Cultural tailoring to promote hepatitis B screening in Turkish Dutch: a randomized control study

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SUMMARY
Hepatitis B virus (HBV) infections are an important health problem in Turkish migrants in the Netherlands. This study describes the effectiveness of a culturally tailored internet intervention promoting HBV screening in Turkish migrants. Methods: Turkish migrants, aged 16–40 years old, could participate in an online intervention offering either: (i) behaviourally plus culturally tailored (BCT) information; (ii) behaviourally tailored (BT) information or (iii) generic information (GI). Subsequently, free HBV screening was offered. Results: Out of 10,069 invited persons, 1512 (15%) logged in on the website and 623 people were tested. Screening uptake was 44% in the BCT group, 46% in the GI group and 44% in group BT. The BCT group showed favourable intervention effects for scores on determinants of screening when compared with baseline scores and BT. Conclusion: Although BCT did show favourable intervention effects for several determinants addressed in the intervention, we were not able to demonstrate the added value of BCT on screening uptake. Trial registration: The Netherlands National Trial Register NTR 2394.

Key words: cultural tailoring; behaviour change; hepatitis B; infectious diseases

INTRODUCTION
Hepatitis B virus (HBV) infection is considered a major infectious disease globally (WHO, 2007). Each year, around 1800 HBV infections, 79% of which are chronic, are reported in the Netherlands (Koedijk et al., 2007). Chronic HBV infections cause 23% of all liver cancers in the Netherlands and are an important problem in the Turkish community (van Marrewijk et al., 1999; van Lier et al., 2007). The prevalence of chronic HBV infection is 0.2% in the general Dutch population, whereas a prevalence of 1.2–4.8% is reported for first-generation Turkish migrants (van Steenbergen et al., 2001; Baaten et al., 2007; Marschall et al., 2008; Hahné, 2011). The majority of Turkish patients with chronic HBV infection acquired it via maternal transmission during birth or as children through blood contact with household members (Koedijk et al., 2005; Degertekin and Gunes, 2008). Carriers of the virus can infect others by blood contact or by sexual contact (Health Council of the Netherlands, 2001).

In the past decade, treatment options for chronic HBV have improved. Antiviral treatment aims to suppress viral replication and thereby slow disease progression. Several
cost-effective, registered drug therapies for chronic HBV are now available (Lok and McMahon, 2007). Thus, detection of HBV infection via blood screening is important. Current national HBV control policy in the Netherlands focuses on screening during pregnancy and on vaccinating specific risk groups. For example, newborns should be vaccinated to protect them from their HBV-infected mothers, children of parents born in HBV-endemic areas should be vaccinated, and people engaging in high-risk behaviour should be vaccinated (Health Council of the Netherlands, 2001). However, these programmes leave a substantial part of the adult Turkish population in the Netherlands unprotected from new HBV infection, whereas those who are infected may not be aware of their HBV-positive status.

This study evaluated two interventions designed to promote HBV screening in first-generation Turkish migrants. One intervention offered behavioural tailoring (BT), and the other intervention offered behavioural tailoring plus cultural tailoring (BCT). Both interventions were based on computer tailoring, which is a strategy that targets a specific person based on characteristics that are unique to that person. In addition, computer tailoring is related to the outcome of interest and is derived from an individual assessment (Kreuter and Skinner, 2000). The interventions were developed systematically according to intervention mapping (Bartholomew et al., 2006), which is a protocol that facilitates the empirical and theoretical grounding of an intervention. Both the BT and the BCT interventions were tailored on social-cognitive determinants of screening, such as knowledge, attitude, self-efficacy, social norms and support. The BCT intervention was additionally tailored using cultural factors. Cultural tailoring can be defined as the use of health messages ‘...which recognize and reinforce a group’s cultural values, beliefs, and behaviors and built upon those to provide context and meaning to the health message’ (Resnicow et al., 2002). Cultural sensitivity in the tailoring process can be conceptualized as surface structure and deep structure dimensions (Resnicow et al., 2002). Surface structure increases the comprehension and acceptance of the message of the intervention by matching the interventions to the characteristics of the target population. Deep structure conveys salience, by understanding how members of the targeted population perceive HBV and how cultural values influence screening behaviour. We relied on empirical evidence to identify cultural factors. This evidence was collected based on Betancourt’s model of culture and behaviour (Betancourt and Flynn, 2009). This model postulates that health behaviour is a function of psychological processes but is also associated with specific aspects of culture, such as value orientation, beliefs and expectations, which may be directly or indirectly associated with health behaviour through mediating psychological processes. The BCT intervention targeted cultural values such as perceived rules regarding health and disease, family values, personal norms and the level of satisfaction with Dutch health care.

