

**Cognitive factors predicting intentions to search for health information: an application of the Theory of Planned Behaviour**

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## Key messages box

### Implications for Practice'

- The questionnaire we developed may be a useful tool for understanding cognitive factors predicting search for health information so that these could be targeted in future interventions
- In the present study among parents and representatives of the general public, attitudes and perceived behavioural control associated with search were identified as important predictors

### Implications for Policy'

- By mapping and tailoring important identified predictors to change, interventions may be developed to enable people in obtaining of health information.

## **Cognitive factors predicting intentions to search for health information: an application of the Theory of Planned Behaviour**

### **Introduction**

The ability to obtain health information is a precondition for effective participation in health decision making, and important for health outcomes (1, 2). According to the World Health Organization, the primary goal of health education is to improve the skills that individuals require to obtain health information in order to making informed healthy choices (3). This competency is often referred to as ‘health literacy’ and is defined as:

*“the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health”*

P10, (3)

Studies exploring the factors influencing search behaviour have largely addressed demographic factors such as sex, age and education, and the sources of information people prefer (4-7). Some have shown, for example, that people who are younger and have a higher level of education are more likely to search for health information (4-7). In this study, we sought to explore the cognitive variables impacting upon peoples search for health information so that these could be targeted in an intervention. The aim of which was to improve the ability of the public to obtain health information through a tailored set of educational tools to be made available online. Consequently, a questionnaire was constructed based on the theory of planned behaviour (TPB) (8). The TPB is a rigorously tested and widely used social cognition model used to predict

individual behaviour and behavioural intentions (8-10). Previous studies have used the TPB model to explore behavioural intentions related to issues including: speeding prevention (11), cardiovascular risk prevention (12), oral health care promotion (13), self-care by those with diabetes 2 (14), the use of dental services (15), professional behaviour (16), and immunisation (17). Moreover, the TPB model has been applied successfully in the tailoring and evaluation of interventions (8, 11, 17-19). To our knowledge, there is little current evidence available that describes the cognitive factors that might predict health information searching by members of the public, and this is the first study to use the TPB for this purpose. Thus, although modest in scale, we believe that our study may contribute with new evidence to this area of research, as well as providing others that aim to do quality improvement work targeting health information searching with a useful and practical tool.

### ***Predicting behavioural intentions using the theory of planned behaviour***

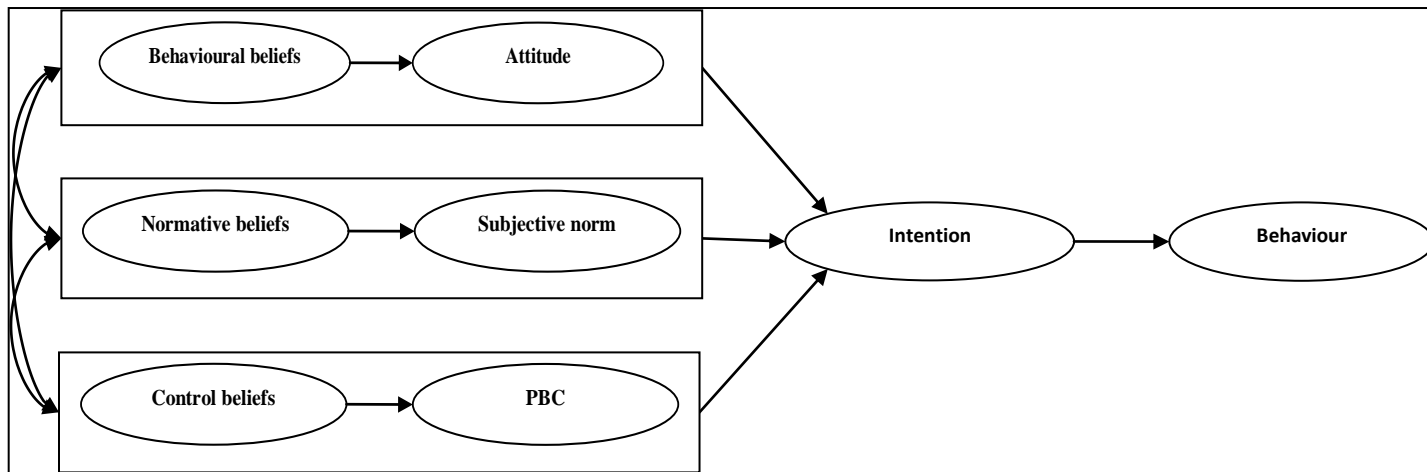
Evidence based theory may be helpful in identifying and targeting important factors that influence the success of interventions, such as barriers and facilitators to change (20, 21). The TPB is an extension of the theory of reasoned action developed by Ajzen and Fishbein and proposes a model where intentions are precursors of actual behaviour (22). Although there is not a perfect relationship between intended and actual behaviour, behavioural intention has been shown to be a valid proxy measurement of actual behaviour (10, 23). According to this model, three variables directly influence behavioural intentions (Figure 1) (22). These are:

