VOLUME 1

SOCIAL COGNITION MODELS: A REVIEW OF THEIR RELEVANCE FOR UNDERSTANDING PARTICIPATION IN CANCER SCREENING

Prepared for the Victorian Cytology Service
by

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Victorian Cytology Service

VCAP
Victoria's Cancer Action Plan

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1. INTRODUCTION

1.1 Background

The Victorian Cytology Service (VCS) was commissioned by the Victorian Department of Health to undertake a review of international literature (peer-reviewed and grey literature) focusing on key areas that inform thinking, knowledge and approaches to engaging individuals, groups and communities to participate in organised programs, including population-based screening programs.

The aim of the review was to consider:

- factors that enhance or hinder engagement in health screening and other preventative programs, including perceptions held by participants
- needs of specific groups (e.g. information needs of specific groups, such as those with low literacy skills)
- health beliefs and their impact on cognitive constructs and behaviour in relation to screening and engagement in positive health behaviours
- structural and environmental barriers to participation
- key work in other disciplines or settings that provide insight into innovative thinking and practice in engaging individuals and communities; especially within organised, voluntary programs or initiatives
- work completed in health and other disciplines on translating research findings into action.

The VCS contracted the Centre for Health Policy, Programs and Economics (CHPPE) to undertake the identification, synthesis and summary of the evidence.

Taken together, the three volumes cover the Department's requirements relating to the role of health beliefs, the factors associated with screening and knowledge translation. The three volumes are:

1. Social cognition models: a review of their relevance for understanding participation in cancer screening.
2. Identifying hard-to-reach groups: review of the factors (including barriers) associated with cancer screening
3. Knowledge translation: a review of strategies to increase participation in cancer screening

In Volume 2, a variety of factors were shown to be associated (either positively or negatively) with the uptake of screening. The factors were categorised under six domains. This first volume of the review concentrates on the cognitive domain.

1.2 Social cognition

> *Social cognition is concerned with how individuals make sense of social situations. The approach focuses on individual … thoughts as processes which intervene between observable stimuli and responses in specific real world*

situations. A significant proportion of social psychology over the past quarter century has started from this assumption that social behaviour is best understood as a function of people's perceptions of reality, rather than as a function of an objective description of the stimulus environment.[1]

Social cognition models (SCMs) describing the key cognitions (i.e. thoughts or perceptions) and their inter-relationships in the regulation of behaviour have been extensively applied to the understanding of health behaviours. The most widely applied SCMs include:

- the Health Belief Model (HBM)
- Protection Motivation Theory (PMT)
- Theory of Planned Behaviour (TPB) and its forerunner the Theory of Reasoned Action (TRA)
- Social Cognitive Theory (SCT)
- health locus of control
- a set of models that focus on the idea that behaviour change occurs through a series of qualitatively different stages (e.g. the Transtheoretical Model (TTM), the precaution-adoption process model (PAPM), the health action process approach).[1]

1.2 Methodology

This review has focused on the HBM and the TPB.[1] It is organised as follows:

- Chapter 2: The Health Belief Model
- Chapter 3: The Theory of Planned Behaviour
- Chapter 4: An examination of the intention–behaviour (I–B) relationship
- Chapter 5: The implications of the review for understanding screening rates and developing interventions.

Chapters 2 and 3 begin with a brief description of the models and how they have changed over time. The descriptions rely heavily on the work of Connor and Norman (2005) to provide an up-to-date description of the models.[1] The second section in each of these chapters looks at the utility of the models. This analysis draws on quantitative studies (mainly, but not entirely meta-analyses) in the peer-reviewed literature that show the strength of the relationships between the concepts included in each of the models.

Throughout the review, a small amount of Australian data is included to demonstrate some of the concepts. These examples are indicative only and should not be over-interpreted as the aggregated nature of the data precluded multivariate analyses.

[1] For an overview of other SCMs, see Conner and Norman (2005)[2]

2 HEALTH BELIEF MODEL

2.1 Understanding beliefs

Beliefs are individual cognitive characteristics (perceptions) that shape behaviour. They can be acquired by:

- internalising the beliefs of the people around us during childhood (primary socialisation)
- adopting the beliefs of significant others (e.g. peers and leaders)
- being exposed to repetitive messages, and association of beliefs with images of sex, love and other strong positive emotions (the primary thrust of the advertising industry)
- physical trauma.