In the present study, the effectiveness of the BCT intervention was compared with that of the BT intervention and that of an intervention using generic online information (GI). Specifically, we examined the differential effects of the interventions on actual HBV screening uptake and determinants of screening.

METHODS

Design
The primary outcome measure was screening uptake in eligible persons, which was evaluated using a clustered randomized three-group pre- and post-test design. Changes in the pre- and post-intervention intention scores were also measured according to this design. The secondary outcome measures were the social-cognitive and cultural-determinants scores, which were evaluated in a cluster-randomized three-group control post-test design in which the GI group provided baseline scores and the BT and BCT groups provided the two-tailored intervention group scores. Clustering was based on randomizing people living at a single house address into the same intervention group.

Participants and recruitment
Rotterdam-registered people who were born in Turkey and who were 16–40 years old on 1 September 2010 received a postal invitation to visit the study website, which functioned as a portal for the three interventions. The invitation letter contained information about HBV infection in the Turkish population and information about the main course of transmission,
i.e. mother-to-child transmission at birth. As the letter was sent by the municipal public health service (MPHS), the letter both explained that this centre aims to prevent the spread of infectious diseases and why this special project was being offered to the Turkish community. The letter described the purpose of the project’s website and requested that people log in and learn more about HBV and testing using a unique code provided in the letter. These letters were sent between 13 September and 17 December 2010, in Dutch, and the letters included a reference (written in Turkish) to a Turkish translation on the website. Reminder letters were sent in both languages. At 16, 19 and 21 weeks after the date on which the first letters were sent, everyone who requested a laboratory form but who had not been tested by that time received a reminder to get tested.

To begin the intervention development phase, 20 Turkish organizations were invited to a meeting that discussed the findings of the needs analysis. These organizations were sent regular newsletters and were involved in pre-testing the materials and in the dissemination of informational materials during the campaign. Furthermore, information packages, including posters, were sent to all general practitioner practices in Rotterdam.

The Medical Ethical Review Board of the University Medical Centre Rotterdam approved this study.

### Website and test procedures

The website guided each visitor through the following sections: (i) homepage; introduction to the health problems associated with HBV and the aim of the website; (ii) tailored test advice and demographic questions; (iii) the GI, BT or BCT intervention; (iv) informed consent; and (v) laboratory form for HBV testing and information about the laboratory locations.

The participants could view the website in either language, i.e. Dutch or Turkish. The visual design of the website only differed in the intervention section (iii); the other sections used the same generic design for all participants. Based on their unique code, participants received tailored test advice and were considered eligible for testing unless they knew that they had been tested (and were sure that they were an HBV carrier or were immune to HBV) or if they had been vaccinated and had a sufficient vaccine response. Non-eligible persons were informed why they did not need to be tested, and the website was no longer available to those persons. Eligible persons continued by answering demographic questions, and, subsequently were guided through one of the three interventions. The website recognized the randomly assigned unique codes as belonging to the GI, BT or BCT intervention. Group GI continued with a questionnaire that measured social-cognitive and cultural-determinants and then received generic information (GI) about HBV, HBV prevention and HBV treatment (this information was the same as that offered in the knowledge modules in the BT and BCT interventions). The GI intervention used internet text from the National Hepatitis Centre (NHC, 2011). Group BT answered the same questions and simultaneously received behaviourally tailored information regarding HBV; in addition, the BCT group received culturally tailored information. After signing to indicate informed consent, participants could request a laboratory form and obtain a free HBV blood test at a community health centre. Within three weeks after the test, the participants received a letter containing the HBV screening result and advice for further action.

