to benefit even more from clear message design than people with higher meta-cognitive skills (Garner, 1987). However, research with members of the general public is necessary to assess the strength of these effects.

In conclusion, the present study confirms the merits of a theoretical and empirical approach in designing health campaign materials. Not only did participants of the modified brochure condition show higher knowledge levels than the control group, they also showed higher knowledge levels when compared to the original brochure condition. This was the case in two randomized experiments. We thus recommend endeavors to further investigate on the effects of theory-based approaches to health education material design. By doing this, we may very well be able to develop more effective and successful methods for changing proximal determinants of health behaviours.

CHAPTER 5

Experimental pretesting:

Using theory and eye movements recordings as
an evaluation tool of health education posters

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Abstract

The aim of the present study was to demonstrate the value of developing health education materials, in particular posters, on a theoretical and empirical research basis. As posters are often only viewed for a short period, a good graphic design is essential. In addition, accurate measurement of the predicted effects is necessary to obtain reliable conclusions about the effects of the materials. The posters used in this study were originally produced by a Dutch national campaign office to promote visiting of a website about the prevention of alcohol abuse. In a randomized controlled trial, the original posters were compared with modified versions of the posters on measures of recall of the website link and motivation to visit the website. In addition to these self-report measures, eye movements were recorded to measure attention to relevant parts of the posters. There were no differences on self-report measures, except a significant effect of attitude to visit the website. Results of the eye movements showed that participants tend to spend more time looking at the modified posters than the original (i.e. more fixations, higher dwell time). These positive design effects did not result in higher recall of the website link and intention to visit the website. Implications for the use of eye movement recordings in health education pretest research are discussed.

Introduction

Yearly, numerous health education campaigns are launched to help us attain a healthier lifestyle. Depending on the specific purpose of the health education campaign, different material formats are used, such as websites, TV Commercials, billboards, and posters. Because posters reach a large population, an important purpose of posters is to give extra publicity to the campaign they are usually part of. For instance, posters may promote a campaign website, on which more elaborate information can be found (Klein, Havens, & Carlson, 2005). Since posters are only viewed for a short period, not to mention the competition with the numerous other attention-drawing objects in the visual environment, the graphic design of a poster is essential in order to draw attention and deliver the message effectively and efficiently. That is, attention should be drawn to the essential information parts, and the message contents in these parts should be readable and understandable in order to be memorized in the relevant context (e.g., when sitting behind a personal computer to access the Internet). Despite the frequent use of posters in health education practice, only little research has been performed to investigate posters on their effectiveness and efficiency in reaching predetermined objectives (Krugman, Fox, Fletcher, Fischer, & Rojas, 1994).

In the present study we test specific theory-based strategies for increasing the effectiveness of posters in motivating undergraduate university students to visit a campaign website. We used self-report measures as well as eye movement recordings to evaluate the posters on the motivation to visit the website and effective attention allocation, respectively. On a more fundamental level, this paper aims to illustrate the merits of combining theory and experimental research in developing effective health education materials.

Systematic intervention development

Research has shown that theory-based health campaign materials contribute positively to the effectiveness of campaign materials (Fishbein, Cappella, et al., 2002; Fishbein, Hall Jamieson et al., 2002; Fishbein & Yzer, 2003; McGuire, 1985; Michie & Abraham, 2004). According to the framework of Intervention Mapping (Bartholomew et al., 2006), which provides a systematic approach to intervention development, designing a new campaign begins with formulating clear goals and objectives that are derived from a systematic needs assessment procedure. Appropriate theory-based methods aimed at changing psychosocial determinants should be selected and translated into practical strategies, which are then combined to form the final intervention program (Kok et al., 1996; Kok et al., 2004).

Theoretical methods in health interventions are easily overlooked. Instead of focusing on developing campaign materials in line with theoretical notions on the optimal use of the materials, program designers often focus on the actual and concrete campaign materials, such as health brochures, TV commercials, or posters (Kok et al., 2004). However, it is important to consider both the practical strategy and the theoretical method. The conditions or parameters of the theoretical method should be fulfilled if the practical strategy is to be effective (Bartholomew et al., 2006). For example, when the objective of a campaign is to draw attention to a campaign website, a widespread poster campaign promoting to visit the website could be a practical strategy. Important parameters of successfully presenting information on posters include applying principles derived from cognitive ergonomic research, for example font type, color use, and language, to enhance effective attention allocation and comprehension of the material (Arens, 2002). For example, text on posters should not exceed 50 words (Lester, 2000).

Experimental pretesting

It seems obvious that health education materials are created to be effective and to reach their predetermined goals. However, one cannot assume that health education materials are always as effective as they were intended to be (Fishbein & Yzer, 2003). It is important to establish reliable conclusions about the potential effectiveness of the developed materials in influencing predetermined objectives prior to the final production of health education materials and the large-scale implementation of the intervention program. It is thus essential that a well-designed experiment be conducted, wherein sufficient controls for the influence of uncontrolled 'third' variables (Foxcroft et al., 1997; Rossi et al., 1999) are present. In addition, internally valid measures of outcome variables are necessary, in order to be able to draw reliable conclusions deduced from the reported outcomes (Kools et al., 2007; Michie & Abraham, 2004). Conducting such an experiment provides program designers with the information and tools necessary to make evidence-based decisions for the further creative development and implementation of the intervention program. For a more elaborate discussion on the need of experimental pretesting in health education development research, see recent work of Whittingham and colleagues (Whittingham, Ruiters, Bolier, et al., in press; Whittingham, Ruiters, Castermans, Huiberts, & Kok, in press).

Eye tracking in health education research

As said before, a widespread purpose of posters in health education practice is to raise awareness for health problems. Furthermore, there is a growing interest in their ability to enhance intermediate stages of behavioural change, such as information seeking (Health Council of The Netherlands, 2006; Rimal, Flora, & Schooler, 1999). An example is motivating individuals to visit the campaign website where more elaborate and possibly tailored information is provided (Brunsting, 2007; Klein et al., 2005). As posters compete for attention in a competitive communication environment, they should be developed in a systematic way if they are to be effective (Krugman et al., 1994). It is essential that they are noticed and that, once they are attended to, they are effectively processed in terms of speed and message comprehension. Only when effectively processed, they may leave traces in memory that are useful in later steps of behavioural change (Wedel & Pieters, 2000).

Attention measures, such as eye movement recordings, are important tools in assessing early stages of information processing. Eye movements are eminent indicators of visual attention (Krugman et al., 1994; Wedel & Pieters, 2000). Eye movements comprise a sequence of fixations (i.e., discrete periods of immobility of the eye) and saccades (i.e., quick jumps between fixation locations). Extraction of information occurs during fixations, which refer to moments of attention to the stimulus, whereas vision is basically suppressed during saccades (Rayner, 1998; Wedel & Pieters, 2000).

In persuasion research, eye tracking is a method that is particularly used in commercial settings, for example in marketing and consumer research (Fox, Krugman, Fletcher, & Fischer, 1998). Furthermore, the number of fixations is related to the amount of information a viewer extracts from an ad (Rayner, 1998; Wedel & Pieters, 2000).

In order to design effective posters, campaign designers need to understand how individuals pay attention to print advertisements and how this contributes to memory, and eventually to other behavioural determinants (Wedel & Pieters, 2000). In persuasion research, eye tracking is a method that is particularly used in commercial settings, for example in marketing and consumer research (Wedel & Pieters, 2000). For this reason, we think that eye tracking could be a valuable additional instrument to evaluate health education materials, especially if the effects of these materials are dependent on limited processing time as is often the case with posters.