Beliefs can differentiate between individuals from the same background and, although there is an assumption that beliefs can be modified, people often cling to beliefs and act on them even against their own self-interest. An example is provided by Yarbrough and Braden (2001) in their article on the utility of the health belief model as a guide for explaining or predicting breast cancer screening behaviour noted:

> *Residents of a community with a documented increased incidence of cancer were very resistant to health education interventions in spite of knowing about their increased risk. They argued that because the cause of cancer is unclear, health promotion and protection activities might not be effective for reducing cancer risk.*[3]

2.2 Description of the Health Belief Model

The HBM emerged in the late 1950s. Rosenstock (1974) attributed the first HBM research to Hochbaum's 1958 studies of the uptake of tuberculosis X-ray screening. The HBM was originally used to understand why people did not participate in preventive services, and more recently to understand decisions around the use of health services.[4,5]

In the early models, the key beliefs considered to shape health behaviours were defined as the:

- perceived likelihood of experiencing a health problem
- perceived severity or seriousness of the consequences of experiencing the health problem
- perceived benefits of the health action
- perceived barriers or costs association with performing the health action.[4,6]

Over time, the model has been expanded to include other factors:, such as the inclusion of self-efficacy. This concept asserts that whether or not people undertake a task or health behaviour will depend, in part, on their judgements of their own ability to organise and execute the actions or steps required to complete the task.[7] Rosenstock, Strecher and Becker (1988) believed that including self-efficacy would provide a more powerful approach in understanding health-related behaviour. [8] According to Abraham and Sheeran (2005), a number of studies have tested the predictive utility of including self-efficacy in the HBM, and generally confirm that 'self-efficacy is a useful additional predictor'. However, the authors do

point out that 'self-efficacy may not always enhance the predictive utility of the model' when floor or ceiling effects are observed. This would occur if people were either uniformly very confident (ceiling), or uniformly very unconfident (floor), that they could perform the required actions.[6]

Other factors have been added to the model over time. Table 1 Health Belief Model used to examine factors associated with breast and cervical screening in Hispanic women1 shows the HBM used by Austin, McNally and Stewart (2002) to guide their literature review into the factors associated with breast and cervical screening in Hispanic women.[5] This model included not only self-efficacy but also 'cues to action'.

Table 1 Health Belief Model used to examine factors associated with breast and cervical screening in Hispanic women

Concept	Definition	Application
Perceived susceptibility	One's opinion of chances of getting a condition	Define populations at risk, risk level; personalise risk based on a person's features or behaviour; heighten perceived susceptibility if too low
Perceived severity	One's opinion of how serious a condition and its sequelae are	Specify consequences of the risk and the condition.
Perceived benefits	One's opinion of the efficacy of the advised action to reduce risk or seriousness or impact	Define action to take; how, where, when; clarify the positive effects to be expected.
Perceived barriers	One's opinion of the tangible and psychological costs of the advised action	Identify and reduce barriers through reassurance, incentives, assistance
Cues to action	Strategies to activate 'readiness'	Provide how-to information, promote awareness, reminders
Self-efficacy	Confidence in one's ability to take action	Provide training, guidance in performance action

Source: Austin, McNally and Stewart (2002)[5]

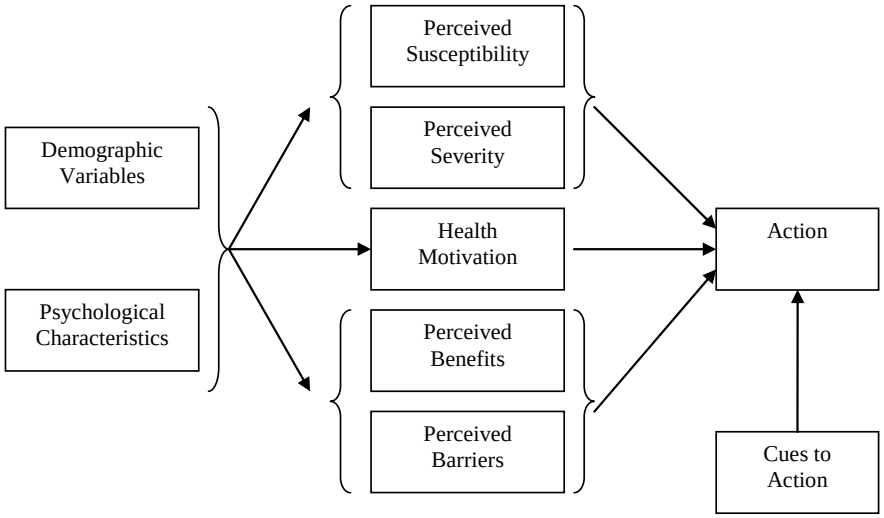
Figure 1 shows the HBM, as outlined by Abraham and Sheeran in 2005, which appears to be the most comprehensive exposition of the model. This exposition includes four major domains, as outlined below.

1. **Threat evaluation**
   Threat evaluation consists of two key beliefs: (i) perceived susceptibility to illness or health problem; (ii) the perceived severity of the consequences of illnesses.
2. **Behavioural evaluation**
   Behavioural evaluation also consists of two key beliefs: (i) perceptions concerning the benefits, or efficacy, of a recommended health behaviour; (ii) perceptions about the costs of, or barriers to, enacting the behaviour.
3. **Health motivation**
   Health motivation is the readiness to be concerned about health matters.
4. **Cues to action**
   Cues to action are a diverse range of triggers that can activate health behaviour when

appropriate beliefs are held. These include such things as an individual's perceptions of symptoms, social influences and health education campaigns.[6]

This exposition of the model does not specifically include self-efficacy, although it could perhaps be included under one of the other headings (e.g. perceived barriers).