### Interventions

#### Behaviourally tailored intervention

The BT intervention was designed to be an intervention that would be appropriate for any citizen of Rotterdam; thus, it used background pictures of typical city sites. The BT intervention comprised five modules that focused on the previously identified social-cognitive determinants of screening behaviour: knowledge, attitude, self-efficacy, perceived subjective norms and social support. The BT intervention used change strategies such as active learning, direct feedback, peer stories and modelling. In all modules, and for each individual, the indicated barriers were addressed with counselling advice, whereas the motivating factors were reinforced. In total, the BT intervention offered 122,880 different possible scenarios.

#### Behaviourally and culturally tailored intervention

The BCT intervention offered 1,474,560 different possible scenarios using seven modules: five social-cognitive modules were added by two
‘cultural’ modules that took into account cultural factors such as religious rules, values and responsibility, the perceived quality of health care in the Netherlands and the association of HBV screening with sexuality. All modules were tailored to the Turkish population, such as the knowledge module that provided additional information on HBV and control policies in Turkey. With regard to surface structure elements, the BCT intervention included Turkish peer pictures (these distinguished between men and women younger and older than 30 years) and incorporated attractive cultural background pictures. In the cultural modules, religious rules regarding health were either reinforced or primed by peer stories with quotes such as, ‘Being a Muslim, I feel it is important to care for my health’, and ‘Our religion teaches us: for every disease, there is a solution’. With regard to the perceived quality of Dutch health care services, it was emphasized that testing was free of charge and explained the organization of the care and follow-up in this project. Furthermore, the importance of family values was reinforced by peers who stressed their responsibility for the well-being of the family. For instance, a young woman stated, ‘I told my partner we should get tested and vaccinated so that our future children will not get the disease from us!’ Lastly, the perceived association of screening uptake with sexual behaviour was addressed in a subtle way by stressing the main route of transmission in this community, i.e. transmission from mother to child at birth. A more detailed description of the intervention and its development is published elsewhere (van der Veen et al., 2011).

Data collection during the intervention
For all groups, demographic data were gathered prior to exposure to the randomized intervention. The requested demographic factors including the following: sex, age, socio-economic status of the residential area, marital status, education, income situation, health insurance, religion and whether the participant knew someone with HBV. In the GI intervention, social-cognitive and cultural-determinants data were gathered before the generic health information was provided in order to gather baseline scores for these determinants. In the BT and BCT interventions, data on determinants were collected during the intervention in order to provide tailored information related to these determinants and to record the direct effects of the BT and BCT interventions on social-cognitive and cultural-determinants.

Outcome measures
The primary outcome measure was screening uptake in eligible persons for the BT, BCT and GI interventions. The secondary outcome measures were changes in social-cognitive and cultural determinants of screening for the BT and BCT interventions when compared with the baseline information obtained in the GI group (Figure 1). The measurements of the social-cognitive constructs were based on the health belief model (Janz and Becker, 1984) and on the theory of planned behaviour (Ajzen, 1991). The measurements of the cultural constructs were based on existing scales in socio-cultural research (Phinney, 1992; Lukwago et al., 2001; Dagevos and Schellingerhout, 2003; Phalet et al., 2004). The specific questions were tested in the explorative phase of the project in which cognitive interviewing and test-retest procedures were used to improve validity (van der Veen, submitted for publication). Mean scores were calculated for constructs with Chronbach’s α > 0.60 and for knowledge, self-efficacy, subjective norms, social support and perceived rules. Due to low Chronbach’s α-values for the barriers and health care satisfaction items, these data are presented separately. All items were recoded in such a way that a higher score represents more of the construct. The screening intention was measured pre- and post-intervention.

Analyses
The demographic characteristics of the eligible participants were compared across intervention groups using chi-squared tests for all factors except age, for which ANOVA was used. Screening uptake was evaluated using logistic regression analysis and controlling for age and sex. Changes in pre- and post-intervention intention scores were evaluated by ANOVA. Following the intention-to-treat principle, scores on determinants were analysed for all participants who started the randomized intervention section in one of the three groups; for these analyses, we used ANOVA and controlled for age and sex. Simple contrast analyses were applied to those determinants that differed
### Social Cognitive Constructs

