

Helping smokers to decide on the use of efficacious smoking cessation methods: a randomized controlled trial of a decision aid

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ABSTRACT

Aims Most smokers attempt to stop smoking without using help. We evaluated the efficacy of a decision aid to motivate quitters to use efficacious treatment. **Setting and participants** A total of 1014 were recruited from a convenience sample of 3391 smokers who intended to quit smoking within 6 months. **Design and intervention** Smokers were assigned randomly to either receive the decision aid or no intervention. The decision aid was expected to motivate quitters to use efficacious cessation methods and contained neutral information on treatment methods, distinguishing between efficacious and non-efficacious treatments. **Measurements** Baseline questionnaire and follow-ups were used 2 weeks and 6 months after the start of the intervention. **Findings** The decision aid increased knowledge of cessation methods and induced a more positive attitude towards these methods. Furthermore, 45% reported increased confidence about being able to quit and 43% said it helped them to choose between treatments. However, no clear effect on usage of treatment aids was found, but the intervention group had more quit attempts (OR = 1.52, 95% CI 1.14–2.02) and higher point prevalence abstinence at 6-month follow-up (20.2% versus 13.6%; OR = 1.51, 95% CI = 1.07–2.11). **Conclusions** An aid to help smokers decide to use efficacious treatment when attempting to quit smoking had a positive effect on smoking cessation, while failing to increase the usage of efficacious treatment. This finding lends support to the notion that the mere promotion of efficacious treatments for tobacco addiction might increase the number of quit attempts, irrespective of the actual usage of treatment.

Keywords decision aid, randomized trial, smoking cessation, treatment.

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INTRODUCTION

Tobacco use is still one of the most widespread and harmful of addictive behaviours. In the 25 countries of the European Union alone, 656 000 people die every year as a direct or indirect consequence of smoking, making tobacco addiction the most important avoidable cause of disease and premature death (European Commission 2004). Randomized trials have shown consistently that quitters who use evidence-based therapy significantly improve their chance of success compared to no therapy or placebo (Fiore *et al.* 2000). Among these therapies are self-help methods, physician advice, telephone counselling, cognitive behavioural therapy,

nicotine replacement therapy and non-nicotine medication such as bupropion.

Clinical guidelines for treating tobacco dependence that describe the range of efficacious therapies have recently become available in various developed countries (Raw, McNeill & West 1998; National Health Committee 1999; Fiore *et al.* 2000). These guidelines recommend that every smoking patient should be offered tobacco dependence treatments. It is believed that increasing the use of effective smoking cessation aids could, in principle, have a substantial public health impact (West *et al.* 2005).

Nowadays, smokers who want to quit smoking can choose from a variety of efficacious therapies. Indeed, the use of treatments has increased, for example from 8% in

1986 to 20% in 1996 in the United States (Zhu *et al.* 2000), and from 18% in 1991 to 24% in 2000 in the Netherlands (Willemsen, Wagena & van Schayck 2003). Furthermore, recent data from the Community Intervention Trial for Smoking Cessation (COMMIT) trial show that the prevalence in the United States of ever having used assisted methods to quit increased from 45% to 60% between 1993 and 2001 (Hyland *et al.* 2004). These increases are probably caused by the fact that more stop-smoking methods became available in the 1990s, especially a wider range of pharmacological treatments. However, despite these increases, the current situation is still that the number of smokers who attempt to quit on their own far outweighs the number who use some form of efficacious therapy. Effective treatments for tobacco dependence are still widely underused (Cokkinides *et al.* 2005). For example, in the Netherlands 64% of smokers who made a quit attempt in 2004 had not used any method (Zeegers, Segaar & Willemsen 2005). Nicotine therapy was used by only 13% of quitters (8% used the gum) and only 4% used bupropion. Popular methods were non-efficacious methods such as laser therapy (8%) and the Allen Carr method (book or 1-day course; 6%).