Figure 1 Health Belief Model



Source: Abraham and Sheeran (2005)[6]

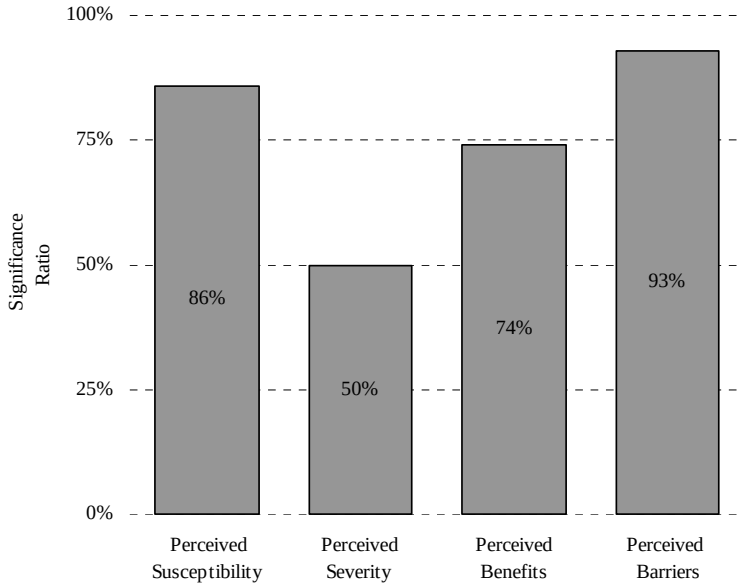
2.2 Utility of the Health Belief Model

A number of uses have been outlined for the HBM. According to Abraham and Sheeran (2005), there were a number of studies prior to the early 1970s which indicated that the key health beliefs underlying the threat and behavioural evaluations provide a useful framework for understanding individual differences in health behaviour, and for designing interventions to change behaviour.[6] According to Glanz and Rimer (1995), the HBM can be used effectively to guide the development of messages aimed at persuading individuals to undertake health actions such as screening mammography. [9]

However, there are a number of difficulties that make any evaluation of the utility of the model difficult. The first relates to the fact that, in the evaluations of the HBM, most attention has focused on the four factors contained in the threat and behavioural evaluation. Cues to action and health motivation have received less attention.[6]

The implications of the HBM have generally been stated as the fact that people are more likely to undertake a health action if the threat evaluation is high (e.g. high risk with serious consequences) and the behavioural evaluation is positive (e.g. large benefits and few barriers).[10] Two meta-analyses have calculated significance ratios and effect sizes for the impact on behaviour for the four factors (Figure 2 and Figure 3), but there does not appear to have been any such analysis for the other constructs (health motivation and cues to action).

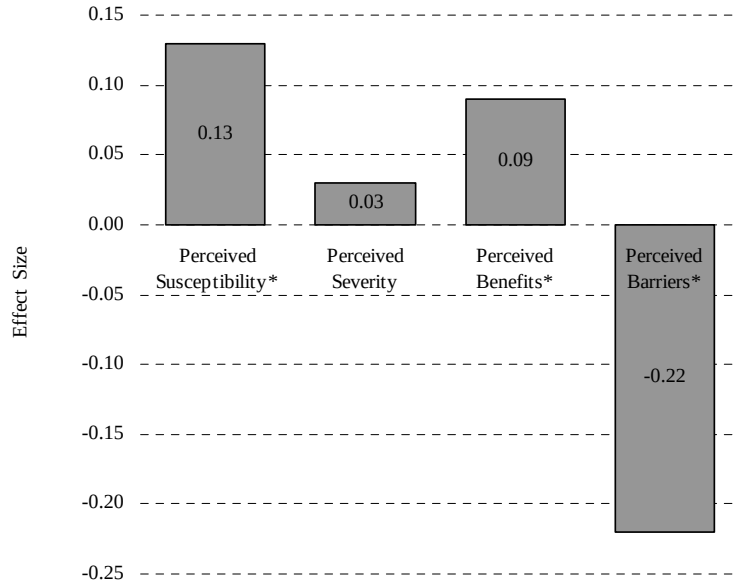
Figure 2 Significance ratios for Health Belief Model constructs for preventive behaviours (29 studies)



Source: Janz and Becker (2002)[10]

Notes:
Significance ratio: (number of studies with statistically significant results) ÷ (number of studies reporting significance tests)

Figure 3 Screening behaviour effect sizes for the factors in the Health Belief Model (based on 5 studies; 2136 participants)



Source: Harrison et al. (1992)[11]
Notes:
*p < 0.001

The second difficulty in determining the utility of the HBM is the idiosyncratic interpretation and implementation of the model in practice. Examples are provided below.