1. The extent to which the person is in favour of performing the behaviour (referred to as the person's "attitudes")

2. The extent to which the person feels social pressure to perform the behaviour (referred to as the person's "subjective norms")

3. The extent to which the person feels in control of the behaviour (referred to as the person's "perceived behavioural control")

**Figure 1. Model of the Theory of Planned Behaviour adapted from Ajzen (1991)**



\*Note: PBC = Perceived Behavioural Control

The model therefore suggests that the more favourable the attitude, motivation to comply to subjective norms, and perceived behavioural control, the stronger the intention will be to perform the behaviour (22). According to this model, perceived behavioural control predicts not only intentions but also actual behaviour directly. This is because attitudes and subjective norms influence behaviours that are largely under volatile control; but perceived behavioural control provides information about the individuals perceived barriers (10). In other words, even though the intentions indicated by attitudes and subjective norms may be strong, the actual implementation of behaviour is always dependent on personal and contextual constraints (10).

While the model suggests that there is a linear relationship between the three variables and intentions, these may also be inter-correlated (22).

The three variables that are thought to influence intentions (attitudes, subjective norms and perceived behavioural control) can be measured using both *direct* and *indirect measures* describing the same constructs. Whereas direct measures are used to question respondents about their overall- or general- assessment, indirect measures question them about the underlying specific beliefs and outcome evaluations (8). The indirect measures are composite measures of people's behavioural beliefs and corresponding behavioural outcome evaluations. Furthermore, indirect measures are assumed to influence people's overall assessments (direct measures), and are seen as explanatory factors for understanding how the overall assessments are formed (14). In other words, the indirect measures provide detailed information about the person's attitude, subjective norm or perceived behavioural control, underlying their overall assessments.

The objectives of this study were therefore:

- To test the utility of the questionnaire in predicting intentions to search for health information, and
- To identify important predictors associated with this intention such that these could be targeted in an intervention.

## **Methods**

### ***The questionnaire***

The Theory of Planned Behaviour manual, developed by Francis and colleagues, is based on a substantial review of literature related to the TPB and informed the development and analysis of

our questionnaire (8). The behaviour we examined was defined according to its Target, Action, Context, and Time (8, 22). In our study, these elements were:

- Target: Users of health care with likely access to the Internet
- Action: Searching for health information (regardless of source)
- Context: Health decisions
- Time: On their own time, independent of health providers.

*Constructing items evaluating intentions and direct measures*

Items were developed asking about the respondents general (overall) intentions towards this behaviour (see Table 1, example 1 and 2). These were based on the standardised items and suggested scales recommended in the TPB manual using a 1-7 -point scale being ranged from Strongly disagree to Strongly agree (8). Standardized worded items were also used when developing the direct measures of attitudes, subjective norms and perceived behavioural control using a 1-7-point bipolar adjective scale (good-bad) (8).

**Table 1. Examples of question formats for evaluating intentions, direct and indirect measures**



**Example 1: Question format for evaluating intention**

I intend to search for health information on my own in future health decisions

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

**Example 2: Question format for evaluating direct measure of attitude (overall assessment)**

Searching for health information independently is

Harmful 1 2 3 4 5 6 7 Beneficial

**Example 3: Question format for evaluating indirect measures of attitude***a) Belief statement*

If I search for health information on my own to be used in health decisions, it will provide me with more insight

Unlikely 1 2 3 4 5 6 7 Likely

*b) Outcome evaluation*

To gain more insight is:

Extremely undesirable -3 -2-1 0 +1 +2 +3 Extremely desirable\*

\*Due to software limitations when creating the questionnaire, it was not possible adapt the scale to this response format (-3 to +3), thus we used the following scale which ranged from: “Extremely undesirable”, “Undesirable”, “Partly undesirable”, “Neither undesirable nor desirable”, “Partly desirable”, “Desirable” through to “Extremely desirable”. In the analysis, these categories were transformed into the numeric scale as shown in the box.