The present study

The main goal of the present study is to show the merits of designing health education materials that are aligned with theoretical notions about the conditions under which health information is effective in influencing determinants of behaviour. In this case, posters that were part of a campaign on the prevention of alcohol abuse among university undergraduate students were evaluated. The main objective of the posters was to communicate the Internet address where students could access more information on the risks of alcohol abuse by participating in an alcohol knowledge quiz. Therefore, the main outcome variable was the amount of attention allocated to the provided website link. In addition, recall of the website and the motivation to visit the website were measured. This way, we measured the effects of exposure to the posters at three stages of health information processing: attention, comprehension and motivation (Blumberg, 2000).

To optimally test the advantages of theory-based campaign development, we conducted a randomized controlled study to compare the existing posters against posters that were modified mainly on the basis of theoretical notions derived from cognitive ergonomics research. Our expectation was that the theory-based posters would generate more effective attention allocation to the address of the campaign website than the original poster, as reflected in more fixations, higher dwell time, and faster recognition times for the specific area of interest. Furthermore, we expected this increased attention for the website address to be reflected in higher recall of the website address and motivation to visit the website. The present study was approved by the Ethical Board of the Faculty Psychology at Maastricht University.

Method

Participants

In total, 96 first-year students of Maastricht University participated in the study (69 female; 27 male). Participants were recruited using sign-up forms located on the campus where the schools of psychology, medicine and health sciences are located. The mean age of the participants was 20.43 years ($SD = .29$). Participants received course credits or a gift voucher of 12 Euros for their participation.

Materials

The test materials were existing health education posters that are part of a national alcohol moderation campaign, targeted at first-year university students, which runs at the beginning of each academic year. In essence, the posters attempt to motivate students to fill out a quiz with alcohol-related questions, and to get them to learn more about the risks of alcohol abusive behaviour and to motivate them to moderate their alcohol use. The campaign (including the posters) was developed by the National Institute for Health Promotion and Disease Prevention (NIGZ). This Dutch organization is responsible for developing public health campaigns that aim to prevent alcohol abuse in different segments of the national population, among which the undergraduate student population.

The original posters, which had three versions, target a combination of motivations to visit the website. First, cryptic questions were provided to raise people's curiosity and motivate them to take part in a knowledge quiz on the internet to learn more about the topic (e.g., "I am drunk ... and who are you?" [translated from Dutch]). Second, the same posters made reference to prize money that could be won if one would participate in that same quiz (e.g., "Win €1000 in the alcohol knowledge quiz" [translated from Dutch]). In addition, the knowledge quiz itself was believed to function as an extra motivation for university undergraduate to access the website address and participate in the quiz.

In this experiment, the three original posters (see Figure 1a for an example) were compared with two modified sets, each containing three theory-based posters. In both sets of modified posters, we changed the appearance of the link to the website. In the original version of the posters, the link to a website was incorporated in a sentence and presented in the same font as the rest of the sentence. In the modified versions, the link was presented in a larger and bolder font and separated from the rest of the text on a single line. By doing this, more attention was drawn to the website link by creating a pop out effect, thereby increasing the likelihood that the link would be attended and subsequently remembered by viewers (Treisman & Gelade, 1980).

Furthermore, in the first modified set, further referred to as the cognitive set (see Figure 1b for an example), the prize money information was left out. Each poster in this cognitive set tried to motivate viewers to visit the website solely by raising interest in learning more about alcohol abuse. In the second modified set, further referred to as the motivational set (see Figure 1c for an example), the prize money was put forward as the central point of the poster, whereas information aimed to raise cognitive interest was excluded. With these two modified sets, we were able to test whether the cognitive interest approach or the external motivational goal of being able to win money motivates students

more strongly to attend to and visit the website. In the social psychological literature both routes to persuasion appear in theoretical constructs, such as the systematic approach versus heuristic approach (Chaiken & Maheswaran, 1994; Petty & Cacioppo, 1986), respectively, and intrinsic and extrinsic motivation (Ryan & Deci, 2000).

It is important to note that all other features (e.g., color, font type) of the poster design were kept constant across conditions. This way we attempted to avoid differences caused by design changes other than those based on theoretical insights.

Figure 1 A: Example of screenshot of original poster.

Figure I B: Example of screenshot cognitive poster.

Figure I C: Example of screenshot motivation poster.

Apparatus

Eye movements were registered by the EyeLink I eyetracker from SensoMotoric Instruments (SMI, Germany) and SR Research (Canada), with a 250 Hz temporal resolution, a 0.005° gaze and eye position resolution, and a gaze position accuracy with 0.5-1.0° average error. It is a headband-mounted infrared video-based tracking system that can track both eyes. The system corrects for head-motion by means of an additional infrared camera.

The participant's head rests on a chin-rest at an approximate distance of 57 cm of a computer monitor (19" flat panel Dell monitor). Monitor resolution was set to 1024 * 768 pixels. A Dell Optiplex GX110 Pentium III computer controlled the stimulus presentation. The posters were presented on the screen in color format of 7 by 13 cm. The presentation of stimuli and analysis of the eye tracking was performed with Matlab 6.5. Although viewing was binocular, only movements of the right eye were monitored.

Procedure and Design

Upon arrival at the eye movement laboratory at Maastricht University, participants were randomly assigned to three conditions: 1) original poster set, 2) cognitive poster set, and 3) motivational poster set. After explaining the procedure of the experiment, participants signed an informed consent, and the Eyelink system was installed on the head. Participants were seated at a table in front of a computer screen, with their head resting on a chin-rest. After calibrating and validating the Eyelink system, the experiment started.

Depending of the condition participants were assigned to, each of them viewed either the set of original posters, the set of cognitive posters, or the set of motivational posters. Each poster was presented for 20 seconds. Within a set, the posters were presented in the same order across participants. Before a poster appeared on the screen, a dot was presented at the centre of the screen. Participants were asked to focus on the dot, so that each participant would start viewing every poster in the same way. During exposure to the posters, eye movements were registered. After the presentation of the posters, the headset was removed and the participant started with filling out the questionnaire.

Measures

Alcohol use. Alcohol use was measured with a self-report questionnaire based on the timeline follow-back method (Sobell & Sobell, 1990; Wiers et al., 1997). Participants indicated on grids how many standard units they consumed of different types of alcoholic drinks during each day on a typical week. To assist participants they were provided with information in which each kind of consumption was rescaled to standardized units. For

example, participants were explained that 1 glass of wine equals 1.5 consumptions, and 1 glass of beer equals 1 consumption.

Attitudes and intentions. Given that the original posters not only aimed to increase website visiting, but also had a central role in the campaign on moderating alcohol use, we measured attitudes and intentions to visit the website as well as attitudes and intentions towards moderate alcohol use. For each outcome variable, scores on related items were averaged to a mean score. Response scales ranged from 1 to 7. Higher scores represent more positive views with respect to behavioural object. Attitude towards moderate alcohol use was measured by nine semantic differentials (e.g., 'I consider drinking less than five glasses of alcohol when I go out ... *good – bad; smart – stupid; positive – negative; healthy – unhealthy; responsible – irresponsible; safe – dangerous; fun – boring; pleasant – unpleasant; nice – nasty*'; $\alpha = .90$). Intention towards moderate alcohol use was measured by two items ('The next night I go out, I will drink less than five glasses of alcohol'; 'The next night I go out, I plan to drink less than five glasses of alcohol'; *very unlikely – very likely*; $\alpha = .81$). The attitude towards visiting the website used the same nine semantic differentials as the attitude towards moderate alcohol use measure, but following the statement: 'I consider visiting the website ...' ($\alpha = .81$). Intention to visit the website was measured by two items (i.e., 'I am certainly going to visit the website' and 'I intend to visit the website'; *very unlikely – very likely*; $\alpha = .80$).