- In a review of the utility of the HBM as a guide for explaining or predicting breast cancer screening behaviours, Yarbrough and Braden (2000) found that the maximum amount of variance explained by HBM variables in the studies was 47%. The study that reported this result included the non-HBM variable of socioeconomic status as a factor. In the other studies, the variability accounted for by any one, or a combination, of HBM variables was only 15–27%.[3]
- Abraham and Sheeran (2005) reported that four theory-based interventions (included in two studies) increased screening mammography utilisation on average by 23% compared to usual care.[6] On checking the primary studies on which this conclusion was based, it was found that:
    - one study used a model containing six belief concepts: susceptibility, severity, benefits, barriers, motivation and control; 'control' is not an HBM variable but was derived from the TPB outlined in the next chapter
    - the other study included 'intentions to undertake screening' as a predictor in the analysis; once again, this is not an HBM factor but is also included in the TPB model.

In 2000, Yarbrough and Braden concluded that the HBM did not have the power to predict behaviours consistently. According to these authors, the reasons for the HBM's apparently limited predictive power stemmed from the methodological shortcomings of the model, namely:

- theoretical descriptions not being strong enough to predict points for targeting interventions
- a lack of evidence of the essential conditions for each 'concept': its boundaries, and the background factors that would influence it
- the relationships between concepts have not been validated
- most of the studies addressed linear relationships between the HBM factors rather than multiplicative interactive influences of variables on one another.

In 2005, Abrahams and Sheeran (2005) reviewed findings from the quantitative reviews of the four factors. They concluded that, although the four factors are often found to be statistically significant predictors of health-related behaviours, the effect size is small.[2] The authors point out a number of caveats that need to be borne in mind when considering the results of these analyses. One is that the effects of individual health beliefs should be combined in some way and that the combined effect may be greater than the sum of individual effects. The second is that the effect sizes show 'considerable heterogeneity', implying that differences in the design and measurement (i.e. operationalization) of the factors influence the results.[6]

Finally, this section on the utility of the HBM ends with the presentation of some descriptive data relating to the uptake of screening mammography and faecal occult blood testing (FOBT) in the Australian context. Although the data appear to indicate that there are differences

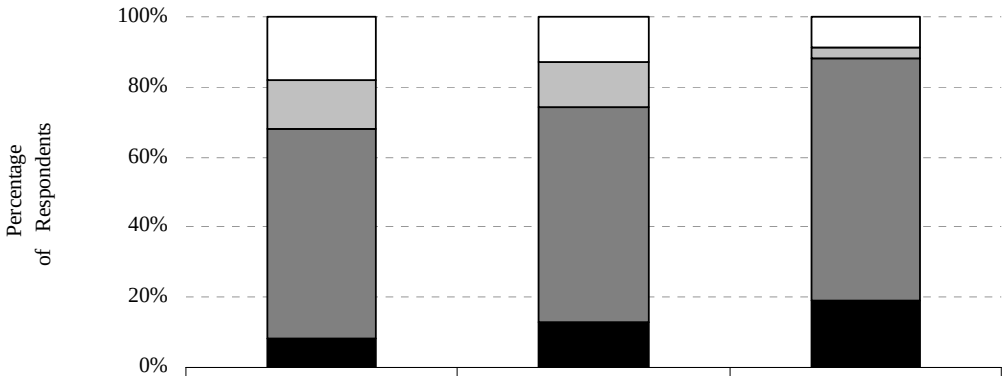
[2] Cohen's (1992) recommendations for judging effect sizes (ES) [12]

Test	Statistic	Small ES	Medium ES	Large ES
m_a vs m_b for independent means	*d*	0.20	0.50	0.80
Significance of produce moment	*r*	0.10	0.30	0.50
r_a vs r_b for independent rs	*q*	0.10	0.30	0.50

between well-screened, under-screened and never-screened groups across some of the factors outlined in the HBM, the data need to be interpreted with caution. Firstly, they represent bivariate analyses and the apparent relationships may be mediated by other variables. Secondly, the nature of the data in one of the primary sources does not allow for significance testing. This means that apparent differences may not be significant.

- **Screening mammography**
  The data presented in Figure 4 indicate that there may be differences in perceived risk among women who have never had a mammogram (never-screened), those who do not screen regularly (under-screened) and those who are up-to-date with their screening (well-screened). Never-screened women were less likely to perceive themselves at risk of developing breast cancer than under-screened and well-screened women (68% vs 74% and 88%). Never-screened and under-screened women were more likely to indicate that they had no chance of developing breast cancer (14% and 13% vs 3%).[13] However, these data needed to be treated with some caution as they are cross-sectional rather than prospective. This means there is no way of knowing the impact of screening on the risk perceptions of the participants.