*Constructing items evaluating indirect measures*

When constructing indirect items, an explorative study is recommended to elicit beliefs associated with the behaviour and thus improve content validity (8). Therefore, we performed a qualitative study to explore: a) the perceived advantages and disadvantages of searching for

health information, b) people who would disapprove or approve of the searching for health information, and c) the perceived barriers and facilitators to searching for health information (24). The results of this study have been reported previously (24). Supplementing the findings from the qualitative study, we also performed a systematic search in Medline using the following terms: (public or patient or consumer) and (Internet or mass media) and (health behaviour or search or attitude).

**Table 2. Identified specific beliefs included in the questionnaire**

<p><b>Attitudes towards searching for health information</b>  (The perceived advantages and disadvantages of performing the behaviour)</p>	<p>Provides insight</p> <p>Provides useful background knowledge for consultations with health professionals</p> <p>Is helpful if one is unsure about what to do in a health decision</p> <p>Provides additional knowledge if the information given by health professionals is incomplete</p>
<p><b>Subjective norms about search for health information</b>  (The people who would disapprove or approve of the behaviour)</p>	<p>Family and friends</p> <p>Health professionals</p> <p>Other social groups (colleagues, patient organisations)</p>
<p><b>Perceived behavioural control associated with searching for health information</b>  (The perceived barriers and</p>	<p>Difficult to attain an overview of all the information available</p> <p>May not possess knowledge to evaluate the quality of the information</p>

facilitators to adopting the behaviour)	Time consuming
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The specific beliefs were converted into two types of questions as recommended by the TPB manual (see Table 2, example 3)(8); one set of statements about behavioural beliefs measured on a 1-7 scale (where 1 = Likely and 7 = Unlikely), and one set of corresponding behavioural outcome evaluations measured on a -3 to 3-point scale (where -3 = Extremely Undesirable and +3 = Extremely Desirable (see Table 1)). The same procedures were done for the specific beliefs underlying subjective norm (statements about normative beliefs multiplied with motivation to comply) and perceived behavioural control (statements about control beliefs multiplied with influence of control beliefs).

Multi-item measures are recommended to improve reliability (9). Generally, a minimum of three items was developed for each construct. A set of demographic questions that related to the background data of the sample (age, sex and level of education) was also included. Furthermore, items were distributed across variables, and scales were arranged so that they were a mix of negative and positive endpoints as recommended (8).

### ***Participants***

The questionnaire was tested twice on two samples: one from the general population and the other of parents.

*Sample 1: mixed population*

The first sample was taken from the general population. Based on the recommendation by the TPB manual, 80 respondents was considered adequate (8). However, considering that a 50% response rate is generally to be expected in TPB questionnaire studies this total was rounded up (8). Consequently, a random sample of 200 potential respondents (100 women and 100 men) was drawn from three districts in a major city of Norway. Three distinct districts were chosen as a way of capturing different socio-economic backgrounds within the sample. The reason for this was that age and education has been found to be factors influencing search for information, and thus we wanted our sample to represent a range of the population across these background variables (4-7, 25). Because the intervention that the questionnaire would be used to tailor was Internet-based, it was important to ensure that the sample included those most likely to have Internet access at home. In Norway, this includes over 80% of the population but the majority of those who have access are under 65-years of age (26). As there was no way to know *a priori* which of the respondents would have Internet access, we therefore excluded people over the age of 65. A postal questionnaire was mailed out together with a pre-stamped envelope. One reminder was also sent and, to improve response rate, all respondents were informed that participation would be rewarded with the chance to win a small gift certificate (27).

*Sample 2: parents*

Respondents in the second sample were parents because we wanted to target a group of people who would typically be interested in accessing health information. Generally, because parents of under age children are younger and more likely to be in frequent contact with the health services

than any other age group in Norway, they are also more likely to search for health information (7, 28). A purposeful (convenience) sample of parents was recruited (including pregnant women) to further test the questionnaire in a single district of the same city as described above. This district contained a population of mixed socio-economic status. As in the first sample, we aimed to include approximately 80 respondents. The questionnaires in this instance were administered face-to face at a local maternal and child health centre and the attached shopping centre.