Recall. As the poster had the clear objective of motivating students to visit the campaign website, recall of the website link was measured by asking respondents to write down the website link that was presented on the posters. Answers were coded dichotomously as being correct (1) in case of full reproduction of the link, and incorrect (0) if only partly recalled or not at all.

Results

Alcohol consumption

On the measure of alcohol drinking behaviour, the average weekly consumption of participants was 13 glasses of alcohol ($SD = 4.45$; *range* 7-27). No significant difference on this measure was found among the three conditions, $F(2, 93) = 1.71, p = .19$.

Eye tracking

The eye tracking data was extracted from Data Viewer (SR Research software) to SPSS. To analyze the eye movements we divided the posters in different, so-called, areas of interest.

These areas of interest were specifically chosen based on the features of the posters (see Figure I a-c). For each poster, there were four areas of interest. The first area of interest contained the slogan; the second area of interest contained general information; the third area of interest contained the website link; and the fourth area of interest contained source information. We were mainly interested how much time was spent viewing the different areas of interest, and whether differences could explain scores on the measures of recall, attitude and intention. To do this, we investigated fixations and dwell times in the different areas of interest.

Visual inspection. It is difficult to represent the scan path of participants viewing sessions. However, from generally looking at the eye tracking results, some general findings were found. The scan path for the first poster in each set was fairly consistent across participants. All participants started at the centre of the poster, as they fixated on the dot before appearance of the poster. Next, all participants started at the top of the poster, and scanned the poster from top to bottom. Finally, participants carefully read the text on the posters, again from top to bottom. All text on the posters was read, the small text at the bottom containing information about the source of the information as well.

In contrast, the scan paths for the second and third poster in each set varied considerably for each participant. Some followed the same pattern of attending as for the first poster, but were quicker on starting reading carefully. Others just had a quick look and then continued staring at the screen, presumably because they evaluated the poster as familiar. In sum, no consistent scan pattern was found upon visual inspection for the second and third posters for the different conditions. These findings suggest that participants do not allocate attention to materials that contain information they have already seen. Because eye movements on the second on third poster in each set were far less informative, we decided to analyze the eye movement recordings only for exposure to the first poster in each set.

Fixation maps. In order to visualise the most informative, in other words the most viewed, parts of the posters, we created “fixation maps” (see Figures II a - c). For each poster, areas which were viewed most are illuminated. The brighter the luminance, the more the specific area is viewed. It is interesting to see that participants attend intensively to the source of the campaign. Previous research has shown the importance of credible sources in health education practice (McGuire, 1985; Vrij & Smith, 1999). Also, the slogan areas of the modified versions are less illuminated than that of the original poster, and

thus less attended. In contrast, the area with the link to the website seems to be more illuminated in the modified versions than in the original version. In the next sections, more accurate analyses will be performed in order to draw conclusions about the attention allocated to the different areas of interest.

Figure II A: Fixation map original poster.

Figure II B: Fixation map cognitive poster.

Figure II C: Fixation map motivation poster.

Statistical analyses. First, we investigated differences between the posters in dwell time and the number of fixations. Table I shows the average dwell time and number of fixations for the different areas of interest for each poster. We found significant differences in the number of fixations on each poster, $F(2, 93) = 25.51, p < .001$. Post-hoc analysis (LSD) showed that the alternative versions had significantly more fixations than the original posters ($p < .001$). There were no significant differences between the two alternative versions. The same pattern was found for dwell time, $F(2,93) = 22.61, p < .001$. Post hoc analysis showed that the motivational poster had significant more dwell time than the cognitive poster ($p < .001$). Also, the interest poster had a significant higher dwell time than the original poster ($p < .001$). These results suggest that the alternative versions of the posters draw more attention than the original posters.

Because the most important feature of the posters is the website link, we analyzed the differences between the posters on time spent in that particular interest area. Again, we found a significant effect of poster type on the number of fixations, $F(2, 93) = 9.22, p < .001$, and dwell time, $F(2,93) = 9.22, p < .001$. Post hoc analysis showed that the motivational poster had significant more fixations and dwell time than the cognitive poster (p 's $< .001$). Also, the interest poster had significantly more fixations and dwell time than the original poster (p 's $< .001$). As shown in Table I, the changes we made to the link of the website did result in changes of viewing time for the area of the website.

Table I: Mean number of fixations and amount dwell time for the different types of posters; area of interest providing the website address for each poster type and start time first fixation in area of interest (time 3).

	Poster				Area website address				
	Fixations		Dwell time		Fixations		Dwell time		Start time
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Original	38.94	9.18	10026.58	2120.31	2.49	0.64	582.07	166.59	4337.33
Cognitive	53.43	12.53	11836.24	2111.83	6.79	0.58	1497.19	152.48	5893.71
Motivational	56.82	8.38	13233.86	853.82	6.11	0.67	1377.14	175.28	4760.00

Next, we analyzed whether there were differences in start time of the first fixation in the area of interest of the website. The start time is a time stamp of the first fixation in the particular area of interest. The lower this time, the earlier participants arrived at the particular area of interest. We found significant differences between each of the three conditions, $F(2, 86) = 4.08, p < .05$. Post hoc analysis showed that the mean score of the original poster was the lowest, followed by the motivational poster and the cognitive poster (see Table I for mean scores and standard deviations). This finding suggests that participants viewed this particular area of interest earlier than those who saw the modified posters.

Recall. We investigated whether eye movements in the area of interest are predictors of recall of the website link, in other words whether recall of the website link can be explained by more fixations or dwell time. A logistic regression analysis showed that dwell time and the number of fixations were no significant predictors of the recall of the website link ($p > .05$). Furthermore, no difference in recall of the website link among the three conditions was found, $\chi^2(2, 96) = .88, p > .05$. Overall recall of the website link was low. Only a minority of all participants were able to reproduce the website link correctly (see Table II for details).

Table II: Summary of mean scores on the measures of psychosocial determinants of alcohol consumption; recall of website; and visiting the campaign website.

	Original	Cognitive	Motivational
Attitude moderate alcohol use	5.26	5.36	5.19
	.94	1.05	1.11
Intention moderate alcohol use	4.42	5.31	4.85
	.33	.31	.38
Attitude quiz	3.02	3.48	3.52
	.14	.13	.15
Intention quiz	2.17	2.01	2.41
	.22	.21	.25
Recall correct ^a	13	18	10
	39%	50%	37%
Recall incorrect ^a	20	18	17
	61%	50%	63%

^aNote: Cells contain the amount of participants who were able to reproduce the website content.

Attitude and intention

In order to measure the effect of the original and modified versions of the posters on attitude and intention towards moderate alcohol use and visiting the website, separate univariate analysis of variance (ANOVA) were performed. Table II presents the mean scores on each of the outcome variables for each of the three conditions. There were no significant differences among the conditions found on the attitude and intention towards moderate alcohol use, $F_s < 1$, *ns*. However, we did find a significant difference on the attitude towards visiting the website, $F(2, 86) = 3.57$, $p < .05$. Post hoc analysis showed only a significant difference between the set of original posters and the motivational posters ($p < .05$). Participants who had seen the motivational posters had a more positive attitude towards visiting the website than participants who had seen the original posters. However, this effect was not confirmed on the intention to visit the website, $F(2, 86) = .23$, *ns*.