Figure 4 Perceptions risk of developing breast cancer among never-screened, under-screened and well-screened women aged 50–69 years (post-campaign)



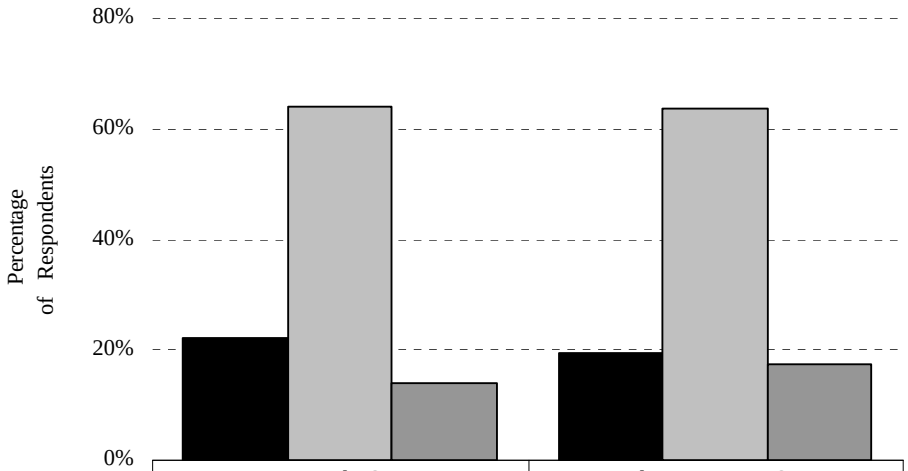
	Never-Screened	Under-Screened	Well-Screened
Don't Know	18%	13%	9%
No Chance	14%	13%	3%
Slight Chance	60%	61%	69%
High Chance	8%	13%	19%

Source: King et al. (2003)[13]

Notes:
Percentages exclude those who indicated they had already had a diagnosis of breast cancer, and may not sum to 100% within the groups due to rounding
Slight chance: slight chance + very slight chance
High chance: High chance + very high chance
Sample sizes not included in the original

- **Faecal occult blood testing**
  The data presented in Figure 5 indicate that there was no statistically significant difference in the risk perceptions of people who returned FOBT kits in the Bowel Cancer Screening Pilot Program (BCSPP) and those who did not return the kits. However, as shown in Figure 6, those who did not return kits had a less positive behavioural evaluation than those who did not. They were nearly 12 times more likely to agree with the statement that 'Having a test like FOBT seems like more trouble than it's worth' (23% vs 2%). Those who returned the kits were more than twice as likely to strongly disagree with the statement (72% vs 30%).[14]

Figure 5 Threat evaluation: risk perceptions of people who did and did not return faecal occult blood testing kits in the evaluation of the Bowel Cancer Screening Pilot Program



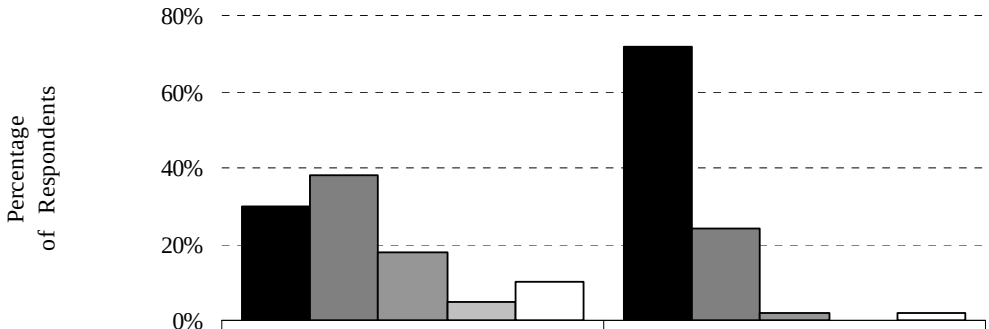
	Returned FOBT (N=1240)	Did Not Return FOBT (N=296)
Likely	22%	19%
Unlikely	64%	64%
Others	14%	17%

Source: Department of Health and Ageing (2004)[14]

Notes:
Likely: Likely + very likely
Unlikely: Unlikely + very unlikely
Others: Neither likely nor unlikely + not sure/don't know/it depends
FOBT: Faecal occult blood testing

Post-hoc significance test using three response categories conducted by CHPPE: Chisq = 2.76, df = 2, p = 0.251
Although the significance test using all six response categories shows a significant difference (p = 0.03), it appears that the 'Others' categories are responsible for the statistical significance. Post-hoc significance testing using five response categories showed no statistically significant difference between the two groups (Chisq = 6.01, df = 4, p = 0.198).

Figure 6 Behavioural evaluation: agreement with the statement that the faecal occult blood testing was 'more trouble than it was worth' in the evaluation of the Bowel Cancer Screening Pilot Program



	Did not Return FOBT (N=303)	Returned FOBT (N=1261)
Strongly Disagree	30%	72%
Disagree	38%	24%
Agree	18%	2%
Strongly Agree	5%	0%
Others	10%	2%

Source: Department of Health and Ageing (2004)[14]

Notes:

Others: Neither agree nor disagree + unsure/don't know

FOBT: Faecal occult blood testing

Post-hoc significance test using five response categories conducted by CHPPE: Chisq = 305.54, df = 4, $p < 0.001$.