### *Ethical considerations*

All participants were informed about the purpose of the study, that participation was voluntary, that they could withdraw from the study at any time, and how the data would be used. Data was processed anonymously and confidentially: sensitive information, such as respondents' names and addresses (only retrieved in the postal survey of the random sample), were kept separately from the data collected so that the results could not be traced back to individuals. Ethical approval for the study was granted by the Norwegian Social Science Data Services (NSD) and the Regional Committees for Medical and Health Research Ethics (REK).

### *Analysis*

#### *Data management*

All the data were entered into a statistic program (SPSS) according to the manual guidelines and the items recoded (where appropriate) (8). Following this, the datasets were examined for missing or illogical values to ensure correct administration. The two data-sets were analysed separately.

### *Reliability and validity*

When testing the utility of a questionnaire, it is important to examine the internal consistency of the constructs used (in other words, their reliability) (8) and the relationship between the constructs hypothesised as related (in other words, the construct validity) (29). This was done in three steps.

First, we tested the internal consistency between the items in the scales measuring behavioural intentions and the direct measures of attitude, subjective norm, and perceived behavioural control (all measured by three items each). The items describing intentions and the three direct measures respectively are reflective within each category. In other words, they measure the same construct, and are consequently expected to have a high internal consistency. A Cronbach's Alpha value above 0.6 was considered to be an indicator of acceptable consistency (8). After checking for reliability, these items were then recoded into one composite variable measuring each construct (in total four variables, one measuring intention and one for each direct variable respectively) with a total possible range of 1 to 7 (8).

Secondly, the TPB model, and consequently the questionnaire, contains operationalisations of theoretical constructs with assumptions about the interrelationships between them (Figure 1). These relationships were explored by computing simple bivariate correlations using a Pearson R test. Based on the TPB model, we hypothesised that the direct TPB measures would positively correlate with intention, and that the direct measures might also be interrelated as these according to the TPB are not seen as categories independent of each other

(22). Furthermore, we hypothesised that the internal consistency of constructs and relationship between the direct measures and intentions would be consistent across samples.

Finally, we tested the relationship between indirect and direct measurements of the same constructs. By weighting belief statements by the score for the relevant outcome evaluation, new variables were created into a new set of weighted beliefs by multiplying each behavioural statement with the corresponding behavioural outcome evaluation. The total possible scores thus ranged from -21 to +21 (see table 1, example 3). In contrast to the direct measures, the indirect measures consist of both negative and positive beliefs, because as Francis and colleagues state, *“people can quite logically hold negative and positive beliefs about the same behavior”* p 9, (8). It is therefore not appropriate to assess the reliability of indirect measures using an internal consistency as a criterion, or to eliminate some of these beliefs based on low or negative correlations among them (8, 14). However, seeing the indirect and direct measurements as corresponding (measuring the same construct) one would expect a high correlation between each individual indirect item and the corresponding direct measurement, as well as high correlation between the overall composite indirect measure and direct measure of the same constructs. Therefore, we conducted correlations between each individual indirect item and direct measurements of the same construct: this determined if appropriate beliefs had been identified and properly measured. In turn, this allowed us to identify and delete any suboptimal items. Overall composite scores were then summed for each of the three variables. The minimum and maximum overall scores will be dependent on how many items are included in each indirect category (8). Thus the interpretation of weak, moderate and strong attitude will be dependent on the range (8). If, for example, three items are used to measure an indirect category, each item with a maximum and minimum value of -21 to +21, the minimum and maximum possible score

of the composite score will -63 to +63. We then calculated the correlations between the composite indirect and direct measurements for each construct respectively. Furthermore, to assess the extent to which indirect measures explain the direct measures, we performed a multiple regression analysis in which the composite indirect measure were used as predictor variables and the corresponding direct measurements were the dependent variables for each construct (8).

### *Descriptive statistics*

Descriptive analysis was undertaken to describe background characteristics (age, sex and education) and the distributions (mean and standard deviations (SD)) of the measures.