Various strategies have been suggested to improve the usage of efficacious cessation aids. One strategy is by reimbursing treatment costs. Some recent studies showed that this results in modest but significant improvements in usage (Curry *et al.* 1998; Schauffler *et al.* 2001; West *et al.* 2005), whereas others reported no benefit (Boyle *et al.* 2002). In the United Kingdom, free formal smoking cessation services have been made widely available to smokers, although they are still much underused (Britton 2004). Another strategy is through intermediaries. For example, family physicians can advise their smoking patients to quit smoking and inform them about the most beneficial treatment. However, many patients who smoke still do not receive adequate advice from physicians on tobacco cessation methods, despite the emergence of clinical guidelines (Cabana *et al.* 1999; Schnoll & Engstrom 2004). A third strategy is by offering cessation services in an unsolicited manner, for example through direct marketing (Paul *et al.* 2004). Little is known about the efficacy of this strategy. A fourth strategy is by educating smokers about the benefits of treatment. One reason why few smokers use treatment may be that they are unaware of the available range of treatments and do not know their potential to increase success rates (Hammond *et al.* 2004). Recent data show that many smokers have misconceptions about the efficacy and safety of nicotine replacement therapy (Etter & Perneger 2001; Bansal *et al.* 2004). Smokers who were more knowledgeable about the safety and efficacy of nicotine medications were more likely to report ever having used them (Bansal *et al.* 2004).

To improve awareness of treatment choices and the potential benefits of using these treatments, we developed a decision aid called 'Starters' Kit', which provides smokers with detailed information about the availability and efficacy of a wide range of treatment methods and helps them to make a choice. Although the field of consumer decision support interventions has grown rapidly in the last 20 years (Estabrooks *et al.* 2001), they have not yet been applied to tobacco addiction treatment.

The efficacy of the decision aid was evaluated by exposing smokers to the aid and comparing their reactions and behaviour change with those of a group receiving no intervention. We hypothesized that the decision aid would increase smokers' knowledge of smoking cessation therapies, make their attitude towards using them more positive, increase their expectation of success when using cessation methods and increase their intention to use treatment in future quit attempts. Furthermore, we expected that exposure to the decision aid would result in more quit attempts and in greater use of evidence-based cessation methods among smokers making a quit attempt, which in turn would result in higher success rates of smoking cessation.

METHODS

Design and participants

We carried out a randomized controlled trial among participants drawn from an internet-based database of more than 35 000 households. These respondents participate in various studies by TNS NIPO, a large market research company, and are used to examine, test and evaluate commercial and non-commercial products at home, for which they receive a financial reward. First, all households received a first screening questionnaire. This identified 3391 smokers who intended to quit smoking within the next 6 months. These were sent a further screening questionnaire through the internet to identify and recruit participants into the study. The response to this questionnaire was 87% (2955 respondents). The result from this questionnaire was that a number of potential participants were excluded. Excluded were participants who no longer smoked (9.4%), those who no longer intended to quit smoking within 6 months (46.4%), those who reported they already knew the decision aid (in response to a colour picture that was presented to them) (6.4%), and those who were unable to or did not want to participate in 'an evaluation of an information kit' that they were told they would receive by mail within a few weeks (without giving specifics about its content, nor stating that it was about smoking cessation) (3.4%). Thus, a total of 1014 respondents (34.4%) were enrolled into the study. Of these, 500 were randomized to the experimental and 514 to the control group. Participants in the experi-

mental group received the decision aid by post. Participants in the control group received no intervention. The fieldwork for the study was conducted in April/May 2003 (pre-test and first post-test) and October/November 2003 (post-test).

Intervention

The decision aid was designed to motivate smokers to use an efficacious cessation method when making a quit attempt and to help them make an informed decision about the treatment method to use. The decision aid was an 8-cm (height) × 23-cm (length) × 23-cm (width) cardboard box, with the logos of STIVORO and the Dutch Cancer Foundation printed on its side. The box was called 'Starter's Kit' and contained a number of items. The first was a booklet describing all major treatment methods available in the Netherlands. A distinction was made between category 'A' treatments (i.e. self-help manual, computerized tailored advice, telephone counselling, group counselling, physician advice, behavioural therapy, nicotine replacement therapy, bupropion) and category 'B' treatments (e.g. the Allen Carr method, hypnosis, acupuncture and soft laser therapy). This distinction was introduced by saying 'Research has shown that some treatments work better than others, but not all treatments have been thoroughly studied yet. Category "A" represented all forms of treatment of which we now know for sure that they are effective'. The distinction between the 'A' and 'B' categories was in line with the Dutch clinical guidelines for smoking cessation (van Weel *et al.* 2005). A short objective description was given of each treatment, using neutral wording, supported with information on the 'intensity' of the treatment (number and frequency of contacts) the type of contact (written, telephone, face-to-face), the length of the treatment period, the financial costs and whether these could be reimbursed by health insurers. Furthermore, the kit contained a video showing Dutch celebrities as well as unknown Dutch ex-smokers who described how they had successfully quit smoking using specific treatments. It was expected that by observing these models, through a process of vicarious learning (Bandura 1986), smokers would learn which cessation method could work best for them. The video also featured a tobacco control expert giving independent and objective information on how various treatment methods work and what may be expected from them. Finally, the kit contained a number of 'samples' of category 'A' treatment methods, to function as a cue to action for smokers to actually make the important step of applying for a cessation method. The following items were included for this purpose: a postcard with which a smoking cessation self-help manual could be ordered, a leaflet about how to apply for group coun-