3 THEORY OF PLANNED BEHAVIOUR

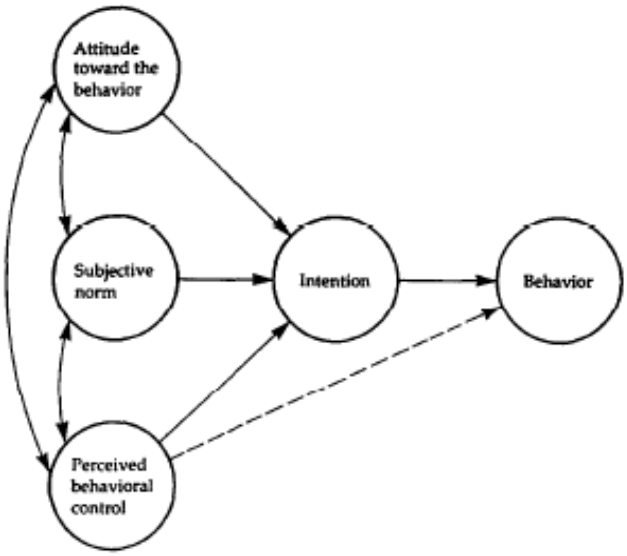
3.1 Description

Because the Theory of Reasoned Action (TRA) suffered from limitations in dealing with behaviour over which people do not have complete control, the model was revised and renamed the Theory of Planned Behaviour (TPB).[15-17] The TRA proposed that a person's intention (I) to adopt a particular behaviour was influenced by the person's attitudes (A) toward that behaviour, and subjective norms (SN). The TPB included a third component: perceived behavioural control (PBC).[18, 19] According to Cooke and French (2008), the TPB and the TRA (Ajzen 1997), have been utilised 'extensively' to predict health behaviour.[17]

The three conceptually independent determinants of intention originally proposed by the TBP are summarised below.

1. **Attitude toward the behaviour**
   This refers to the extent to which a person has a favourable, or unfavourable, evaluation of the behaviour in question.
2. **Subjective norm**
   This refers to the perceived social pressure from others to perform, or not to perform, the behaviour.
3. **Perceived behavioural control**
   This refers to the perceived ease or difficulty of performing the behaviour and is assumed to reflect past experience as well as anticipated impediments and obstacles. PBC was used as proxy measures of actual control. There was overlap in definition of PBC with Bandura's (1977) definition of self efficacy (i.e. 'the conviction that one can successfully execute the behaviour required to produce the outcomes').[15, 16] PBC also had a direct influence on behaviour (Figure 7).

Figure 7 Model of the theory of planned behaviour



Source: Ajzen (1991)[15]

The relative importance of attitude SN and PBC in the prediction of intention was expected to vary across behaviours and situations. However, as a general rule, the more favourable the attitude and SN and the greater the PBC, the stronger would be an individual's intention to perform the behaviour. The TPB depicts behaviour as a linear regression function of behavioural intention and perceived behavioural control.

$$B = w_1 I + w_2 PBC$$

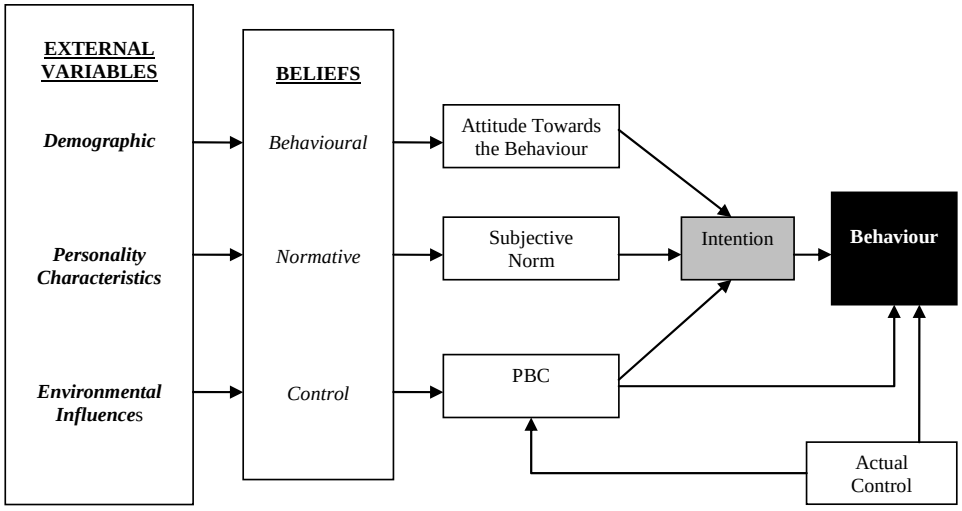
where B is behaviour, I is behavioural intention, PBC is perceived behavioural control and w_1 and w_2 are regression weights.[16]

According to Ajzen (1991), accurate prediction of behaviour requires that:

1. measures of intention and PBC correspond to, or are compatible with, the behaviour that is to be predicted
2. intention and PBC remain stable in the interval between their assessment and observation of the behaviour; intervening events may produce changes in intentions or PBC with the effect that the original measures of these variables no longer permit accurate prediction of behaviour
3. PBC must be an accurate proxy for actual behavioural control.[15]

Connor and Sparks (2005) presented a revised TPB model that still contained the original constructs, but included a construct called 'actual control' and outlined how other beliefs and external variables (demographic, personality and environment) influence attitude, SN and PBC (Figure 8).[16]