### *Multiple regression analysis of direct measurements and intention to search*

According to the TPB model, attitude, subjective norm, and perceived behavioural control can be used to predict behavioural intentions (8). To examine the overall potential of the questionnaire to predict intentions and to identify the predictive strength of each direct measurement, multiple regression analyses were performed.

The assumptions of linear regression were checked (all were found to be satisfied) (30), and the direct measurements of attitude, subjective norm, and of perceived behavioural control were examined as predictor variables; intentions was used as the dependent variable (8).

Based on the assumptions of the TPB, the three variables' overall prediction of intention was expected to be the same in both samples (and comparable to other TPB questionnaires).



However, the most important predictors of intention to search were expected to vary potentially in the two samples reflecting different views dependent on the population studied (8).

For all outcomes, a p-value less than or equal to 0.05 was considered statistically significant.

## **Results**

### ***Reliability analysis and validity***

In the reliability analysis exploring internal consistency between the items measuring each direct variable respectively, one item (measuring perceived behavioural control) demonstrated poor inter-item correlation with the other items measuring the same construct in both samples, and was subsequently deleted. The Cronbach's Alpha values for intentions to search and the direct measurements indicated a range from satisfactory to very good across the samples. For the mixed population, the Cronbach's Alpha values were 0.98 for intentions, 0.92 for attitude, 0.66 for subjective norms and 0.74 for perceived behavioural control. In the parent sample, the Cronbach's Alpha values were 0.78 for intentions, 0.81 for attitude, 0.83 for subjective norms and 0.93 for perceived behavioural control.

A significant and positive correlation was found in both samples between intention and the direct measurements of attitude and perceived behavioural control (see Table 3). In addition, inter-correlations were found between attitude and the two other direct measures namely subjective norms and perceived behaviour.

**Table 3. Correlation coefficients (Pearson R) of intentions, direct and indirect measures**

	Mixed population (n=30)				Parents (n=45)			
	Correlation coefficients (Pearson R)				Correlation coefficients (Pearson R)			
	Direct measures				Direct measures			
	Intentions	ATT	SN	PBC	Intentions	ATT	SN	PBC
<b>Direct measures</b>								
Direct attitude (ATT)	0,58**	-			0,58**	-		
Direct subjective Norms (SN)	0,24	0,49**	-		-0,16	0,22	-	
Direct perceived Behavioural Control (PBC)	0,70**	0,55**	0,28	-	0,44**	0,47**	0,07	-
<b>Indirect measures</b>								
Indirect attitude	0,52**	0,73**			0,53**	0,69**		
Indirect subjective norm	0,27		0,50**		0,31		0,35**	
Indirect perceived behavioural control	0,42*			0,45*	-0,05			0,29

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

Of the indirect measures, five items were found to be very poorly inter-item correlated with their corresponding direct measurement of the same construct and were consequently deleted. The composite indirect measures based on the remaining items had significant positive correlations with their corresponding direct measures of the same constructs, except for perceived behavioural control in the parent cohort which was only borderline statistically significant ( $p = 0.07$ ) (see Table 3). Exploring the correlations between composite indirect measures and intention, the indirect measures followed the same pattern as the direct measurements. In the regression analysis, the composite indirect measures in the mixed and parent samples explained 53% and 48% of the variance in direct measurement of attitude, 25% and 12% of the direct measurement of subjective norm, and 20% and 8% in the direct measurement of perceived behavioural control components respectively (see Table 4).

**Table 4. Regression analysis:****(A) Direct measures as the dependent variable and indirect measures as predictive variables****(B) Intention as the dependent variable and direct measures as predictive variables**

<b>A</b>	<b>Mixed population (n=30)</b>			<b>Parents (n=45)</b>		
	<b><math>\beta</math></b>	<b>P-value</b>	<b>R<sup>2</sup></b>	<b><math>\beta</math></b>	<b>P-value</b>	<b>R<sup>2</sup></b>
<b>Indirect measures</b>						
Indirect attitude	0.04	<0.01	0.53	0.34	<0.01	0.48
Indirect subjective norm	0.04	0.01	0.25	0.03	0.03	0.12
Indirect perceived behavioural control	0.03	0.01	0.20	0.01	0.07	0.08
<b>B</b>						
	<b>Mixed population (n=30)</b>			<b>Parents (n=45)</b>		
	<b><math>\beta</math></b>	<b>P-value</b>	<b>R<sup>2</sup></b>	<b><math>\beta</math></b>	<b>P-value</b>	<b>R<sup>2</sup></b>
<b>Direct measures</b>			0.55			0.47
Direct attitude	0.38	0.09		0.51	<0.01	
Direct subjective norm	-0.08	0.71		-0.25	0.01	
Direct perceived behavioural control	0.66	<0.01		0.15	0.25	