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness (Score 0–4; never heard of, never thought of, heard of but not decided, heard of and decided, have had a HBV test)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Knowledge (0–5; 1 point for every correct answer yes/no/don’t know)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Benefits of screening (0–3; 1 point per checked statement)</td>
<td>0.63</td>
</tr>
<tr>
<td>Barriers regarding screening (0–3; 1 point per checked statement)</td>
<td>0.38</td>
</tr>
<tr>
<td>Self-efficacy (scale 1–10, very easy - very difficult)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Subjective norm (0–4; not important at all - very important)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Social support (-2 no support, important to me; 0 no support, not important to me; 2 support, important to me)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Susceptibility (1–100; very low chance - very high chance)</td>
<td>0.78</td>
</tr>
<tr>
<td>Intention (0–4; definitely not - definitely be screened)</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

### Cultural Constructs

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family values (0–4; very much disagree - very much agree)</td>
<td>0.93</td>
</tr>
<tr>
<td>Personal norm (0–4; disagree - agree)</td>
<td>0.75</td>
</tr>
<tr>
<td>Perceived rules (score 0–4; 1 point for each checked item)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Satisfaction with Dutch health care (score 0–4; disagree - agree)</td>
<td>0.20</td>
</tr>
</tbody>
</table>

**Fig. 1:** Social-cognitive and cultural constructs measured and tailored on in the intervention.
Analyses of dropout rates were performed for eligible persons that dropped out after the eligibility assessment \((n = 231)\). Logistic regression analyses that treated dropouts as outcomes and demographic characteristics as predictors were performed for each of the intervention groups. Non-response analyses were performed with regard to sex, age and living area (as an indicator of social-economic status) by comparing those who logged in on the website with those who did not using chi-squared tests and logistic regression. All analyses were controlled for the cluster randomization that was based on persons living at a single address by multi-level analyses (R Development Core Team, 2009).

**RESULTS**

**Participants**

Out of 10,069 persons invited to participate in this study, 1512 (15.2%) logged in via the website (Figure 2). The majority of website visitors (1400; 92.6%) were eligible for HBV screening, and laboratory forms were requested by 83.2% (1166/1400). The dropout rates, i.e. those who were eligible for HBV testing that did not request lab forms, were 18.5, 17.4 and 14.5% \((p = 0.39)\) for the GI, BT and BCT groups, respectively. People with additional insurance (as opposed to basic insurance or no insurance) were more likely to dropout during the intervention; the \(p\)-values for the GI, BT and BCT groups were 0.07, 0.04 and 0.07, respectively; data not shown. Non-response analyses showed that persons who logged in were more often female (16.0% of invited females logged in versus 13.7% of invited males 13.7%; \(p\), 0.001), slightly older (the respondents’ mean age was 33.4 years versus 32.7 years for the target population; \(p < 0.001\) and more often lived in mid/high socio-economic status areas (16.4% mid/high versus 14.1% low; \(p = 0.001\)).

**Descriptive analyses**

The mean age of the participants on the study website that were eligible for free HBV screening was 33.6 years, and 56.0% were female. Most participants (74.0%) were married and lived in suburbs with lower socio-economic conditions (58.6%). The educational level was almost equal in the three categories, with 29.6, 34.6 and 35.8% having low, medium and higher levels of education, respectively. Half of the group of participants (50.7%) had a paid job, whereas 19.8% were fulltime home makers and 16.0% received social security. Almost all participants had health insurance, either basic insurance (22.4%) or additional insurance (76.9%); 89.6% identified with the Islamic religion. A total of 32.1% of the participants on the study website stated that they knew someone with HBV. There were no significant differences regarding these demographic characteristics in the three intervention groups (Table 1).

**Screening uptake and test results**

Screening uptake was 43.9% (OR 0.94; CI 0.69–1.26) following the BCT intervention, 43.5% (OR 0.88; CI 0.65–1.19) following the BT intervention and 46.0% following the GI intervention. No differences in screening uptake were observed for the three groups \((p = 0.74,\) Table 2). The MPHS received 623 test results that included 12 unregistered carriers, 103 immune and 505 susceptible persons, and three already-registered carriers. Source and contact tracing was conducted at the MPHS for all newly detected carriers, and 20% of the susceptible persons voluntarily started HBV vaccination.

**Pre- and post-intervention screening intention scores**

The overall intention score was 3.18 (scale 0–4) pre-intervention and 3.41 post-intervention. The increase in the intention score was significant for all three groups \((p < 0.001)\) and about equal between the three groups \((p = 0.63,\) Table 2).