selling, a brochure on nicotine gum, information on how to apply for telephone counselling, a questionnaire that smokers could complete and return in order to receive computer-tailored advice on smoking cessation and information on a relapse prevention programme called 'after care'. This programme consisted of seven e-mails or postcards with information and advice on how to prevent relapse, which smokers could receive during the first 3 months after their stated quit date. Smokers could apply for this service by sending in a card or by registering through the internet. The production costs of the box was €3.59 (excluding VAT, with a circulation of 200 000).

Measurements

The first follow-up measurement was conducted 2 weeks after participants in the intervention condition had received the decision aid. The second follow-up took place 6 months after they had received the intervention. All measurements were conducted through the internet. Five behavioural and six intermediary psychological outcome measures were used, and self-reported measures of effects were also included.

Self-reported effects

Four items were included to measure self-perceived changes in (1) attitude towards the use of tobacco dependence treatments ('Did the starters' kit make you think more positive or more negative about the use of smoking cessation aids or treatment?'); (2) motivation to quit smoking ('Did the starters' kit increase your motivation to quit smoking?'); (3) confidence about being able to quit smoking ('To what extent did the starters' kit increase or reduce your confidence in the success of your next quit attempt?'); and (4) the degree to which the quit kit helped smokers make a choice between treatment methods ('To what extent did the starters' kit help you choose the most suitable treatment aid?'). Answers ranged from very helpful to not helpful at all, on a five-point scale. The first three items were scored on a five-point bipolar scale ranging from much more to much less.

Behavioural outcomes

At both follow-up measurements, we assessed whether the respondents had made a quit attempt since the first measurement, whether they had used any of the A or B category treatments for this attempt, and the 7-day point prevalence (i.e. not having smoked in the past 7 days, not even a puff). At the second follow-up, we also measured continuous abstinence. Participants were assumed to be continuously abstinent when they were non-smokers at the 6-month follow-up (7-day point prevalence criterion), said that they had quit smoking in either April or

May 2003 and indicated that they had not smoked since this quit attempt.

Intermediary psychological outcomes

Knowledge of treatments was measured by asking participants to select from a list of 17 cessation methods which—if any—they 'knew'. Three indices were constructed: one for the number of pharmacological products they knew (range 0–6), one for the number of other A category treatments (range 0–6) and one for the number of B category treatments (range 0–5). Attitude towards the use of treatment was assessed by asking: 'How do you feel about the use of smoking cessation aids or about receiving support from professionals when trying to quit?' [five-point scale from very negative (+2) to very positive (–2)]. We measured respondents' expectation of success when using a treatment method by asking 'Do you think your chance of success would become greater or smaller by using smoking cessation aids or receiving support from professionals?' [five-point scale from much greater (+2) to much smaller (–2)]. Self-efficacy expectation about being able to quit ('Imagine that you quit smoking. Do you expect you will be able to refrain from smoking in every situation that may occur?') was measured on a five-point scale from certainly yes (+2) to certainly no (–2) (Mudde, Kok & Strecher 1995). General intention to use treatment in future quit attempts was measured with the question 'Would you use treatment if you quit smoking?' [certainly yes (+2) to certainly not (–2)]. A more specific intention to use specific treatment in the future was measured by asking participants to select from a list of 17 cessation methods which—if any—they would use in their next quit attempt. Three dichotomous (yes/no) items were constructed indicating whether they intended to use any of the pharmacological aids, any of the other category A methods, or any of the B category aids.