Figure 8 Revised Theory of Planned Behaviour model



Source: Based on Connor and Sparks (2005)[16]

Notes:

PBC: Perceived behavioural control

According to this model, intention does not necessarily result in the desired behaviour. In addition, the concordance between intention and behaviour depends on the:

- PBC of the person, based on an appraisal of internal control factors, such as beliefs about having the necessary skills and resources to perform the behaviour
- actual external factors that affect the performance of the behaviour.[19]

As noted by Peyman and Oakley (2009) both internal and external factors can facilitate or hinder behaviour.[20]

3.2 Utility of the Theory of Planned Behaviour Model

If the TPB is to be used to develop an intervention, it is important to determine which variables should be targeted (i.e. attitude, SN, PBC, or actual control factors). It would be counter-productive to target variables that did not account for variance in intention or behaviour.[16]

There have been a number of studies investigating the relationships between the variables in the TPB and intentions.[3] For example, Connor and Sparks (2005) quote an unpublished meta-analysis by McEachan, Connor and Lawton that included 12 prospective applications of the TPB to breast or testicular self-examination (5 studies), cervical screening (2 studies) and health screening (5 studies). Across all the studies:

- 44% of the variance in intention was explained by attitude, SN and PBC
- attitude was the strongest predictor ($r_+ = 0.56$), PBC the second strongest ($r_+ = 0.43$), and SN the weakest ($r_+ = 0.34$).[4]

Vart (2010) conducted a survey of 334 men and women aged ≥ 60 years in the UK as part of her, as yet, unpublished doctoral thesis. Preliminary findings indicated that the reasoning behind the intention to participate in FOBT was significantly affected by individuals' attitudes towards bowel cancer and bowel cancer screening.[21]

A meta-analysis by Cooke and French (2008) indicated that:

- the strength of SN–intention and PBC–intention relationships varied across type of screening test (Table 2 Estimated effect sizes by type of screening test)
- receiving an invitation increased the strength of the attitude–intention and SN–intention relationships but decreased the PBC–intention relationship (Table 3)
- having to pay for screening decreased the strength of all the relationships but the decrease was outside statistical significance for the SN–intention relationship at $p \leq 0.05$ (Table 3).[17]

[3] The relationship between intentions (I) and behaviour (B) are considered in Chapter 3

[4] r_+ = sample weighted average correlation

Table 2 Estimated effect sizes by type of screening test

Relationship	Variable	Screening mammography	Pap tests	FOBT
A-I	r_+	0.46	0.43	0.43
SN-I	r_+	0.30*	0.43*	0.52*
PBC-I	r_+	0.45*	0.58	0.62

Source: Cooke and French (2008)[17]

Notes:
* Denotes correlations within the row that are significantly different from one another ($p < 0.05$)
FOBT: Faecal occult blood testing
r_+: Sample-weighted average correlation
A–I: Attitude–intention relationship
SN–I = Subjective norm–intention relationship
PBC–I = Perceived behavioural control–intention relationship

Table 3 Estimated effect sizes by program factors

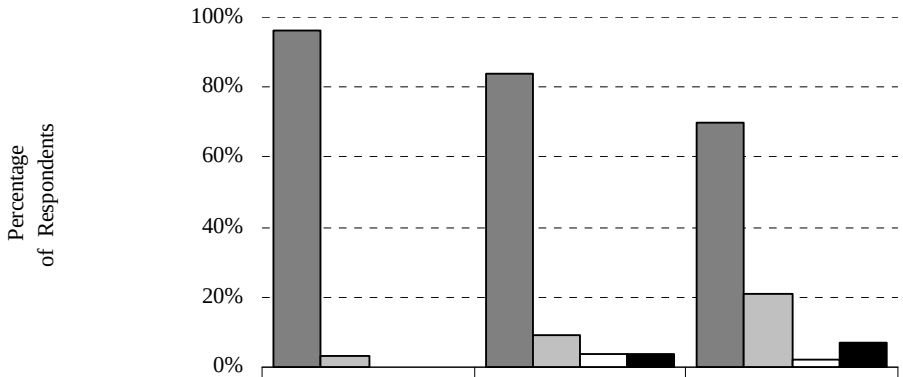
	Invitation		No invitation		p value
	r_+	95% CI	r_+	95% CI	
A–I	0.55	0.53–0.56	0.39	0.36–0.42	< 0.001
SN–I	0.39	0.38–0.41	0.44	0.41–0.47	< 0.001
PBC–I	0.44	0.42–0.45	0.57	0.53–0.61	< 0.01
	Free		Paid		p value
A–I	0.53	0.51–0.54	0.42	0.38–0.45	< 0.001
SN–I	0.40	0.39–0.42	0.43	0.39–0.46	> 0.05
PBC–I	0.47	0.45–0.48	0.38	0.33–0.43	< 0.001

Source: Cooke and French (2008)[17]

Notes:
r_+: Sample-weighted average correlation
A–I: Attitude–intention relationship
SN–I: Subjective norm–intention relationship
PBC–I: Perceived behavioural control–intention relationship

Finally, the evaluation of the 2000/2001 phase of the BreastScreen Australia media campaign indicated differences in attitudes towards the provision of screening mammography by BreastScreen Australia between well-screened, under-screened and never-screened women. Although over 90% of women in each group agreed that BreastScreen Australia screening was a good idea (99% vs 93% vs 91%), the strength of the attitude was lower in the under-screened and never-screened groups; 84% and 70%, respectively thought it was a 'very good idea' compared to 96% of the well-screened groups (Figure 9).