**Subgroup analyses**

Intention scores and screening uptake were analysed in four subgroups of each of the intervention groups, i.e. men and women younger than 30 or 30 years old versus those older than 30 years. Table 1 shows that the subgroups were distributed equally in the intervention groups. Table 3 shows that young women in the BCT group had significantly higher post-intention scores than those in the comparison and BT groups. Notably, there were no significant differences in the pre-intervention intention scores...
between the subgroups, nor did the dropout rates differ according to the pre-intervention intention scores (data not shown). Young men in the BCT group had significantly lower post-intervention intention scores and screening uptake compared with the three other subgroups. The BCT intervention led to higher screening uptake in young women compared with the BT intervention. Lastly, women in the BT group who were 30 years old or younger received HBV tests significantly less often than women over 30 years old in this group.

Social-cognitive measures
Regarding the social-cognitive measures, Table 4 shows that the scores of the two-tailored intervention groups were significantly higher than the baseline scores for knowledge \((p < 0.001)\), perceived benefits of screening \((p < 0.001)\) and subjective norms \((p < 0.05)\). For self-efficacy, only the BCT intervention led to higher scores when compared with baseline \((p = 0.01)\).

Cultural measures
For the BCT group, the post-intervention scores regarding perceived health rules were significantly higher than those at baseline \((p < 0.001)\) and in the BT group \((p = 0.01)\), which in turn were higher than at baseline \((p < 0.001)\). Furthermore, the BCT group scores were significantly higher than the baseline scores with regard to family values \((p = 0.03)\) and satisfaction with Dutch health care services \((p = 0.04)\).
DISCUSSION

This study evaluated the effect of behavioural plus cultural tailoring on HBV screening uptake in Turkish citizens in Rotterdam and compared the effect with that of BT and generic online information. The results showed that overall screening uptake was 44% and that uptake was about equal in the three intervention groups. Intention scores increased significantly in all three groups. Both the tailored interventions led to more positive scores for determinants.
related to screening intention. In addition, the BCT group scored significantly higher with regard to the cultural values related to screening than the non-culturally tailored intervention groups.

**Strengths and limitations of the study**

The strength of this study of the effect of cultural tailoring is that it is the first to have a robust outcome measure, i.e. MPHS registered screening uptake as opposed to the self-reported outcomes used in other studies (Elder et al., 2005; Kreuter et al., 2005; Roberto et al., 2009). Second, although other internet interventions have shown lower screening-uptake rates in eligible participants, for example, 10% for syphilis screening and 28% for hepatitis C screening of the general population (Koekenbier et al., 2008; Zuure et al., 2011), our intervention resulted in relatively high test rates. Third, a non-tailored intervention group was included in the design in order to measure the added value of BT and BCT on screening uptake; notably, this was lacking in other studies of cultural tailoring (Kreuter et al., 2005). Lastly, this is the first report on the use of cultural tailoring for an Islamic ethnic minority population.

This study also has several limitations. First, the low response rate (15%) may have caused selection bias, as participants were likely more motivated regarding HBV testing than non-participants, and this may have influenced their response to the randomized interventions. Second, due to unanticipated political sensitivity regarding culturally specific health promotion activities in the target population, the programme organization was severely limited in seeking public attention for this programme. This may have discouraged participation in some subpopulations, for instance those who depend strongly on public opinion in making health decisions (Hornik, 2002; National Academy of Sciences, 2003) or those less motivated to be screened for HBV. The intervention strategies aimed to reinforce motivating factors and remove barriers. This may have a bigger impact on those who are less motivated than in the (already highly motivated) population under study. Third, non-response analyses comparing persons who logged in on the website with those who did not showed that respondents were more often female, over 30 years old, and from an area with medium-to-high socio-economic status. This should be taken into account when generalizing the results. Lastly, the baseline data on behavioural and cultural determinants were collected in the comparison group before the GI was provided, whereas in BT and BCT, this was carried out during the interventions. In order to measure the effect of the intervention, other studies have collected data on the intervention effect directly after the intervention (Davidovich, 2006; Mevissen et al., 2011) or collected baseline data before as well as follow-up data after the intervention in each of the study groups (Elder et al., 2005, 2006; Kreuter et al., 2005; Resnicow et al., 2009). High dropout rates

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**Table 3: Post-intervention intention scores and test rates in the four subgroups (based on age and sex)**