Potential confounders and effect modifiers

Several variables were included as additional possible confounders and effect modifiers. The first group consisted of demographic variables: gender, age and socioeconomic status (SES). SES (five categories) was constructed by combining educational level and the (most recent) profession of the head of the household. The second group related to smoking history: number of cigarettes smoked per day, nicotine dependency (as measured with the 'time to first cigarette' item) (Heatherton *et al.* 1991), number of quit attempts in the past, smoking status of partner and stage of change (contemplation or preparation) (Prochaska & DiClemente 1983). The third group consisted of psychological background variables that were found in previous studies to predict successful

quitting: perceived social pressure to quit smoking ('How often do people around you say that you should quit smoking?', measured on a four-point scale ranging from very often to never) and self-evaluative consequences of quitting (three items, for example 'If I quit smoking, I will be pleased with myself', Cronbach's $\alpha = 0.73$) (Dijkstra & De Vries 2001).

Statistical analyses

Analysis of variance (ANOVA) and Pearson's χ^2 test were used to test for baseline differences between the two study groups (all tests two-sided). Differences in baseline scores between respondents who participated in the entire experiment and participants who dropped out were assessed by means of logistic regression analysis, with dropout (yes/no) as the dependent variable and study group, smoking history, demographics and potential psychological confounders as predictors.

The effect of intervention on behavioural outcome measures was examined with logistic regression analyses, with relevant baseline factors as covariates. Respondents who were lost to follow-up were included as smokers (intention-to-treat procedure).

For each intermediary psychological outcome variable, we examined changes between pre-test and first follow-up, both in the intervention and the control group. The paired-sample *t*-test was used for knowledge, attitude and success expectations (ordinal scales). The McNemar test was used for changes in intention scores (dichotomous variable). For these analyses, we selected all respondents who provided complete data both at pre-test and first post-test. To assess whether increases in psychological outcome variables between pre-test and first follow-up differed significantly between intervention groups, 'difference scores' (first follow-up score minus pre-test score) were constructed. These were compared between the intervention and control groups by means of *t*-test (ordinal variables) or χ^2 analysis (categorical variables).

In order to examine whether specific characteristics of the smokers modified the effect of treatment on quitting, potential effect modifiers (demographic, smoking history and psychological background variables) were examined in a series of stepwise logistic regression analyses (step 1: treatment and effect modifiers, step 2: interaction terms) with behaviour changes (i.e. making a quit attempt and being abstinent for 7 days at 6-month follow-up) as dependent variables. Treatment and effect modifiers were entered first, followed by interaction terms (treatment–effect). Interaction terms were then removed using a backward eliminating procedure ($P(\text{removal}) = 0.10$). If any interactions remained, the effect of treatment was stratified to this variable in a logistic regression analysis while controlling for relevant confounders.

RESULTS

There were no significant differences between the two study groups in the characteristics of participants (Table 1). However, a baseline comparison between the intervention and control groups in terms of potential psychological confounders revealed that respondents in the intervention condition differed in two items from those who were randomized to the control condition: they had higher general self-efficacy expectations towards smoking cessation (mean scores were 0.0 versus -0.17;

$t = -2.50$; $P < 0.05$) and were less likely to intend to use any of the category A treatments in future quit attempts (11.8% versus 15.6%; $\chi^2(1) = 3.04$; $P = 0.08$). Because these two variables were also associated with behaviour change (quit attempt, 7-day point prevalence of quitting, continuous abstinence), we included them as covariates in all logistic regression analyses involving comparisons between the intervention and control.

Of the respondents who participated in the baseline measurement, 9.6% were lost to the first follow-up and 11.8% to the second follow-up (including non-response to the first follow-up). Attrition analyses revealed that loss to follow-up was not significantly ($P < 0.05$) associated with any of the baseline variables, except with the experimental manipulation: participants in the intervention group were more likely to be missing at the first follow-up (85% versus 96%), but not at the second follow-up.

All participants in the intervention group said they had received the decision aid; 86.1% reported to have actually read the booklet, and 59.8% had watched the video, while 7.5% had applied for the relapse prevention programme.

Self-perceived effects

Fifty-six per cent said that the decision aid had given them a more positive opinion about the use of cessation treatment, while 9% had become more negative and 35% chose the neutral answer. In response to the question of whether the decision aid had increased their motivation to quit smoking, 69% answered affirmatively, 29% 'neutral' and 2% negatively. Self-reported confidence about being able to quit smoking increased as a result of the decision aid for 45% of the respondents (52% neutral, 3% became less confident). Finally, 43% said that it had helped them to choose the most suitable treatment aid (35% neutral, 22% said that it had not helped them).