General discussion

To show the merits of designing health education materials on the basis of theoretical insights, we compared original versions of a health education poster with theory-based

modified versions. An experimental design was used over more traditional, qualitative formats of evaluation research, to control for confounding effects of unknown variables and thus relate the findings on the outcome measures directly to the specific versions of the material that were tested (Whittingham, Ruiter, Bolier et al., in press). Dealing with posters that specifically aimed to communicate a website link, we were specifically interested in the amount of attention allocated to the information providing the website link, and subsequently the extent to which this information was held in long term memory and motivated participants to visit the website. We thus measured the effects of exposure to the posters at three stages of health information processing: attention, comprehension and motivation (Blumberg, 2000).

Effect evaluations are most often based on self-report measures, for example questionnaires. Self-report measures have some restrictions. First, a limitation of these explicit measures is that they require introspection from the participants even though people may not be aware of the motives that drive their behaviour (Wilson & Dunn, 2004; Wilson & Nisbett, 1978). Second, participants may respond with socially desirable statements. Although attention has extensively been researched in cognitive science, it has largely been ignored in health education research. In order for health messages to be attended, they must be capable of attracting and holding attention long enough for persuasive content to be processed (Donohew, 2006). In other words, accurate measurement of the predicted effects is necessary to obtain reliable conclusions about the effects of the materials.

To optimally measure attention to the website link, we recorded eye movements during exposure to the stimulus materials, and combined these with self-report measures of recall and motivation. Data patterns derived from the eye movement recordings supported the theory-based application of cognitive ergonomic principles to enhance attention allocation to relevant information parts. In general, participants exposed to the modified posters spent more time looking at the website link than those exposed to the original poster as reflected in more fixations and resulting dwell time. However, unexpectedly, the enhanced attention to the website link did not result in similar patterns of effects on the measures of recall and the attitude and intention towards visiting the website. On these measures, we only found a difference on the attitude to visit the website. Participants who saw the posters that triggered external motivation processes (i.e., the opportunity to win prize money) reported a more positive attitude to visit the website than those that saw the original posters, which aimed to raise intrinsic motivation processes by enhancing cognitive interest but also by mentioning the opportunity to win prize money. However, this effect was not replicated on intention, which is a more direct measure of behavioural

motivation (Conner & Norman, 2005).

In general, the results showed a positive effect of the modified posters on attention. The lack of effect on subsequent measures of motivation to visit the website could have several explanations. First, as there is only limited space to provide information on posters, it is not possible to present detailed information to persuade viewers. Furthermore, attention is necessary for information-induced behavioural change, but not sufficient. In order to influence intention, more proximal determinants of intention should be manipulated. In the case of motivating participants to visit a website, the most proximal determinant was attitude, as neither subjective norm nor self-efficacy is applicable. In the literature we found that external motivation could lead to attitude change, however, in this case this was not sufficient to influence intention (Chaiken & Maheswaran, 1994). Future research should explore the use of other strategies and methods to motivate students to visit campaign websites.

There were no differences found on the behavioural determinants of alcohol behaviour. The lack of this kind of these specific effects is not surprising given the limited persuasive information presented to the participants. Higher scores in the cognitive condition might suggest that cognitive messages in particular may have effects on determinants of alcohol behaviour. However, this study could not provide statistical evidence for that hypothesis.

An explanation for the low recall of the website link is the complexity of the name of website link. The link of the campaign website consists of a phrase (www.ikbenzaten-wiebenjij.nl; www.iamdrunkandwhoareyou.com [translated from Dutch]), which is difficult to read as there are no spaces between the separate words. Based on our findings, creating a pop out effect by increasing the size of the font of the website link did improve attention, but lacked improving recall of the website link. A better solution might be to change the link of the campaign website into an easier link, for example www.alcoholquiz.nl. This way, viewers might remember the link better. Future research should explore the effects of these changes.

The present study has some practical implications. It has been shown that eye tracking research is an interesting evaluation tool to evaluate health education materials. The method provides interesting and objective information on how materials are processed by viewers. However, this study is not without limitations. The questionnaire outcome measures, in particular recall of the website, were low on specificity. Recall was measured with a dichotomous measure (i.e., correct – incorrect). This measure might not have been selective. Due to this, it was difficult to link the results of the eye tracking data to the re-

sults of the questionnaire. Future research should explore the use of subtle and sensitive measures (e.g., reaction time research) to link to the results of eye tracking, for example to explore to what extent the website link is made available in the brain and consequently the memory. In addition, future research should explore possible methods that could be used to motivate viewers to visit the websites provided on, for example, posters. This experiment lacks concrete conclusions on this matter.

Visual materials are omnipresent in our current society. It is therefore of vital importance that health education posters draw attention to the essential parts of information in the message. Eye movements are very informative in designing and optimizing materials, not only for posters but also for other visual materials such as brochures. Eyetracking data provides additional information to self-reports, which can be used to further improve campaign materials. In our opinion, self-report measures should therefore be complemented with unobtrusive measures such as eye movements, to obtain a reliable estimate of the effectiveness of new campaign materials.

CHAPTER 6

General discussion

The current research project was meant to contribute to health education practice by providing guidelines for designing evidence-based health education materials. In particular, this thesis investigated the role of experimental pretesting in the development process of evidence-based public campaign materials (Fishbein, Cappella et al., 2002; Fishbein, Hall Jamieson et al., 2002; Fishbein & Yzer, 2003; McGuire, 1985; Michie & Abraham, 2004). Therefore, we conducted six empirical studies in which we explored the value and implications of experimental pretesting. All studies were randomized controlled experiments, that is: a) random allocation of participants to the different conditions; and b) the presence of a control condition. Overall, we can conclude that while experimental pretesting is often considered as expensive and time-consuming; our studies have shown that the effort is efficient and worthwhile, and therefore important in order to develop effective public health materials.

What do our experiences show?

Six experimental studies, combined in four chapters, were conducted to demonstrate the merits of evaluating new public health campaign materials in the developmental phase using an experimental design, in other words experimental pretesting. In practice, most new materials are only tested after they have been distributed using non-experimental or quasi-experimental designs. In cases where materials are pretested prior to distribution, pretesting is usually done using qualitative research methods such as focus groups. Although these methods are useful, they cannot reliably predict the effectiveness of new campaign materials in a developmental phase. Therefore, we suggest complementing qualitative research methods for pretesting with experimental research methods.

The first study (Chapter 2) presents an experimental pretest study of new campaign materials intended for distribution in a national STI/AIDS prevention campaign in the Netherlands. The campaign material tested was the storyline of a planned television commercial on safe sex. Results showed positive effects on targeted determinants of safe sexual behaviour. In line with the role of experimental pretesting in the development process of health education materials, this study had important practical implications for the campaign designers in finalizing the materials. One of the most interesting effects of this pretest was that the campaign designers decided to create two different scenarios for the TV commercial – directed at both boys and girls – to accommodate the gender differences reported in the pretest. That is, the storyline of the television commercial produced a positive effect on risk perception. Unfortunately, this effect was restricted to girls. Also, this experimental pretest promoted greater trust in the effectiveness of the televi-

sion commercial among the campaign team. The positive effects of the storyline on most of the targeted determinants of safe sex behaviour, as demonstrated by the experimental pretest, motivated the campaign team to complete production by turning the storyboard into an actual television commercial. In contrast to previous campaigns, this commercial was released with empirical support for the effectiveness of the commercial in changing predetermined objectives. A final important practical consideration is the presence of time and financial constraints on the evaluation of campaign materials. The development and evaluation of new materials is often conducted in a relatively short time frame and often with a limited budget, as was also the case in the present pretest. We will elaborate on this later on in this chapter.