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>GI</th>
<th>BT</th>
<th>BCT</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-intervention intention score overall</td>
<td>3.40</td>
<td>3.35</td>
<td>3.39</td>
<td>3.47</td>
<td>0.20</td>
</tr>
<tr>
<td>women &lt; 30 year</td>
<td>3.41</td>
<td>3.31b</td>
<td>3.33c</td>
<td>3.62b,c,d</td>
<td>0.07</td>
</tr>
<tr>
<td>women ≥ 30 year</td>
<td>3.40</td>
<td>3.36</td>
<td>3.36</td>
<td>3.48f</td>
<td>0.27</td>
</tr>
<tr>
<td>men &lt; 30 year</td>
<td>3.23a</td>
<td>3.27</td>
<td>3.26</td>
<td>3.17b,e,f</td>
<td>0.84</td>
</tr>
<tr>
<td>men ≥ 30 year</td>
<td>3.44</td>
<td>3.35</td>
<td>3.49</td>
<td>3.49f</td>
<td>0.26</td>
</tr>
<tr>
<td>% Tested overall</td>
<td>44.5</td>
<td>46.0</td>
<td>43.5</td>
<td>43.9</td>
<td>0.74</td>
</tr>
<tr>
<td>women &lt; 30 year</td>
<td>44b,d</td>
<td>46</td>
<td>39b,k,l</td>
<td>55k,m</td>
<td>0.07</td>
</tr>
<tr>
<td>women ≥ 30 year</td>
<td>50b,i</td>
<td>48</td>
<td>49b,j</td>
<td>52n</td>
<td>0.76</td>
</tr>
<tr>
<td>men &lt; 30 year</td>
<td>32b,h</td>
<td>37</td>
<td>42</td>
<td>22m,n,q</td>
<td>0.15</td>
</tr>
<tr>
<td>men ≥ 30 year</td>
<td>44b,j</td>
<td>49</td>
<td>43</td>
<td>40q</td>
<td>0.25</td>
</tr>
</tbody>
</table>

*Differs from all other subgroups (p = 0.04).

b:p = 0.04; c:p = 0.05; d:p < 0.01; e:p = 0.02; f:p = 0.04; g:p < 0.001; h:p = 0.03; i:p = 0.01; j:p = 0.02; k:p = 0.01; l:p < 0.001; m:p < 0.001; n:p < 0.01.

GI, generic information intervention group; BT, behaviourally tailored intervention group; BCT, behaviourally plus culturally tailored intervention group.
would be expected if the questionnaire was provided after the intervention was finished; thus, data collection was combined with the collection of information needed for the tailoring of messages.

### Effects on the determinants of screening uptake

The results provide insights into the immediate effects of BT and BCT when compared with the collected baseline information. Both tailored interventions led to better scores on the determinants of screening. Although conclusions on the intervention effect should be drawn cautiously, this finding is supported by the significant increase in the intention scores between the start and finish of the intervention and by the presence of intervention effects on items that were followed by tailored information. This is also supported in the literature by the suggestion that message persuasiveness is enhanced when information processing feels fluent (Uskul and Oyserman, 2010). Processing ease has also been described as ‘feeling right’, and messages that feel right are more likely to be persuasive (Cesario et al., 2004). This is likely to be the case for individually tailored messages (Brug et al., 1999; Kreuter et al., 2000). Thus, it seems plausible that both tailored interventions positively influenced the processing of the provided information during the intervention with regard to knowledge, perceived benefits and subjective norms.

The added value of the BCT intervention is shown by the improved self-efficacy score. This improvement may be due to the use of quotes and pictures of peer models that were used to show how to overcome barriers. This strategy is supported by the social cognitive theory of Bandura, which states that modelling is an effective method for changing outcome and self-efficacy expectations (Bandura, 1986). Regarding the cultural factors, the BCT intervention participants reported the strongest cultural values compared with the other groups, which is in line with literature on (media) priming. The latter suggests that reminding people of their cultural orientation and framing messages

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### Table 4: Mean scores (and SD) on behavioural and cultural determinants at baseline and during the behaviourally tailored (BT) and behaviourally + culturally tailored (BCT) interventions

