The impact and evaluation of two school-based interventions on intention to register an organ donation preference

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Abstract

The present paper describes the impact and evaluation of two intervention components—a video with group discussion and an interactive computer-tailored program—in order to encourage adolescents to register their organ donation preference. Studies were conducted in school during regular school hours. The video with group discussion in class had a positive impact on the intention to register an organ donation preference as well as on the intention to register as a posthumous organ donor. The computer-tailored program had no surplus value when compared to reading an extensive brochure with general information on organ donation. However, participants appreciated the tailored information more than the brochure. It may be that having provided general information before exposure to the tailored program, the tailored intervention will be more effective. This needs to be tested in a further experiment.

Introduction

In most countries, there is a lack of available donor organs and tissues, resulting in loss of quality of life and premature death among people in need of donor organs and tissues (Horton and Horton, 1990; Radecki and Jaccard, 1997). This is also the case in The Netherlands (Driessche et al., 1996). In order to increase the number of potential organ and tissue donors, the Dutch government changed donation legislation in 1998, implementing a new opting-in system in which a central registration system for organ donation preferences was established to replace the use of donor cards. From 1998 on, all Dutch citizens, within 1 year after reaching the age of 18, receive an organ donation registration form on which they can indicate their organ donation preference. All preferences are centrally registered at the Donor Register. One can be registered as:

(1) A posthumous organ and tissue donor
(2) A posthumous organ donor for specific organs and tissues
(3) Non-donor
(4) Leaving the decision to the next of kin
(5) Leaving the decision to a specific person

In 1998, all 12 million Dutch inhabitants aged 18 years and older were asked to indicate their preferences with regard to organ donation. However, 63% of these inhabitants did not complete and return their registration form, which means that for a majority the preference is unknown (Kunst and Witlox, 1999). When a potential donor has not registered his or her desire, permission for donation will need to be asked from their next of kin. In order to create clarity and to prevent the next of kin from taking a difficult decision at a very emotional moment, it is important that people register their organ donation will and that the number of registrants increases to a majority of the Dutch adult population. As each year, on average, 190 000
adolescents in The Netherlands reach the age of 18; this group is considered to be the most important target group for encouraging organ donation registration (Donorregister, 2000). A school-based education program is being developed to enable adolescents to make a well-considered decision about organ donation and to encourage them to register their decision (registration options 1–5 above).

This paper describes and discusses two studies on the development and short-term impact of two intervention components to encourage adolescents to register their preferences with regard to organ donation, specifically developed for that program—a video with group discussion (Study 1) and an interactive computer-tailored program (Study 2).

Preliminary research
Planned health education should be based on a careful analysis of the determinants of the behavior change or attitude change which the intervention is intended to achieve. Three studies were conducted to investigate the determinants of organ donation registration among Dutch adolescents (Brug et al., 2000; Reubsaet et al., 2001a,b), based on Bandura’s Social Cognitive Theory (Bandura, 1986). In brief, these studies showed that negative outcome beliefs (e.g. ‘by registration as an organ donor, death may be established too soon’), positive outcome beliefs (e.g. ‘by completing and returning the registration form, I can decide what happens with my organs and tissues after my death’), social outcome expectations (e.g. ‘I think that my parents would want me to register as an organ donor’) and anxiety related to organ donation registration were all significantly associated with the adolescents’ willingness to register as a posthumous organ donor (registration option 1 or 2). Reubsaet et al. (Reubsaet et al., 2001a,b) also found that involvement with organ donation issues, past behavior (e.g. ‘having discussed organ donation registration with other people’), knowledge, sex and level of education were significantly associated with the willingness to register as a posthumous organ donor. Based on these preliminary studies, it was concluded that interventions should be aimed at increasing involvement, and communicating correct facts and information about outcomes related to organ donation registration.

General methods
Both studies were conducted in a school environment during school hours. In each school, classes were selected and randomly assigned to either an experimental group or a control group.

All students received written information about the study and two informed-consent forms. The first form was to state their personal agreement with participation in the study. The second form was for their parents to fill out (in The Netherlands agreement of participants as well as their parents is required for people between 12 and 18 years old). The informed-consent forms were distributed and collected by the teachers. After written agreement of both students and parents was documented, the experiment was carried out.