In Chapter 3, two studies were presented in which the authors tested written health education materials on the personal acceptance of party drug use. Following a harm reduction strategy, the materials provided information about how to minimize the potential hazards associated with drug use rather than solely discouraging the use of drugs. Because the materials are distributed in different nightlife settings, where the materials might come to the notice of non-users, the potential aversive effects of the effects of these materials were examined not only among users of party drugs, but also among non-users. In the first experiment, the leaflet version of the harm reduction materials on ecstasy use was evaluated among ecstasy users and non-users. The results showed no health promoting effects, but also no counterproductive results. That is, exposure to the leaflet did not result in more positive attitudes, intention and outcome expectancies towards ecstasy use among both users and non-users, but also not in more resistance to ecstasy use when compared to a control condition. In the second experiment, the effects of two different format versions (leaflet vs. infocard) about two different kinds of party drugs (ecstasy vs. GHB) were compared within a non-using population. Again, results showed no positive changes in attitude, intention and outcome expectancies towards ecstasy use as a result of exposure to the ecstasy materials (leaflet and infocard), nor any health promoting effects on these outcome measures. In contrast, exposure to the GHB materials resulted into a more negative attitude towards GHB use (leaflet and infocard) and lower estimates of the likelihood of positive outcomes of use (infocard). However, these effects were not translated into similar effects on the intention measure.

Again, these studies had important implications. First, there were no counterproductive results found. The campaign team thus gained more certainty about possible distribution of the materials, which could also be in settings where nonusers have access to the materials. A second implication is related to the different effects for the infocard and the

leaflet. The infocard elicited more pronounced effects than the leaflet. More importantly, the leaflet does not seem to have an additional value in comparison to the infocard. These findings might suggest that the amount of information is of importance. The less information is presented, the easier it is for the reader to find the different elements of information, and finally to remember the information (Kools et al., 2004; Kools et al., 2007; Kools, van de Wiel, Ruiter, Cruts et al., 2006; Kools, van de Wiel, Ruiter, & Kok, 2006). Future research should further explore this proposition.

Chapter 4 presented two studies in which the usefulness of developing health education materials with a theoretical and empirical research basis is demonstrated. With a specific focus on increasing knowledge, the authors utilized well-researched principles in cognitive psychology to increase the message comprehension of an existing health education brochure. In two experimental studies, the original version of the brochure was compared with the theory-based modified version on measures of knowledge and psychosocial determinants of alcohol use among undergraduate university students. The results showed significant differences in knowledge uptake between the two versions. In both experiments, the modified version elicited higher scores on knowledge uptake than the original version. Despite the positive findings of knowledge uptake, no differences in more proximal psychosocial determinants of behaviour could be found.

This study has several important practical implications. First, these findings underline the importance of theory in the design of health education brochures. Our theory-based modified version of the brochure had a significant positive effect on comprehension of the text. Second, the results emphasize the value of objective dependent measures. In this case, there were no differences on the subjective measure of comprehension that asked participants to indicate on a 7-point scale how well they had understood the text (very bad – very good). However, on the objective measure that contained open-ended questions to test for text-based knowledge and deeper understanding of the presented information significant differences between the experimental conditions were found. This shows that in addition to the specific definition of outcome variables appropriate outcome measures are prerequisites for a good evaluation (see also Michie & Abraham, 2004). Third, the lack of findings on psychosocial determinants of behaviour again supports the empirical evidence in the health education literature that raising knowledge is not sufficient to influence other, more proximal determinants of health behaviour (e.g., attitude, risk perception). These findings suggest that specific determinants should be targeted with specific methods and strategies that are grounded in theory and empirical research (Bartholomew et al., 2006; Conner & Norman, 1996, 2005; Glanz et al., 1990; Norman et al., 2000).

target population. After the campaign is broadcasted, effect-evaluation studies could be performed to inform campaign designer about these effects.

Second, the low amount of participants in our different studies. Consequently, the external validity of the studies is rather small. For this reason, it is difficult to generalize the findings to other materials, or populations. On the other hand it is advantageous that experimental pretesting does not require large groups of participants to investigate the effects campaign materials.

A third limitation is the presence of time and financial constraints in the evaluation of campaign materials. The development and evaluation of new materials must often be conducted in a relatively short time frame and often with a limited budget. We recognize that considering this, it is not always obvious to test the materials in an experimental study beforehand for both practical and financial reasons. This was definitely the case in study in chapter 1 and thus the reason why the pretest was only done in two schools with a limited number of participants. This limitation, unfortunately, reduces the generalizability of our findings. However, by experimentally pretesting materials before implementation, chances of identifying ineffective or even counterproductive campaign materials are increased (Noar, 2006; Snyder et al., 2004).

Fourth, it is difficult to gauge the degree to which campaign materials have to be finalized before pretesting. The ideal, of course, would be to pretest materials in their final and definite form but this may be imprudent given the cost considerations and the chance that the materials may show negative results in the pretest. Finalizing a television commercial is a costly endeavour and thus the pretesting of the final product is, most often, not a feasible option. This was the case in our experimental pretest where the television commercial was presented in the form of a storyboard. Although the storyline was clear, no real characters were presented. It is possible that identification with the characters in the commercial could generate different effects than the storyboard. Nevertheless, knowledge about the effects of public campaign materials, even in an unfinished form, is essential and an experimental pretest is the only means by which causal links between the campaign material and outcome variables can be made.

Finally, there is a lack of behavioural outcome measures in the studies presented in this thesis. That is, our studies did not include behavioural measures at follow up level. The reason for this lack of follow up measures is time constraints. In addition, most campaign materials aim for specific changes in proximal determinants of health behaviour. As a result we focused on measuring these determinants, instead of behaviour in general. As a result, we cannot draw any conclusions towards actual change of behaviour.

Finally, in chapter 5, a study was presented that aimed to demonstrate the need for accurate measurement of the predicted effects to obtain reliable conclusions about the effects of the materials. In an experimental study, original posters were compared with theory-based modified versions of the posters on self-report measures of recall of the website and motivation to visit the website (i.e., attitude and intention). In addition to these self-report measures, eye movements were recorded when viewing the posters to measure attention to relevant parts of the posters. The design changes were effective in a way that viewers tended to spend more time looking at the modified posters than at the original poster as suggested by more fixation points and higher dwell time. Unfortunately, these positive design effects did not result in higher recall of the website and intention to visit the website. It should be noted that specific limitations were linked to the used self-report measures.

It has been shown that eye tracking research is an interesting evaluation tool to evaluate health education materials. The method provides interesting and objective information on how materials are processed by viewers. Second, as in the previous chapter, the study shows the use and necessity of the general principle of experimental pretesting theory-based materials.

In sum, the studies presented in this thesis demonstrated that knowledge about the actual effects of materials before final production offers valuable information for campaign developers. The main advantages of experimental pretesting are a) campaign designers know the effects of materials before broadcasting them, which leads to a growing trust of campaign designers in decisions about the materials and the campaign in general (Chapters 2 and 3); b) experimental pretesting can be used to compare different versions of materials, for example different applications of theoretical strategies (Chapters 4 and 5); and c) it is important to select objective effect measures, if not, one is not able to draw conclusions on the effects of the materials (Chapters 4 and 5).

Limitations of experimental pretesting

In the previous paragraph the practical implication and advantages of experimental pretesting were discussed. Although experimental pretesting is important and offers empirical support for a campaign, some limitations of experimental pretesting do exist.