The final questionnaire included 31 items (in addition to the set of demographic questions): 3 items described intention, 3 items described direct measurements of attitude, 3 items subjective norms, 2 items perceived behavioural control, 8 (4 behavioural statements + 4 behavioural outcome evaluations) items described indirect measurements related to attitude, 6 (3+3) subjective norm, and 6 (3+3) items perceived behavioural control.

### ***Descriptive statistics***

The response rate was low, with only 16% (n=30) of those in the mixed population sample responding and 43% (n=45) in the parent sample. Although using convenience sampling in the

parent sample offered an opportunity to include an optimal number of respondents, this was not possible within the timeframe of the study. Respondents were evenly distributed across age and sex in the mixed population sample. In the parent sample, females and people in the age category 31-40 years were overrepresented. In both samples, those with higher education were overrepresented. Participant characteristics are described further in Table 5.

**Table 5. Description of included participants across samples**

	<b>Mixed population n (%)</b>	<b>Parents n (%)</b>
Overall response rate	30 (16)	45 (43)
<b>Age (years)</b>		
18-30	5 (17)	13 (29)
31-40	9 (30)	29 (64)
41-50	6 (20)	3 (7)
51-60	5 (17)	0 (0)
61-70	5 (17)	0 (0)
71+	0 (0)	0 (0)
<b>Sex</b>		
Female	14 (47)	34 (76)
Male	16 (53)	11 (24)
<b>Level of education</b>		
Primary school	1 (3)	2 (4)
High school	9 (30)	8 (18)
College or university	20 (67)	35 (78)

The mean intention to search for information was high in both samples: a value of 4.9 for the mixed population and 5.4 for the parent sample (see Table 6). In both samples, the intentions to search were higher for those with college or university education.

The mean direct measurements for the mixed population and parent samples were: 5.4 and 5.6 respectively for attitudes, 3.3 and 3.6 respectively for subjective norm, and 4.7, and 5.2 respectively for perceived behavioural control.

The mean composite indirect measurements for the mixed population and parent samples were 45.0 and 40.3 out of a possible -84 to + 84 for attitude, and 13.9 and 14.3 out of a possible -63 to +63 for subjective norm. Perceived behavioural control was measured as -12.6 and -3.0 out of a possible -63 to +63. See also Table 6 for the scores for each individual indirect measure per category.

**Table 6. Mean and standard deviation of intentions, direct and indirect measures**

	<b>Mixed population (n=30) mean (SD)</b>	<b>Parents (n=45) mean (SD)</b>
<b>Intentions</b>	4.9 (1.9)	5.4 (1.1)
<b>Direct measures</b>		
Attitude	5.4 (1.5)	5.6 (1.3)
Subjective Norms	3.3 (1.3)	3.6 (1.5)
Perceived Behavioural Control	4.7 (1.6)	5.2 (1.2)
<b>Indirect measures</b>		
Attitude	45.0 (25.6)	40.3 (26.3)
<i>#1 Provides insight</i>	13.3 (7.4)	10.6 (8.5)
<i>#2 In consultations</i>	12.0 (6.7)	9.0 (7.4)
<i>#3 If unsure in health decision</i>	10.7 (8.0)	10.4 (6.7)
<i>#4 If incomplete information given by     from health professionals</i>	9.5 (8.8)	10.0 (7.3)
Subjective norms	13.9 (18.4)	14.3 (17.5)
<i>#1 Family and friends</i>	6.5 (7.7)	6.2 (6.8)
<i># 2 Health professionals</i>	3.2 (7.5)	4.1 (9.8)
<i>#3 Other social groups (colleagues,</i>	4.2 (6.1)	3.9 (5.2)

<i>patient organisations)</i>		
Perceived behavioural control	-12.6 (23.6)	-3.0 (19.8)
<i>#1 Difficult to attain an overview</i>	-3.7 (8.0)	0.0 (8.0)
<i>#2 Not possessing knowledge</i>	-3.9 (9.1)	-1.5 (7.3)
<i>#3 Time consuming</i>	-5.0 (8.8)	-1.4 (8.6)

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SD=standard deviation

Possible ranges: intention and direct measures from 1 to 7, mean composite indirect measure of attitude from -84 to +84, subjective norm from -63 to +63, perceived behavioural control from -63 to +63, and all specific beliefs from -21 to 21.