Data were collected with self-administered questionnaires. Post-test questionnaires were developed to assess the impact of the interventions. These post-tests assessed the willingness to complete and return an organ donation registration form and donation preference. Additional questions about participants’ reactions to the computer-tailored program and the video with group discussion were included. Questions were included in order to assess how many participants read or saw the information, and to rate the information on interest, understandability, credibility and personal relevance. The questions could be answered on five-point scales, varying from ‘not at all’ to ‘very much’. Finally, questions about the participants’ age, sex and level of education were included in the post-test questionnaires.

Study 1: Video with group discussion

Introduction
The kind of intervention that should be used in health education varies, and depends on the situation and end-users of the intervention (Bartholomew et al., 2001). In a school-based education program, group discussion is a method often used
by teachers for learning and cognitive development (Ahern et al., 1992; Bartholomew et al., 2001). An advantage of group discussions is the interaction between students, giving adolescents the opportunity of expressing different points of view and to explore new concepts. Furthermore, better understanding and more thorough absorption of information can be achieved (Beckman, 1952; Ahern et al., 1992). A video may be a useful education tool to trigger a classroom group discussion and thus encourage involvement among adolescents (Wetzel et al., 1994; O’Donnell et al., 1995). Furthermore, students may learn more easily from visual media. A video combines more ways of providing information than other media (e.g. text), allows learning through both verbal and visual means (Wetzel et al., 1994), and may be better able to capture students’ attention (Ferland et al., 2002). Furthermore, videotape players are nowadays available in all school settings and under the direct control of teachers. Teachers have the possibility to preview a tape, to introduce it at any time that is convenient for them, to stop it for discussion and to rewind it at any time (Wetzel et al., 1994). Finally, video-based intervention is time and cost effective, and can be used repeatedly (Torabi et al., 2000; Ferland et al., 2002).

We developed a video to encourage group discussion about organ donation and registration in order to increase involvement, to encourage positive beliefs and to counter argue negative outcome beliefs in order to increase intentions towards organ donation and registration.

Methods

A quasi-experiment with a Solomon four-group design was conducted in seven secondary schools in The Netherlands. We expected that a pre-test questionnaire could make participants more sensitive to the intervention. In order to examine pre-testing effects, two groups (E1 and C1) received a pre-test questionnaire for completion 2 weeks before the intervention started. Each class was randomly assigned to one of the experimental groups E1 (n = 57) or E2 (n = 69) or one of the control groups C1 (n = 66) or C2 (n = 60). Students in the experimental groups (E1 and E2) watched a video concerning organ donation and registration. After watching the video, students discussed these episodes among each other in the class, supervised by their teacher. The control groups (C1 and C2) did not receive any intervention. Immediately after the intervention, students in all groups received a post-test questionnaire.

The videotape consisted of four episodes in which positive and negative outcome expectations concerning organ donation and registration were discussed. The different episodes of the video were aimed at eliciting a class discussion among adolescents of these different positive and negative outcome expectations.

The first episode deals with the concept of ‘brain death’ from the perspective of the parents and brother of a deceased 16-year-old boy. Participants were encouraged to think about and discuss what brain death means, and who decides when a person is diagnosed as brain dead. The second episode addresses common beliefs that by registering as a posthumous organ donor, one may be able to help a person who is in need of a donor organ. Although many adolescents agree with this outcome expectation, some may not and participants were encouraged to discuss their opinions on this topic. In the third episode, a family discusses some of the pros and cons of registration and non-registration of an organ donation preference. This episode is aimed especially at encouraging adolescents to discuss organ donation and registration within their families. In the last episode, the importance of registering an organ donation preference is discussed again, this time from the perspective of a physician and the parents of a deceased boy.

After each part of the video, participants were encouraged by their teacher to discuss their opinions and beliefs. The group discussion took about 50 min.

Participants

In total, 252 secondary school students participated in the study. Due to privacy reasons, schools were not allowed to provide any information on non-responders. Twenty-four percent of the participants were educated at higher general secondary education
 Results

First, $\chi^2$-tests showed that there was no impact of the pre-test questionnaire on the intention to register an organ donation preference at post-test nor on the intention to register as an organ donor at post-test. Direct logistic regression analysis showed that more female participants were assigned to the experimental group than to the control group (odds ratio (OR) = 2.31; 95% confidence interval (CI) = 1.02–5.27; $P < 0.05$) and that participants who were assigned to the groups with a pre-test questionnaire were significantly younger (OR = 1.75; CI = 1.21–2.54; $P < 0.005$). Therefore, further tests were adjusted for sex and age.