Behaviour change

No effects were found at the first follow-up. Table 2 shows significant behaviour change between the baseline and the second follow-up measurement. At the second follow-up, significant differences were observed between the two experimental conditions in terms of having made a quit attempt and 7-day abstinence. Logistic regression analyses were used to test whether these effects would hold after correcting for the two confounders, showing that those in the intervention group still had a greater chance of making a quit attempt (OR = 1.52; 95% CI = 1.14–2.02; $P < 0.005$) and being abstinent for 7 days (OR = 1.51; 95% CI = 1.07–2.11; $P < 0.05$). The treatment effect on 7-day abstinence was modified by stage of change ($P < 0.001$) in that exposure to the deci-

Table 1 Demographic and smoking history characteristics of the study population at the pre-test measurement.

Variable	Intervention group (n = 500)	Control group (n = 514)
Sex (%)		
Male	53.4	54.1
Female	46.6	45.9
Age (years) (%)		
18–24	4.2	3.1
25–34	22.2	22.6
35–44	31.6	30.4
45–54	25.0	25.5
55–65	11.6	14.2
65+	5.4	4.3
Socio-economic status (%)		
A (high)	17.1	14.8
Bb	37.8	40.2
Bo	19.5	21.2
C/D (low)	25.5	23.8
Daily smoker (%)	86.2	87.7
Number of cigarettes/day (%)		
1–2	6.6	6.2
3–7	14.0	14.4
8–12	15.0	14.6
13–17	15.4	17.1
18–22	27.6	26.3
23–27	10.0	12.6
> 28	11.4	8.8
Number of previous quit attempts (mean, SD)	2.7 (1.44)	2.7 (1.44)
Smoking status of partner (%)		
No partner	20.8	17.9
Smoker	42.0	39.7
Ex-smoker	17.6	19.8
Never smoker	19.6	22.6
Stage of change (%)		
Preparation	35.4	31.5
Contemplation	64.6	68.5
Time to first cigarette (%)		
< 5 minutes	16.0	16.7
6–30 minutes	38.8	38.1
31–60 minutes	16.2	17.9
> 60 minutes	29.0	27.2

Table 2 Association between experimental condition and behavioural outcomes at 2-week follow-up and 6-month follow-up.

	2-Week follow-up				6-Month follow-up			
	Intervention group (%)	Control group (%)	Difference (95% CI)	P-value	Intervention group (%)	Control group (%)	Difference (95% CI)	P-value
Quit attempt	14.0	11.9	2.1 (2.0–2.1)	NS	31.0	22.2	8.8 (3.4–14.2)	<0.01
7-Day abstinence	8.6	6.4	2.2 (2.2–2.2)	NS	20.2	13.6	6.6 (2.0–11.2)	<0.01
Continuous abstinence	–	–	–	NS	5.0	5.1	0.1 (–1.9–2.1)	NS

Table 3 Self-reported use of treatment among respondents who made a quit attempt since the start of the experiment, measured at the 6-month follow-up (proportions and 95% CI).

Type of treatment	Intervention group (n = 155)	Control group (n = 114)	Difference (95% CI)
Any NRT	13.5	7.9	5.6 (–1.7 to 9.9)
Bupropion	7.1	10.5	3.4 (–2.6 to 9.4)
Any other category A method	9.0	10.5	1.5 (–5.7 to 8.7)
Any category B method	13.5	14.0	0.5 (–7.3 to 8.3)
Advice from family physician	3.9	8.8	4.9 (–1.1 to 10.9)
No treatment used (willpower only)	36.8	42.1	5.3 (–5.8 to 16.4)

Note: multiple answers were allowed.

sion aid had an effect among contemplators (OR = 2.62; 95% CI = 1.58–4.33) but not among smokers in the preparation stage (OR = 0.77; 95% CI = 0.47–1.26).

Use of treatment aids

Table 3 shows which types of treatment were used by smokers who had made a quit attempt. Those who attempted to quit and those who did not make a quit attempt did not differ significantly with respect to the usage of treatment aids (two-sided χ^2 test). Analyses of effect modification showed that exposure to the decision aid resulted in a greater chance of making a quit attempt among smokers in the contemplation stage (OR = 2.07; 95% CI = 1.36–2.96), but not among those in the preparation stage (OR = 1.01; 95% CI = 0.65–1.57).