First, the campaign materials were not tested in their natural environment. Although participating on a voluntarily basis, participants were asked to read or view the materials. An artificial situation is thus created in which participants are “forced” to pay attention to the materials. In real life, exposure to the materials may have other effects on the

Experimental pretesting in practice

Previously we stated that experimental pretesting contributes to the development of effective health education materials. The studies presented in this thesis demonstrate this in different ways. The studies were performed in collaboration with the national organizations that develop health education materials. During these collaborations we came across some barriers that complicated the implementation of the studies. Based on these barriers we have created a checklist for health education practitioners who want to experimentally pretest their materials.

1. Define the outcomes of campaign (materials) as specific as possible

In order to develop an experimental pretest, one should start with clearly defining the objectives of the campaign, and the materials in specific. These objectives should be selected on the basis a needs assessment. In health education practice the objectives of health education messages are generally psychological constructs (i.e., determinants) such as attitudes, beliefs, cognitions, and feelings. Influencing these determinants successfully should lead to behavioural change. Campaign designers should try to describe these determinants as specific as possible. Unclear and unrealistic goals should be avoided. For example, in first instance the goal of the tested TV Commercial in Chapter 2 was to promote safe sex, but being both too general and unrealistic this goal was after discussion with the campaign team specified to more specific goals at the determinant level, among which the goal to develop a positive attitude towards condom use. The more concrete these goals are described, the easier it is to select appropriate theoretical frameworks to design the materials, and in the following phase, the more appropriate effect measures can be selected.

2. Use accurate and precise outcome measures when evaluating materials

The selection of outcome measures is essential in order to evaluate the effectiveness of campaign materials (Michie & Abraham, 2004). The indication of whether or not an intervention is successful should be measured by appropriate measures. Specific target behaviour and appropriate measures are prerequisites for a good evaluation. If not, possible changes might be missed. The campaign objectives should be translated into objective outcome measures. The more precise these objectives are defined, the more precise the outcome measures can describe possible effects, for example in self-report questionnaires. Self-report questionnaires are only informative when it represents the specific outcome measures. Nevertheless, there are some methodological limitations towards

self-report measures. First, explicit measures require introspection from the participants even though the people may not be aware of the motives that drive their behaviour (Wilson, 2002). Second, participants may respond with social desirable answers. When evaluating the effects of campaign materials, in particular the role of involved cognitive processes, the use of other, more objective, research methods should be explored, for example event related potential (ERPs), eye tracking research, reaction time paradigms. These methods could measure the, often small, effects of campaign materials in a more objective way.

3. Use an experimental design to evaluate outcomes

As mentioned in the introductory chapter of this thesis, in order to be able to draw reliable conclusions about the effectiveness of interventions, it is essential to use an experimental design. That is, a) random allocation of participants to experimental conditions; and b) the presence of a control condition. The latter can be realized in different forms, for example, a control condition which is not exposed to campaign materials, or a control condition which is exposed to existing materials. The last option is preferred as in this case the effects can be compared with modified (i.e., theory-based) versions of the materials. As in medical research, an experimental design is the only design that allows reliable conclusions about the effectiveness of campaign materials.

4. Pretest theoretical strategies

Experimental pretesting allows comparing different version of materials before they are finalized. As shown in chapter four of this thesis, different versions based on different theoretical strategies could be compared. An example is comparing different strategies to motivate viewers to go to a website. Another example is comparing the original material with a modified version. In response to the findings of the pretest, changes can still be carried out in order to develop more effective campaign materials.

5. Share your results

Providing an elaborate and precise description of the campaign materials and which theoretical frameworks have been consulted are necessary conditions that allow replication (Michie & Abraham, 2004; Oakley et al., 1995). Although it may seem obvious, evaluation reports rarely provide extensive descriptions of the intervention procedures, nor the process of translating the theoretical frameworks into practical strategies (Aarø et al., 2006; Hou, Fernandez, & Parcel, 2004; Kok, Harterink, Vriens, de Zwart, & Hospers, 2006;

Kraag, Kok, Abu-Saab, Lamberts, & Pekkes, 2005; van Empelen, Kok, Schaalma, & Bartholomew, 2003; van Kesteren, Kok, Hospers, Schippers, & de Wildt, 2006). If this would be done, lessons can be drawn from other attempts. Although there is a bias in scientific literature to publish significant results, also non-significant results could be interesting.

6. Make sure that there is opportunity (i.e., time and finance) for pretesting when planning the development of a new campaign

In our experience, the largest obstacle to pretest materials before broadcasting them was of organizational nature. That is, campaign designers are generally very willing to pretest the materials. However, in most cases there is a lack of time and, or financial budgets. Health organizations are often given a budget to develop campaign materials within a small timeframe. Within a few months, a new campaign should be developed and launched. This does not only leave out the possibility of experimentally pretesting materials, but also to complete a systematic process (e.g., Intervention Mapping) to develop theory and evidence based materials. For these reasons we plead that campaign funders and policy experts consider these constraints, and finally contribute to realizing more effective campaign materials. In practice, this would imply that: a) give a larger time frame to develop new mass media campaigns; and b) to insert experimental pretesting as a criterion in future grant proposals. Furthermore, a possible solution might be to implement a continuous dual organizational structure in health campaign offices. That is a research part and an implementation part. The two parts would work parallel and independent of each other. Exchange between the two groups only takes place when experimental pretests have shown that developed campaign materials are effective in reaching predetermined outcomes. Then, the materials can be handed over to the implementation part. Here, materials will be finalized (e.g., filming the TV commercial, selecting appropriate models) and creative decisions will be made. Finally, it can go back to the researchers to design effect evaluations.

Conclusions

This thesis illustrates the use of experimental pretesting with the purpose of developing more effective health campaign materials. This entails the use of experimental designs to pretest campaign materials in the developmental phase. We recommend additional endeavours to further investigate the complementary role of experimental pretesting in the evaluation of campaign materials generated in the developmental stage of a campaign. There is a need for powerful research methods (i.e., experimental studies) to

supplement the existing correlational and focus group research to guide the development of new effective materials (Strahan et al., 2002). These insights may provide important information to campaign developers about the further development and implementation of health education materials. Also, we recommend further investigating the effects of theory-based approaches to health education material design. By doing this, we may very well be able to develop more effective and successful methods for changing proximal determinants of health behaviours.

We do not plead to abandon qualitative research for pretesting. Moreover, qualitative research is appropriate for exploratory research into factors that determine health behaviour (Stephenson & Imrie, 1998). Identifying these factors is key information for the design and development of campaign materials. However, in order to draw strong conclusions on the effectiveness of new campaign materials randomized controlled trials are necessary.

Given the problems associated with making conclusion about the effects of campaigns, we argue that an experimental design is necessary. However, the plead to use and experimental design to evaluate campaign materials is not restricted to formative work (i.e., pretesting), we argue that experimental designs are also appropriate when planning outcome evaluations. It is far more difficult to satisfy the needs of an experimental design when the campaign has been broadcasted (e.g., selecting a suitable control condition, selecting an appropriate time lag before expecting effects, matching populations) (Hornik, 2002; Myhre & Flora, 2000; Yzer et al., 2000). The need to evaluate campaigns remains however. Next to the ideal experimental design; we suggest a pretest-posttest design. To control for possible so-called testing effects, a post-test only group be included. When both groups appear to have equal post-test means, the pretest-posttest differences can be attributed to the effect of the campaign instead of mere participation in the pretest assessment (Yzer et al., 2000). This only holds under the assumption that both groups do not differ on other relevant factors. Another acceptable outcome evaluation strategy is the time-series design with various pretests and posttests (Yzer et al., 2000).