In order to test the impact of the video with group discussion on the willingness to register (as a posthumous organ donor), one-sided direct logistic regression analyses were performed, using study group (E/C), pre-test/no pre-test, interaction between study group and pre-test/no pre-test, age and sex as independent variables (Table I). Because of one-sided logistic regression analyses, 90% CIs are reported. The results show that participants in the experimental group were more likely to be willing to register their organ donation preference than female participants (OR = 0.46; CI = 0.23–0.95).

Of the participants in the experimental group, 71% thought that it was (very) good to discuss different outcome expectations concerning organ donation and registration, while 57% found the discussion (very) interesting. Half of the participants thought that the discussion was (very) easy and only 12% found it difficult. With respect to the novelty of the information they received, 17% indicated that they learned (very) much, 39% indicated that they received a fair amount of new information (neither a lot of new information nor only a little bit of new information) and 46% indicated that they did not learn much nor less from the video and group discussion.

 Discussion

Study 1 was conducted to test the impact and subjective evaluation of a video followed by a group discussion in the class. The results demonstrate that the video-based intervention followed by a group discussion is effective in increasing both the intention to register an organ donation preference and the intention to register as a posthumous organ donor.

As mentioned before, videos are used frequently in school-based education programs addressing various behaviors such as unsafe sex (O’Donnell et al., 1995; Torabi et al., 2000) and gambling (Ferland et al., 2002). These studies also demonstrated positive effects of video-based interventions. Further, O’Donnell et al. (O’Donnell et al.,

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Intention to register an organ donation preference</th>
<th>Intention to register as an organ donor</th>
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<tbody>
<tr>
<td></td>
<td>OR</td>
<td>90% CI</td>
</tr>
<tr>
<td>Video with discussion</td>
<td>3.42$^a$</td>
<td>1.22–9.60</td>
</tr>
<tr>
<td>Pre-test/no pre-test</td>
<td>0.62</td>
<td>0.25–1.51</td>
</tr>
<tr>
<td>Interaction (study group $\times$ pre-test)</td>
<td>0.43</td>
<td>0.10–1.95</td>
</tr>
<tr>
<td>Age</td>
<td>1.13</td>
<td>0.68–1.89</td>
</tr>
<tr>
<td>Sex (1 = female; 2 = male)</td>
<td>0.46$^a$</td>
<td>0.23–0.95</td>
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$^aP < 0.05$ (one-sided).
1995) and Ferland et al. (Ferland et al., 2002) found that the efficacy of a video was increased substantially by using the video as a trigger for an interactive discussion.

Study 2: An interactive computer-tailored intervention

Introduction

Because of the size of the target group of 18 year olds, a mass media approach is a likely choice to encourage 18 year olds to register. However, generic mass media interventions are more effective in drawing attention to a specific issue than in initiating specific actions (Ban and Hawkins, 1996). The generic information that is communicated in these interventions is usually unspecific and not personally relevant for most individuals targeted with the intervention (Kreuter et al., 2000a; Vries and Brug, 1999). By tailoring interventions to the characteristics, education needs and beliefs of individuals, it is possible to provide information that is personally relevant, and therefore more specific and less redundant. It has been proven that personally tailored information is more likely to be read, comprehended, processed more intensively and appreciated more, which makes the desired behavior (change) more likely [see (Brug and De Vries, 1999) and (Kreuter et al., 2000b) for overviews of empirical evidence]. A relatively new approach in health education—computer tailoring—combines the individualized approach of interpersonal counseling with the opportunity to reach larger population groups against relatively low costs per person (Brug, 1999).

Computer tailoring was expected to be a useful approach in teaching adolescents about organ donation (registration), because many misconceptions exist about organ donation and these misconceptions differ among individuals. The misconceptions are important predictors of the willingness to register as a posthumous organ donor, (2) a screening instrument which performs a ‘diagnosis’ at the individual level of these characteristics, (3) a message library that contains educational messages tailored to all possible screening results, and (4) a computer program that evaluates the diagnosis and selects and generates relevant messages tailored to the specific needs of each participating adolescent (Brug et al., 1996; Dijkstra and Vries, 1999).