Effects on psychological variables

Table 4 shows changes in intermediary psychological variables from baseline measurement to 2-week follow-up. Knowledge about cessation treatments increased significantly in both study groups, and these increases were significantly greater in the intervention group than the control group. Attitude towards the use of cessation treatment became significantly more positive, and success expectations significantly increased in the intervention group, but not in the control group. General intention to use cessation treatment did not show an increase in any of the two experimental groups. However, the intention

to use 'other category A treatments' was significantly increased in both groups.

DISCUSSION

The hypotheses were partly confirmed. As expected, the decision aid was effective in increasing smokers' knowledge of smoking cessation methods and in making their attitude towards these methods more positive. Furthermore, 45% reported increased confidence in their own ability to quit smoking and 43% said the kit had helped them to make a choice between treatment options. In view of these positive findings, it was surprising to find no significant effect on actual usage of treatment aids. Exposure to the kit did not result in greater use of bupropion, advice from a physician, nor other efficacious (category 'A') treatments (nor of category 'B' treatments, for that matter). Nicotine replacement therapy (NRT) was used by 13.5 of quitters in the experimental group compared to 7.9% in the control group, but this difference was not significant, due possibly to insufficient statistical power. Thus, it cannot be ruled out that this intervention improves usage of NRT. More studies are needed involving more smokers who make a quit attempt, to be able to conclude whether this type of intervention has a beneficial effect on usage of efficacious cessation methods. For the present study, however, it must be concluded that the decision aid was not powerful enough to increase clear

Table 4 Comparison of changes in psychological outcomes from pre-test (T0) to 2-week follow-up (T1) between intervention and control groups.

Variables	Intervention (I) (n = 425)		Control (C) (n = 492)		Comparison of changes between I and C ^a
	T0	T1	T0	T1	
Number of treatment aids that respondents know (M, SD)					
Pharmacological (0–6)	2.7 (1.5)	3.7 (1.9)***	2.6 (1.4)	2.9 (1.3)***	Δ I > Δ C***
Other Cat A (0–6)	0.9 (1.1)	2.3 (2.0)***	0.9 (1.0)	1.081 (1.1)***	Δ I > Δ C***
Cat B (0–5)	1.6 (1.2)	2.4 (1.6)***	1.6 (1.3)	1.7 (1.2)	Δ I > Δ C***
Attitude towards treatment (M, SD)	0.28 (0.9)	0.47 (0.9)***	0.27 (0.8)	0.29 (0.8)	Δ I > Δ C**
General self-efficacy expectation	-0.01 (1.1)	0.01 (1.0)	-0.15 (1.0)	-0.10 (1.0)	NS
Expectation of success when using treatment (M, SD)	0.74 (0.9)	0.95 (0.7)***	0.76 (0.8)	0.73 (0.8)	Δ I > Δ C***
General intention to use treatment (M, SD)	0.36 1.2	0.38 (1.2)	0.36 (1.2)	0.29 (1.2)	NS
Intention to use specific treatment					
Pharmacological (%)	27.5	30.8	7.0	31.1*	NS
Other Cat A (%)	11.3	23.3***	15.9	22.6***	NS
Cat B (%)	19.5	21.2	15.9	15.7	NS

*P < 0.05; **P < 0.01; ***P < 0.001. ^aResult of univariate analyses of variance to examine changes in ordinal variables and of logistic regression analyses to examine changes in categorical variables (i.e. intention to use specific treatment).

overall usage of cessation methods. For example, smokers were not educated on false perceptions about nicotine replacement therapy, such as the notion that one might become addicted to them, that they are harmful to one's health or the idea that they are designed to make one feel physically sick if smoking at the same time (Bansal *et al.* 2004). An intervention that included these components might have a stronger effect on usage of NRT.

We found positive effects of the decision aid on smoking cessation. Smokers who received the decision aid had a more than 50% greater chance of making a quit attempt and of being 7-day abstinent after 6 months, compared to a control group receiving no intervention. The 7-day point prevalence quit rate was 20.2%, which is quite high. A very interesting finding was that the effect of treatment on making a quit attempt, as well as on 6-month point prevalence quit rate, was restricted to smokers who were in the contemplation stage of change at baseline. Those in the preparation stage did not benefit from the decision aid. One explanation is that these quitters had already decided on the best way of quitting, whereas those in the contemplation stage were still in the process of gathering information about treatment. This is in line with the trans-theoretical model, which states that people in the contemplation stage are most open to consciousness-raising techniques, i.e. they seek new information and try to gain understanding and feed-back about the problem behaviour (Prochaska, DiClemente & Norcross 1992).