### ***The direct measurements predictive strength on intention to search for health information***

The multiple regression analysis showed that the three direct measurements accounted for 47% of the variance in intention to search in the sample of parents and 55% in the mixed population respectively (see Table 4).

In the mixed population sample, perceived behavioural control was the strongest predictor of intention to search ( $\beta = 0.66$ ,  $p < 0.01$ ), whereas the strongest predictor in the sample of parents was attitudes ( $\beta = 0.51$ ,  $p < 0.01$ ) followed by subjective norms ( $\beta = -0.25$ ,  $p = 0.01$ ).

## **Discussion**

### ***Study limitations***

The study was limited by the fact that the data was cross-sectional and did not include longitudinal data allowing for test-retest analysis (8). Recruiting, and particularly loss to follow up, is a resource-demanding challenge in questionnaire studies, and we were unable to undertake

larger or longer-term data capturing within the limits of our study. However, by administrating the questionnaire to two different samples we were able to provide a descriptive approach that allowed for examining the utility of the questionnaire across samples.

Another limitation of the study was that the samples were subject to a low response rate: this is a common challenge in questionnaire studies (8, 27). Francis et al (8) estimate that a response rate of 50% may be expected for TPB-questionnaires. Response rates may be influenced by a number of factors including: the incentives offered, the length of the questionnaire, the inclusion of sensitive questions, the actual appearance of the questionnaire, and how it is administered (27). Speculating about the underlying reasons for this low response rate in our study is difficult, but it was apparent that the rate was higher when the questionnaire was delivered face-to-face.

### ***The utility of the questionnaire in predicting intentions to search***

The questionnaire had several strengths. The Theory of Planned Behaviour Manual written by Francis and colleagues provided us with explicit, evidence based and practical guidance for developing the questionnaire (8). When an internal reliability test was performed (Cronbach's Alpha test), values for the intentions and the direct measures were found to be high in both samples. Correlations between the constructs that were hypothesised to be theoretically related were satisfactory overall with the exception of the subjective norm correlations. These latter correlations were modest and not statistically significant. This may be a consequence of the low response rate and not enough statistical power, or be explained by subjective norm having a weak association with intention for searching for health information.

When we examined the relationship between indirect and direct measurements of the same constructs, we found significant positive correlations with corresponding measures in both samples with the exception of perceived behavioural control in the parent cohort ( $p = 0.07$ ). In our regression analysis all the three composite indirect measures were shown to predict their respective direct measurements of the same constructs. However, with the exception of the indirect -direct attitude relationship which was found to be strong (48% and 53%), the predictive strength of indirect measurements of subjective norm and perceived behavioural control were somewhat weaker. Previous TPB-studies have shown that the predictive strength of mean indirect measurement scores accounts for around 25% of the variance in direct measurements (10). These findings indicate that the identified specific beliefs are appropriate indicators for understanding the direct measurements, important for determining construct (and content) validity of the questionnaire. However, the somewhat weak predictive strength of the composite indirect measurements may indicate the need to further expand the specific beliefs we have used and will be investigated in further research. Francis et al (8) state that it is likely that TPB questionnaires may vary in this regard and that the strength of predictions is also a function of the number of beliefs included in the indirect measures. Thus, the decision to include more items will depend on the complexity of the behaviour being studied viewed against the consequences the length of the questionnaire may have in terms of respondent fatigue and acceptability.

***Attitude and perceived behavioural control: the strongest predictors of intention to search***

The mean scores for intention, direct measurements and indirect measurements are largely consistent in both samples. Overall, the intention to search for health information was found to be



high and echoes descriptive cross-sectional studies both in Norway and internationally, which have explored searching behaviour for health information (4, 5, 7). Furthermore, the mean scores for direct measurements of attitudes and perceived behavioural control were moderate to high, indicating a favourable attitude and perceived behavioural control associated with search for health information. The direct measurements of subjective norm scores in both samples were somewhat lower, indicating moderate perceived social pressure associated with search for health information.