<table>
<thead>
<tr>
<th>Tailoringa</th>
<th>Baselineb (n = 481)c</th>
<th>BTb (n = 417)c</th>
<th>BCTb (n = 453)c</th>
<th>Overall p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness (0–4)</td>
<td>n.a.</td>
<td>1.74 (1.51)</td>
<td>1.91 (1.50)</td>
<td>1.89 (1.48)</td>
</tr>
<tr>
<td>Personal norm (0–4)</td>
<td>n.a.</td>
<td>3.08 (0.92)</td>
<td>3.13 (1.10)</td>
<td>3.18 (0.96)</td>
</tr>
<tr>
<td>Susceptibility (0–10)</td>
<td>n.a.</td>
<td>2.93 (2.17)</td>
<td>3.19 (2.20)</td>
<td>3.03 (2.21)</td>
</tr>
<tr>
<td>Start intention (0–4)d</td>
<td>n.a.</td>
<td>3.10 (0.96)</td>
<td>3.12 (0.99)</td>
<td>3.22 (0.87)</td>
</tr>
<tr>
<td>Knowledge (0–5)</td>
<td>BT and BCT</td>
<td>2.71 (1.52)</td>
<td>3.43 (1.48)e</td>
<td>3.40 (1.39)e</td>
</tr>
<tr>
<td>Perceived rules (0–4)</td>
<td>BCT</td>
<td>2.55 (1.65)</td>
<td>2.97 (1.50)e</td>
<td>3.27 (1.28)f</td>
</tr>
<tr>
<td>Family values (0–4)</td>
<td>BCT</td>
<td>3.09 (1.09)</td>
<td>3.19 (1.02)</td>
<td>3.23 (0.97)f</td>
</tr>
<tr>
<td>Benefits of screening (0–3)</td>
<td>BT and BCT</td>
<td>2.14 (0.99)</td>
<td>2.36 (0.93)e</td>
<td>2.37 (0.91)e</td>
</tr>
<tr>
<td>Barriers (0–3)</td>
<td>Worries</td>
<td>BT and BCT</td>
<td>0.20 (0.40)</td>
<td>0.21 (0.41)</td>
</tr>
<tr>
<td>Time-spend</td>
<td>BT and BCT</td>
<td>0.04 (0.20)</td>
<td>0.06 (0.23)</td>
<td>0.03 (0.17)</td>
</tr>
<tr>
<td>Costs</td>
<td>BT and BCT</td>
<td>0.15 (0.35)</td>
<td>0.15 (0.36)</td>
<td>0.13 (0.34)</td>
</tr>
<tr>
<td>Higher cost of testing in NL (0–4)</td>
<td>BCT</td>
<td>2.07 (1.04)</td>
<td>2.12 (0.99)</td>
<td>2.00 (1.06)</td>
</tr>
<tr>
<td>Satisfied with quality of care NL (0–4)</td>
<td>BCT</td>
<td>2.31 (1.10)</td>
<td>2.44 (1.09)</td>
<td>2.48 (1.06)f</td>
</tr>
<tr>
<td>TR doctors more HBV experience (0–4)</td>
<td>BCT</td>
<td>2.29 (0.98)</td>
<td>2.39 (0.95)</td>
<td>2.33 (0.93)</td>
</tr>
<tr>
<td>SE (0–10)</td>
<td>BT and BCT</td>
<td>6.85 (2.03)</td>
<td>7.03 (1.91)</td>
<td>7.15 (2.02)f</td>
</tr>
<tr>
<td>Subjective norm (0–10)</td>
<td>BT and BCT</td>
<td>3.24 (0.90)</td>
<td>3.41 (0.83)f</td>
<td>3.49 (0.73)e</td>
</tr>
<tr>
<td>Social support (0–2)</td>
<td>BT and BCT</td>
<td>1.47 (0.61)</td>
<td>1.49 (0.53)</td>
<td>1.56 (0.59)</td>
</tr>
<tr>
<td>Final intention (0–4)d</td>
<td>n.a.</td>
<td>3.35 (0.89)</td>
<td>3.39 (0.79)</td>
<td>3.47 (0.77)</td>
</tr>
</tbody>
</table>

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aBT (behaviourally tailored) or BCT (behaviourally + culturally tailored) information was provided in resp. groups BT or BCT regarding the indicated determinants.

bBaseline data gathered in the comparison group, BT, behaviourally tailored; BCT, behaviourally and culturally tailored.