An important question remains as to why smokers in the intervention condition were much more successful in quitting smoking, because, compared to the control

group, they were not more likely to use efficacious tobacco dependence treatment when attempting to quit smoking. Apparently, exposure to the decision aid somehow made them decide to try to quit smoking on their own. We may rule out the possibility that the decision aid was used as a self-help method in and of itself, because the decision aid itself did not contain any concrete self-help information that smokers might have put into practice. Furthermore, if the aid was used as a self-help quit method one would expect that self-efficacy expectations would increase after exposure to the decision aid, which did not occur. Another explanation is that the information in the decision aid took away specific barriers to quit smoking, more specifically any excuses participants might have, such as not having enough information on the costs, efficacy and availability of cessation treatment methods. These were all presented to them in a very concise and clear manner, leaving very little room for this 'excuse'. If this explanation were true, the implication would be that large-scale promotion of the existence of efficacious smoking cessation methods, for example through the mass media, could increase the number of quit attempts, irrespective of the actual usage of these cessation methods. Possibly smokers learned from the decision aid that there is a wide range of treatments available, and this new knowledge challenged them to try to quit, knowing that if they should fail, they could still fall back on more formal treatments. From the viewpoint of population impact, therefore, promoting the availability of evidence-based cessation methods may be as important as or perhaps even more important than the actual use of these methods by smokers.

Another explanation for the observed effectiveness of the decision aid is that the decision aid worked as a motivating agent in and of itself, more or less irrespective of the specific content. A qualitative pre-test that was conducted among smokers to assess the likeability and the communication potential of the decision aid showed that the aid was seen by smokers as original, credible and trustworthy (as it featured the Dutch Cancer Foundation as one of the sources). The design of the box had a very active (step-by-step) and no-nonsense 'feel' to it, which may have motivated smokers to take action. Furthermore, the package's sturdy nature (a thick cardboard box), its attractive exterior and the fact that it contained a video may have made it difficult for many smokers to simply throw it away. Thus, by being present in the smokers' home for some time, it may have reminded them constantly that they should quit smoking. Further research into the efficacy of decision aids in smoking cessation should study these heuristic aspects more explicitly, which may account partly for the observed effects on behaviour.

A strength of the study was the low dropout from the study and the fact that we worked with smokers who did not self-select for the intervention. The study population were Dutch smokers in either the contemplation or preparation stage of change and who were not particularly interested in receiving information about smoking cessation aids nor help with quitting. This is in contrast to most experimental studies, which use highly motivated self-selected smokers as study participants, often recruited through self-referral in clinics or through newspaper advertisements. In this context, the high quit rate that was obtained in our study is remarkable, especially given the fact that treatment effects were most pronounced among smokers who did not intend to quit smoking within the next 4 weeks (contemplation stage). These smokers typically do not enter smoking cessation treatment trials. In the general population of smokers, this group is larger than the group of smokers in the preparation stage. An important conclusion is therefore that widespread diffusion of decision aids such as the one presented in the present study can potentially help reduce the burden of disease caused by tobacco smoking. We recommend providing the decision aid to all smokers contemplating quitting, for example through family physicians, pharmacies and other intermediaries.

A possible limitation of the study was the reliance on self-reports of outcomes. We did not conduct biochemical verification of smoking status, because this would have affected our high participation and response rates. In a study such as the present one, that features a low-intensity, population-based intervention trial involving smokers who have no specific characteristics making it

plausible for them to deceive, biochemical validation is no longer recommended (Benowitz *et al.* 2002). More specifically, we do not think that the respondents felt any pressure to provide socially desirable answers, as they received financial incentive for participating in the study completely irrespective of the outcomes. Another possible limitation of the study was the small sample size in the group of smokers who made a quit attempt ($n = 269$), leaving open the possibility that the intervention did improve usage of NRT and perhaps even reduced the usage of advice from family physicians. However, the total number of respondents ($n = 1,014$) was sufficient to draw firm conclusions about the effect of the intervention on behavioural outcomes.

In sum, a decision aid designed to help smokers decide to use efficacious treatment when attempting to quit smoking was found to have a positive effect on smoking cessation, while failing to increase the usage of treatment. This finding lends support to the notion that promotion of the availability of efficacious treatment methods for tobacco addiction may be as important or even more important for many quitters than the actual usage of these treatments.

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Declaration of interest

The decision aid that is the subject of the study was developed by the same institute at which the research was carried out.

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