Despite the extra investment, in terms of time, money and organizational efforts, the practical and financial advantages of determining the effectiveness of materials prior to full implementation are significant. Experimental pretesting allows us to approximate the effectiveness of campaign materials and establish counterproductive or non-results prior to the investment of time and money in the final production and implementation of large-scale multimedia public health campaigns, and thus should be an essential part of any development process.

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SUMMARY

The current research project was meant to contribute to health education practice by providing guidelines for designing evidence-based health education materials. In particular, this thesis investigated the role of experimental pretesting in the development process of evidence-based public campaign materials. Therefore, we conducted six empirical studies in which we explored the value and implications of experimental pretesting. All studies were randomized controlled experiments, that is: a) random allocation of participants to the different conditions; and b) the presence of a control condition. Overall, we can conclude that while experimental pretesting is often considered as expensive and time-consuming; our studies have shown that the effort is efficient and worthwhile, and therefore important in order to develop effective public health materials.

Following Chapter 1, which provides a general introduction, Chapter 2 describes an experimental pretest study of new campaign materials intended for distribution in a national STI/AIDS prevention campaign in the Netherlands. The campaign material tested was the storyline of a planned television commercial on safe sex. Results showed positive effects on targeted determinants of safe sexual behaviour. Exposure to the storyline of the television commercial produced a positive effect on risk perception. Unfortunately, this effect was restricted to girls. The storyline also had a positive effect on the intention to buy and carry condoms and on the intention to take initiative in discussing condom use before having sex. These findings suggest a positive effect of the exposure of the television commercial on important determinants of safe sex behaviour among young people. Despite these positive effects, the storyline failed to elicit a positive effect on other targeted outcome variables among which perceived personal responsibility, anticipated regret and the motivation to consistently use condoms with known partners. It was concluded that despite the extra investment, in terms of time, money and organizational efforts, the practical and financial advantages of determining the effectiveness of materials prior to full implementation are significant.

Chapter 3 describes two experiments in which the effects of written health education materials on the personal acceptance of party drug use were evaluated. Following a harm reduction strategy, the materials provided information on minimizing potential hazards associated with drug use. Potential aversive effects of these materials were examined on attitude, intention, and outcome expectancy measures among users of party drugs and non-users. In the first experiment, a leaflet on ecstasy use was evaluated among ecstasy users and non-users. Results showed no health promoting effects, nor counterproductive results on the outcome measures. In the second experiment, the effects of two different formats (leaflet vs. infocard) about two different kinds of party drugs (ecstasy vs. GHB)

were compared within a non-using population. Again, results showed no positive changes on the outcome measures towards ecstasy use as a result of exposure to the ecstasy materials. However, exposure to the GHB materials resulted into a more negative attitude towards GHB use (leaflet and infocard) and lower estimates of the likelihood of positive outcomes of use (infocard). The implications of these findings for drug use intervention program focusing on harm reduction are discussed, including the need for experimental pretesting.

Chapter 4 describes two experiments in which we aimed to demonstrate the usefulness of developing health education materials with a theoretical and empirical research basis. With a specific focus on increasing knowledge, the authors utilized well-researched principles in cognitive psychology to increase the message comprehension of an existing health education brochure. The brochure used was produced by a Dutch national campaign office for preventing alcohol abuse among undergraduate students. In two experimental studies, the original version of the brochure was compared with the theory-based modified version on measures of knowledge and psychosocial determinants of alcohol use among undergraduate university students. The results show significant differences in knowledge uptake between the two versions. In both experiments, the modified version elicited higher scores on knowledge uptake than the original version. Despite these positive findings, no differences in more proximal psychosocial determinants of behaviour could be found. It is concluded that the findings underscore the importance of theory in the design of health education brochures, but that principles in cognitive psychology should be complemented by determinant-specific theory-driven change methods if behaviour change is to occur.

Chapter 5 also focused on the value of developing health education materials, in particular posters, on a theoretical and empirical research basis. In particular, we explored the use of eye tracking to evaluate materials in health education practice. As posters are often only viewed for a short period, a good graphic design is essential. In addition, accurate measurement of the predicted effects is necessary to obtain reliable conclusions about the effects of the materials. The posters used in this study were originally produced by a Dutch national campaign office to promote visiting of a website about the prevention of alcohol abuse. In a randomized controlled trial, the original posters were compared with theory-based modified versions of the posters on measures of recall of the website link and motivation to visit the website. In addition to these self-report measures, eye movements were recorded to measure attention to relevant parts of the posters. There were no differences on self-report measures, except a significant effect of attitude to visit

the website. Results of the eye movements showed that participants tend to spend more time looking at the modified posters than the original (i.e. more fixations, higher dwell time). These positive design effects did not result in higher recall of the website link and intention to visit the website. The chapter ends with a discussion of the implications of eye movement recordings in health education pretest research.

Finally, in Chapter 6 the findings of the studies are discussed. General guidelines are provided for health education practitioners for designing an experimental pretest including:

1. Define the outcomes of campaign (materials) as specific as possible
2. Use accurate and precise outcome measures when evaluating materials
3. Use an experimental design to evaluate
4. Pretest theoretical strategies
5. Share your results
6. Make sure that there is opportunity (i.e., time and finance) for pretesting when planning the development of a new campaign

It is concluded that experimental pretesting allows us to estimate the effectiveness of campaign materials and establish counterproductive or non-results prior to the investment of time and money in the final production and implementation of large-scale multimedia public health campaigns, and thus should be an essential part of any development process.

SAMENVATTING

Dit proefschrift heeft als voornaamste doel een bijdrage te leveren aan de praktijk van gezondheidsvoorlichting door het aanbieden van specifieke richtlijnen voor de systematische ontwikkeling van voorlichtingsmaterialen. Dit proefschrift onderzocht daarbij in het bijzonder de rol van experimenteel vooronderzoek tijdens de ontwikkeling van nieuwe campagnematerialen. Om deze reden werden zes empirische studies uitgevoerd waarin het nut en de implicaties van experimenteel pretesten werd onderzocht. Elke studie was gebaseerd op een experimentele onderzoeksopzet, door a) proefpersonen willekeurig te verdelen over de verschillende condities; en b) de aanwezigheid van een controleconditie. In het algemeen kunnen we concluderen dat ondanks dat experimenteel pretesten als zeer duur en tijdrovend wordt ingeschat, onze studies hebben aangetoond dat de inspanning wel degelijk efficiënt en waardevol is tijdens de ontwikkeling van nieuwe materialen.

Na de algemene introductie van de onderzoeksvraag en de empirische studies in het eerste hoofdstuk, wordt in het tweede hoofdstuk een studie beschreven waarin nieuwe voorlichtingsmaterialen werden geëvalueerd. De materialen waren bedoeld voor de nationale campagne Veilig Vrijen 2004 van Soa Aids Nederland. Het materiaal dat in deze studie getest werd, was de geïllustreerde verhaallijn van een TV spotje. De resultaten toonden verschillende positieve effecten op uitkomstmaten die overeenkwamen met de doelstellingen van het materiaal. Blootstelling aan de verhaallijn van het TV spotje veroorzaakte een positief effect op risicoperceptie. Dit effect was echter slechts beperkt tot de meisjes. Verder waren er ook positieve effecten op de intentie om condooms te kopen, bij zich te hebben en te communiceren over het gebruik ervan tijdens het vrijen. Deze bevindingen suggereren een positief effect van het geplande TV spotje op belangrijke determinanten van veilig vrijen bij jongeren. Ondanks deze positieve effecten werden er geen effecten gevonden op andere gedragsdeterminanten, bijvoorbeeld de ervaren eigen verantwoordelijkheid, geanticipeerde spijt, en de motivatie om consistent condooms te gebruiken met partners die men kent. Het hoofdstuk eindigt met de conclusie dat ondanks de extra inspanning in tijd, geld en organisatie, de praktische en financiële voordelen van het bepalen van de effectiviteit van de materialen voorafgaand aan de uiteindelijke implementatie substantieel zijn.