cThose who started with the randomized section of the intervention (intention to treat).

dStart and final intention marked the start and end of the tailored section of the intervention.

eDiffered from baseline score, p < 0.001.

fBCT score differed significantly from BT score (p = 0.01).

gDiffered from baseline score, p < 0.05.
culturally relevant terms increases message effectiveness (Uskul and Oyserman, 2010; Fishbein and Yzer, 2003; Fishbein and Capella, 2006; Oyserman and Lee, 2008). In our study, this was accomplished by providing a culturally appropriate website design. The improvements in both the social-cognitive and cultural-determinant scores, and the increase in intention scores, may also reflect an increased level of informed consent, which is an important condition for participation in screening (Steckelberg et al., 2011).

Although the tailored interventions had an impact on the selected determinants of screening, this did not lead to higher screening uptake rates in the tailored interventions. This may be due to the dropout between the intention measurement and the actual screening or due to the selection of predictors, which is discussed below.

**Dropout**

A total of 6.2% (623/10,029) of the target population was screened for HBV in this programme, suggesting that an internet intervention may be a suitable, low-cost strategy for migrant health screening. Although the actual screening rate was high, there is room for improvement in terms of the dropout rate. The reasons for dropout are unknown but may include a waning effect of the information provided, as discussed in a review of tailored health promotion interventions that reported a shorter period between the intervention and follow-up as a crucial factor in success (Noar et al., 2007). In addition, during the time between the intervention and the actual HPV testing, unanticipated practical barriers may have come up that discouraged persons with a lab form from being tested. Lastly, participants may have gained a more realistic perception of their risk of having HBV, for instance by gathering information on the HBV status of their mothers, after they received their lab forms.

**Selection of predictors**

Additional exploratory analyses of the predictors of actual screening uptake in the baseline data (data not presented) showed that higher levels of awareness, perceived susceptibility to HBV and more perceived benefits of screening were the most important motivating factors, whereas the perceived higher cost of screening in the Netherlands was a barrier to screening. Of these predictors, the BCT intervention only affected the perceived benefits of testing (OR 1.36 (1.07–1.71); \(p = 0.01\)), as awareness and perceived susceptibility were not specifically addressed in either the BT or BCT intervention and testing was freely offered to all participants. The predictors in the baseline data only partly agree with previous findings that showed that the perceived benefits of screening and subjective norms were the most important determinants of screening intention (van der Veen, submitted for publication). This discrepancy in the predictors of screening intention may be due to the selected subpopulation reached with this intervention.

**Ethical considerations**

In deciding on the appropriateness of a screening programme, the criteria described by Wilson and Junger (Wilson and Junger, 1968) should be taken into account. Most of these criteria were met in the present study, because chronic HBV is an important public health problem, and an acceptable test for detecting HBV in an early stage of the infection is available. The natural history of HBV is well known, and there is increasing evidence of the effects of HBV on clinical outcomes. Furthermore, the cost-effectiveness of HBV screening for first-generation migrant populations in the Netherlands has been shown previously (Veldhuijzen et al., 2010). Finally, the benefits of the screening outweigh its disadvantages. The ethical aspects of screening particular societal or migrant groups for HBV and hepatitis C should be the subjects of further study. However, for this population and this intervention, it is expected that any psychological drawbacks due to HBV-related HBV stigma are limited. Studies preceding the intervention showed that although the stigma related to HBV is negatively related to the intention of being screened, these feelings of stigma were actually not very strongly present in this population (van der Veen et al., 2009). In addition, these interventions emphasized that the main route of transmission of infection in the population is transmission at birth from mother to child. The qualitative study showed that when this fact was communicated, the stigma related to HBV was reduced.

**Theoretical and practical implications**

Future HBV screening programmes for migrants should study the effect of interventions that
address the participants’ awareness of and susceptibility to HBV, the benefits of screening and the effect of providing free screening services. These factors seemed to predict actual screening uptake. This study indicated that screening uptake and the effect of the intervention on determinants of screening may be hampered by limitations in terms of public attention. This should be taken into account when planning HBV screening interventions for migrants, and alternative strategies for optimal communication to the public should be developed. Finally, cultural beliefs provide insights into the perceptions of Turkish migrants regarding HBV screening and may help in the development of interventions targeting this population in the future.

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