An interactive computer-based screening questionnaire was developed. Completion of the questionnaire took 15–20 min and adolescents could feed their answers directly into the computer by mouse clicks. All answers to the screening questions were automatically coded and read into a data file. The screening questionnaire included questions on positive and negative outcome expectations, social outcome expectations, and are used more and more in school-based activities (Lieberman, 1997).

Methods

A computer-tailored intervention was developed and tested in a post-test design against a control group who received information about organ donation through a brochure. Because of the results found in Study 1, we used a more simple two-group design in this study. Five schools (14 classes) participated and in each school the classes were randomly assigned to either an experimental group ($n = 86$) or a control group ($n = 100$). Students in the experimental classes individually started and completed the program. Since in Study 2 we wanted to test whether computer-tailored information would be more effective than existing brochures with information on organ donation, the control group received an 11-page brochure from the Dutch Foundation of Donor Education. Students in both groups received a post-test questionnaire immediately after completion of the tailored program or reading the brochure.

For the generation of a computer-tailored intervention, four elements are required (Figure 1): (1) a theory-based and empirically validated inventory of variables that are important determinants of the willingness to register as a posthumous organ donor, (2) a screening instrument which performs a ‘diagnosis’ at the individual level of these characteristics, (3) a message library that contains educational messages tailored to all possible screening results, and (4) a computer program that evaluates the diagnosis and selects and generates relevant messages tailored to the specific needs of each participating adolescent (Brug et al., 1996; Dijkstra and Vries, 1999).
donation registration, involvement with organ donation issues, past behavior, and knowledge.

Most questions could be answered on four-point (fully agree–fully disagree) scales with a ‘don’t know’ option. The two past behavior questions were answered with ‘yes’ or ‘no’ and the knowledge statements were answered with ‘right’, ‘wrong’ or ‘don’t know’.

The messages library file consisted of 226 different feedback messages, which were tailored to different beliefs, knowledge scores, anxiety levels and general interest. Different feedback messages were written for each item of the screening questionnaire. The messages were written by professional health educators in association with a physician and representatives of the Dutch Foundation of Donor Education. The feedback messages were pre-tested among a small group of adolescents and were rewritten according to the results from the pre-test. Each feedback message was provided with a unique code.

Figure 2 gives an example of one of the possible feedback pages in the program. A professional designer enriched the messages with illustrations and a clear and attractive layout.

A computer program, written in Visual Basic, read and analyzed the screening results, and selected relevant messages from the library. The tailored feedback was on screen and consisted of a series of interlinked web pages. Participants could also print the feedback.

Six topics related to organ donation and registration were presented (advantages of organ donation and registration; what do other people think about organ donation and registration; is organ donation scary?; what do you think about organ donation and registration?; the organ donation knowledge test; do you want to receive more information about organ donation and registration?). By clicking on a topic, the screening questions related to that particular topic appeared on the screen. Feedback was provided immediately after all questions on a topic were completed. After reading the information on a topic, participants could continue with one of the other topics. For the present study, subjects were instructed to go through all six topics.

Fig. 1. Computer-tailored intervention.
Participants
A total of 186 secondary school students participated. Again, two different school levels (comparable to the UK secondary school system) were included in the study: higher general secondary education \((n = 136)\) and university preparation school education \((n = 50)\). Mean age was 16.02 (SD = 0.65; range 15–18) and 53% were female.

Results
Direct logistic regression analyses were performed with the intention to register and the intention to register as an organ donor as dependent variables, and study group, age, sex and school type as independent variables. The results showed that the intervention had no significantly stronger impact on either the intention to register an organ donation preference or the intention to register as a posthumous organ and tissue donor than the control condition, in which students studied the (extensive) brochure (Table II).

Table III shows that the computer-tailored information was more often read than the general information \((t = 2.72, \text{d.f.} = 184, P < 0.01)\). Furthermore, \(t\)-tests showed significant differences between the experimental group and the control group in the extent to which the information was found to be interesting \((t = 3.13, \text{d.f.} = 184, P < 0.01)\) and personally relevant \((t = 2.88, \text{d.f.} = 183, P < 0.01)\). However, participants in the general information group perceived to have learned more

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**Fig. 2.** An example of a feedback page in the computer-tailored intervention.
from the information they received \((t = -2.54,\ d.f. = 183,\ P < 0.05)\). No differences in credibility, comprehensibility, quality and novelty of the information were found.

**Discussion**

Study 2 showed that the computer-tailored intervention was appreciated better than general information, but did not result in stronger intentions to register or in differences in preference for registration as an organ donor.