When we examined the mean scores on the indirect measurements, the scores reflected a moderate to high positive attitude in favour of searching, a fairly weak positive social pressure to search, and a weak level of negative control (in other words, searching for health information was perceived as somewhat difficult).

The questionnaires' overall predictive strength of intentions was found to be good, and accounted for 47% to 55% of the variance in the two samples. These findings are consistent with – or better than – found in other studies using the TPB to predict behavioural intentions across a range of health topics (10).

The most important positive predictor of intention in the mixed population sample was perceived behavioural control, whereas the most important predictor in the parent sample was having a positive attitude towards searching. In the mixed population, attitude had a high beta value but it did not reach statistical significance ( $\beta=0.38$ ,  $p=0.09$ ).

The importance of peoples attitude associated with search for health information is supported by other descriptive cross-sectional studies where people reported positive attitudes related to search because it provided them with support when making health decisions, in consultations with health

professionals, and provided them with comfort and additional knowledge (5, 31, 32). These were also the indirect measurements that received the highest score in both of our samples. However, people also experience several practical barriers to searching for health information, as data from the indirect measurements associated with perceived behavioural control in our questionnaire support, include being unsure if the information is understood properly or feeling overwhelmed (5, 32).

As hypothesised, the strength of the individual predictors varied somewhat across the two samples. This may be due to the fact that the parent sample was younger: efficacy associated with searching has previously been associated with people in younger age groups (5, 7, 25). In other words, searching for information is perceived as less difficult by younger people.

Interestingly, in both samples, perceived social pressure was negatively associated with increased searching frequency, although this relationship was only significant in the parent sample. This finding contrasts with the theoretical assumptions of the TPB which suggest that increased social pressure will make people perform more likely to search. However, it should be noted that this assumption have been criticised as being a too simplistic conceptualisation generally concerned with peoples' desire to comply (10). Some have argued that the relationship between social influence and behaviour is more complex, and the construct has therefore been subject to much debate and empirical attention in research within the field of TPB methodology (10). Our findings in this study will contribute further to this debate.

The evidence describing social pressure or expectations related to searching is limited. What we do know is that people rely on health providers for health information (25), and that searching for health information are often done to supplement this information (25, 31-33). There is also

evidence to suggest that the involvement of people in decision making by health providers is sub-optimal (34, 35) and that the activity of independently searching for health information is rarely discussed, facilitated or addressed during consultations (5, 32, 36-38). Consequently, people may not feel appropriately informed and thus perceive that they need to search for further health information on their own (32, 33). Exploring the indirect measurements underlying subjective norm, the perceived pressure from all groups were modest, and interestingly, health professionals were given the lowest score.

The findings of this questionnaire identified several areas for improvement related to people's intention to search. Based on the principles of TPB it is the strongest predictors that should be targeted in order to change behaviour, in that way "*we can increase the chance that the person will intend to do a desired action and thus increase the chance of the person actually doing it*" p7,(8). Thus, in order to facilitate peoples' search for information, attitudes and perceived behavioural control should be considered as possible targets for intervention.

As was mentioned introductory, facilitating the active involvement of people about own health is of international priority (3, 39, 40). However, such efforts face two important barriers. The information that people frequently use and rely on, such as advice from family and friends or mass media reports (4-7), may be unreliable and biased, and not based on systematic research. Furthermore, people may not have the necessary health literacy skills to evaluate the information they find (2). In order to address these issues interventions that aim to improve people's health information seeking should also target people's ability to evaluate the validity and relevance of the information they find.

## Conclusion

The reliability and validity of the questionnaire was found to be satisfactory and consistent across the two samples. Overall prediction of intention was high in both samples and accounted for 47% to 55% of the variance in behavioural intention.

Attitudes and perceived behavioural control were identified as important predictors of intention to search and possible targets for intervention.

The findings of this study suggests that the questionnaire we developed may be a useful tool for understanding intentions to search for health information, and may be used by librarians, health educators, health professionals or researchers to describe important factors associated with intention to search. Furthermore, by mapping and tailoring important identified predictors to change, interventions may be developed to enable people in obtaining of health information.

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