In hoofdstuk 3 worden twee experimenten beschreven waarin de effecten van materialen met betrekking tot party drugs werden geëvalueerd. De materialen waren gebaseerd op een harm reduction strategy. Dit wil zeggen dat de materialen tot doel hadden informatie te geven over hoe potentiële negatieve of schadelijke effecten van party drugs te minimaliseren en niet zozeer mensen ertoe probeerden aan te zetten de drugs niet te gebruiken. De ontwikkelaars van de materialen waren bezorgd dat deze strategie tegen-

gestelde effecten zou uitlokken, meerbepaald dat lezers positiever worden ten opzichte van druggebruik omdat de algemene toon van de informatie niet negatief is. Om deze reden werden de materialen geëvalueerd op determinanten als attitude, intentie, en uitkomstverwachtingen bij niet-gebruikers en gebruikers ten aanzien van het gebruik van party drugs. In de eerste studie werd een folder over ecstasy gebruik geëvalueerd bij niet-gebruikers en gebruikers. De resultaten toonden geen positieve resultaten die duiden op een preventieve werking van de materialen ten aanzien van gebruik, noch tegengestelde effecten op de gedragsdeterminanten. In de tweede studie werden verschillende uitgaven van de informatie (brochure vs. folder) over twee verschillende party drugs (ecstasy vs. GHB) met elkaar vergeleken bij niet-gebruikers. Opnieuw werden er geen positieve en negatieve effecten gevonden na lezing van de ecstasy-gerelateerde materialen. Echter, na het lezen van zowel de brochure als de folder hadden proefpersonen een negatievere attitude ten opzichte van GHB gebruik, en na het lezen van het folder kochten proefpersonen de kans op positieve effecten van GHB lager in. Het hoofdstuk eindigt met een bespreking van de implicaties van deze bevindingen voor de ontwikkeling van drugpreventieprogramma's op basis van een harm reduction strategy en het nut van experimenteel pretesten daarbij.

In hoofdstuk 4 worden twee experimenten beschreven waarin het nut van het ontwikkelen van nieuwe campagnematerialen op basis van empirische en theoretische evidentie wordt aangetoond. In dit geval was er een specifieke focus op het verhogen van kennis over alcoholgebruik bij de deelnemers. Op basis van bekende principes uit de cognitieve psychologie werd de leesbaarheid en begrijpelijkheid van een bestaande brochure verbeterd. De brochure was ontwikkeld door het Nationaal Instituut voor Gezondheid en Ziektepreventie (NIGZ) om alcoholmisbruik bij eerstejaarsstudenten tegen te gaan. In twee experimentele studies werd de originele versie van de brochure vergeleken met de aangepaste versie op metingen van kennis en gedragsdeterminanten van alcoholgebruik (attitude, intentie). De resultaten toonden significante verschillen in kennisopname tussen de twee verschillende versies. In beide experimenten zorgde de aangepaste versie van het materiaal voor een betere kennisopname dan de originele versie. Ondanks deze positieve effecten werden er geen verschillen gevonden op meer proximale, psychosociale determinanten van gedrag. Geconcludeerd werd dat de bevindingen het belang van het gebruik van theorie tijdens de ontwikkeling van brochures aantonen en dat meer specifieke methoden en strategieën nodig zijn om verandering in gedragsdeterminanten te bewerkstelligen.

Hoofdstuk 5 gaat verder door op het belang van het ontwikkelen van materialen, met name posters, op basis van theoretische bevindingen. In deze studie werd specifiek

de methode van oogbewegingen getest om voorlichtingsmaterialen te evalueren. Omdat posters slechts gedurende een korte periode bekeken worden, is het design van een poster essentieel om de boodschap goed over te brengen. Bovendien is een accurate meting nodig om de voorspelde effecten van de posters te testen nodig, zoniet kunnen geen betrouwbare conclusies getrokken worden. De posters in deze studie werden ontwikkeld door het Nationaal Instituut voor Gezondheid en Ziektepreventie (NIGZ), en waren primair bedoeld voor het onder de aandacht brengen van een website waar meer informatie over de effecten van alcoholmisbruik gevonden kan worden. In een experimentele studie werden de originele posters vergeleken met posters die werden aangepast op basis van theoretische bevindingen op maten van herinnering van het adres van de website en de motivatie om de website te bezoeken. Naast de gebruikelijke zelfrapportage maten, werden oogbewegingen geregistreerd om de mate van aandacht voor de verschillende delen van de posters te meten. Hoewel er geen verschillen werden gevonden op de zelfrapportage maten, met uitzondering van een positief effect van de aangepaste posters op de attitude om de website te bezoeken, toonden analyses van de oogbewegingen aan dat proefpersonen meer tijd (c.q. aandacht) spendeerden aan het bekijken van de aangepaste versies van de posters dan aan de originele versies (i.e., meer fixaties). Deze positieve effecten leidden echter niet tot een betere herinnering van het adres van de website of de intentie om de website te bezoeken. Het hoofdstuk eindigt met het beargumenteren van het nut en de implicaties van het gebruik van oogbewegingen bij het pretesten van nieuwe voorlichtingsmaterialen.

Tot besluit worden in hoofdstuk 6 de bevindingen van de verschillende studies besproken. Algemene richtlijnen worden besproken voor het gebruik van experimenteel pretesten in de praktijk van gezondheidsvoorlichting:

1. Specificeer de uitkomsten van de campagne (materialen) zo precies mogelijk
2. Gebruik objectieve en accurate uitkomstvariabelen
3. Pas een experimenteel design toe
4. Pretest theoretische strategieën
5. Verspreid je resultaten
6. Zorg voor de mogelijkheid (i.e., tijd en geld) tot pretesten tijdens het plannen van de ontwikkeling van een nieuwe campagne

Er wordt geconcludeerd dat experimenteel pretesten zeer nuttig is in het bepalen van de effectiviteit van campagne materialen, waaronder het vaststellen van mogelijke averechtsse of uitblijvende effecten, voordat grote hoeveelheden tijd en geld worden geïnvesteerd in de productie en implementatie van grootschalige multimedia campagnes. Met andere woorden, experimenteel pretesten zou een standaardonderdeel moeten zijn bij de ontwikkeling van nieuwe campagnematerialen.

CURRICULUM VITAE

Curriculum Vitae

Jill Whittingham werd geboren op 2 september 1980, in Gent (Belgie). Zij behaalde haar middelbaar diploma in 1998 aan het Sint Lambertus College in Bilzen (Belgie). Datzelfde jaar begon zij haar studie Psychologie aan de Universiteit Maastricht. In 2002 studeerde zij af in de cognitieve psychologie, met als specialisatie onderwijspsychologie. Daarna is zij tot april 2007 als promovenda werkzaam geweest bij het Departement Work & Social Psychology van de Universiteit Maastricht. Momenteel werkt zij als onderwijsbeleidsmedewerker bij de Universiteit Maastricht.

Jill Whittingham was born on September 2nd 1980, in Gent (Belgium). In 1998 she graduated from secondary school Sint Lambertus College, in Bilzen (Belgium). A few months later she started studying Psychology at Maastricht University. In 2002 she graduated in cognitive psychology with specialization in educational psychology. In September 2002, she began her Phd research at the department of Work & Social Psychology at Maastricht University. She is currently working as educational policy advisor at Maastricht University.

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