Earlier studies showed positive effects of computer-tailored education over a range of health-related behaviors, such as dietary change (Brug et al., 1999) and smoking cessation (Dijkstra et al., 1998; Strecher, 1999). However, Kreuter et al. (Kreuter et al., 2000b) showed that the impact of tailoring may be completely dependent on the (lack of) variation in beliefs and other determinants of the target behavior in the study population. In a study on weight loss, it was shown that among people for whom non-tailored materials (by chance) fitted their beliefs, non-tailored materials were equally effective or even more effective than tailored information. In the present study, the control group received fairly specific information on organ donation and registration through a brochure, and this may have been as well fitting and therefore as influential as the computer-tailored information. Because we wanted to test if computer-tailored information would do better than generic information, a control group that received no information on organ donation and registration was not included in the study.

It may also be that, because organ donation and registration is a relatively new topic for adolescents, and because for many students it was the first time they discussed this topic, in such situations tailored information has no additional impact and that initially generic information is sufficient. Also, because of their age, adolescents often do not regard organ donation as a highly relevant topic.

Finally, in most computer-tailored interventions that have been evaluated to date, computer

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<tr>
<th>Table II. ORs and 95% CIs for potential predictors of the willingness to register organ donation preference</th>
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<tr>
<td>Outcome variable</td>
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<tr>
<td>OR</td>
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<tr>
<td>Computer-tailored intervention</td>
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<td>Age</td>
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<td>Sex (1 = female; 2 = male)</td>
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<td>School type</td>
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<tr>
<th>Table III. Participants’ reactions to computer-tailored interactive information and general information [mean scores (SD)]</th>
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<tbody>
<tr>
<td>Items (possible range)</td>
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<td>-------------------------</td>
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<tr>
<td>Did you read the information? (1/3)</td>
</tr>
<tr>
<td>How interesting was the information? (-2/+2)</td>
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<tr>
<td>How credible was the information? (-2/+2)</td>
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<td>How understandable was the information? (-2/+2)</td>
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<tr>
<td>How good was the information? (-2/+2)</td>
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<tr>
<td>How personally relevant was the information? (-2/+2)</td>
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<tr>
<td>How much new information did you read? (-2/+2)</td>
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<td>How much did you learn? (-2/+2)</td>
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T = tailored information; G = general information.
technology was used very sparsely and participants may not even realize that computer technology was used to give them personal advice. In these studies, participants completed written questionnaires and received written feedback while the feedback-generating process was done at an intervention centre (Vries and Brug, 1999). However, the present study used an interactive computer program so there could be no doubt that a computer generated the feedback. Hardly anything is known yet about how trustworthy web-based information is perceived to be.

As in earlier studies (Brug et al., 1998; De Bourdeauduij and Brug, 2000), the tailored information was read more often, and was evaluated as more interesting and personally relevant than the general information on organ donation and registration.

**General conclusions**

In The Netherlands, the educational curriculum pays little or no attention to organ donation and registration. In order to increase the number of registered adolescents in The Netherlands, interventions activities were developed that could be incorporated in a school-based education program. The present paper described the development, rationale and efficacy tests of these activities: a video-based intervention with group discussion and an interactive computer-tailored program. Efficacy testing is generally regarded as important before implementing a program in which different activities are combined. Pre-test research is often restricted to very brief qualitative research. In the present study, we presented a more extensive, experimental and, therefore, quantitative, pre-test.

The video with group discussion had a positive effect on the intention to register an organ donation preference as well as on the intention to register as an organ donor, and participants evaluated the group discussion as good and interesting. Although the computer-tailored program did not show more effects than reading an extensive brochure on organ donation, participants did appreciate the tailored information better than general information. It may be that having provided general information before exposure to the tailored intervention (e.g. by means of a video with group discussion), the tailored intervention is more effective because awareness and general interest have already been established. This needs to be tested in a further experiment.

A limitation of the present study is that the focus was on behavioral intention instead of actual behavior. Information on actual behavior cannot be made available due to privacy protection legislation. Future research should address the need for actual registration behavior by including a longer follow-up.

Presently, both the video with group discussion and the computer-tailored program are integrated in a school-based education program consisting of two lessons. Although the computer-tailored component did not have a significant effect, it was included because it was found to be much more attractive to the students, is more flexible in its applications and is less costly to apply.

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**References**


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