Figure 9 Attitudes of Australian women towards screening by BreastScreen Australia



	Well-Screened	Under-Screened	Never-Screened
Very Good Idea	96%	84%	70%
Fairly Good Idea	3%	9%	21%
Bad Idea	0%	4%	2%
Don't Know	0%	4%	7%

Source: King et al. (2003) [13]

Notes:
Percentages may not sum to 100% due to rounding
Sample sizes not included in the original

4 INTENTION–BEHAVIOUR RELATIONSHIP

Intentions can be defined as the instruction that people give themselves to perform particular behaviours in order to achieve certain goals. They are characteristically measured by items of the form 'I intend to do/achieve X'. Intentions are regarded as the culmination of a decision-making process.[22-25]

Godin and Kok (1996) reviewed the literature applying the TPB to attendance at screening programs. Across six studies, they reported sample-weighted average correlations (r_+) between intentions and behaviours of 0.35 – a moderate effect according to the Cohen (1992) scale in footnote 3.[12, 26] In 2002, Sheeran published the results of a meta-analysis of ten individual meta-analyses of the intention–behaviour (I–B) relationship and found that intention accounted for 28% of the variance in behaviour (r = 0.53). This was a 'large' effect size and suggested that 'intentions are good predictors of behaviour'.[27] However, it is difficult to gauge from correlational studies such as this the impact that a change in intention (IΔ) would have on behaviour (BΔ).

In 2006, Webb and Sheeran published a meta-analysis of intervention studies that assessed both IΔ and subsequent BΔ. The forty-five included studies contained forty-seven tests of the IΔ–BΔ relationship. A major finding of the meta-analysis was that a medium-to-large IΔ (d_+=0.66) engendered a small-to-medium BΔ (d_+=0.36).[5] The authors concluded that intention has a significant impact on behaviour but the effect is considerably smaller than correlational tests have suggested.[23, 28]

Webb and Sheeran (2006) investigated the impact of various factors that may mediate the IΔ– BΔ relationship and, as shown in Table 44, found that the impact of IΔ on behaviour was:

- **larger** when (i) participants had more actual or perceived control over the health behaviour; (ii) the interventions resulted in significant IΔ rather than significant, simultaneous IΔ and PBCΔ; (ii) the behaviour was measured objectively rather than by self-report
- **smaller** when (i) circumstances supported the development of habitual behaviour; (ii) the study involved risky behaviours performed in social contexts; (iii) the interval between intention and behaviour measures was greater than 11.5 weeks; (iv) the comparison group received no intervention.

The IΔ–BΔ relationship was not mediated by (i) the way in which intentions were measured; (ii) the publication status of the study (peer-reviewed vs grey literature); (iii) the nature of the participants (students vs non-students).[23]

[5] The magnitude of the effect sizes was based on Cohen's (1992)[12] recommendations for *d* shown in footnote 3.

Table 4 Conceptual factors moderating the intention change (IΔ)–behaviour change (BΔ) relationship

	Level 1		Level 2		Interpretation of the results
	Rating	d_+	**Rating**	d_+	
CONCEPTUAL FACTORS					
Volitional control					
Assessed control	Low	0.25	High	0.45	IΔ had a larger effect on behaviour when participants were rated as possessing more control over the behaviour
PBC	Low	0.32	High	0.51	IΔ had a larger effect on behaviour when participants perceived they had more control over the behaviour
PBC effect	I Only	0.55	I + PBC	0.33	IΔ had a larger effect on behaviour when interventions produced significant IΔ only compared to those that generated significant IΔ and PBCΔ
Intention measure	I	0.38	BE	0.35	The type of intention measure (intention (BI) vs expectation (BE)) did not influence the IΔ–BΔ relationship
Habitual control	Unlikely	0.74	Likely	0.22	IΔ had smaller effect on behaviour when circumstances supported the development of habits
Social reaction	Unlikely	0.45	Likely	0.19	IΔ has smaller effect on behaviour in the case of risky behaviours performed in social contexts compared with health-protective behaviours
MEASUREMENT FACTORS					
Time interval	≤ 11.5	0.46	> 11.5	0.23	IΔ had smaller effect on behaviour when the time interval between intention and behaviours was greater than 11.5 weeks
Behaviour measure	Self-report	0.30	Objective	0.67	IΔ had a greater impact on behaviour when behaviour was measured objectively
Comp. intervention	None	0.25	Alternative	0.41	IΔ had a smaller impact on behaviour when there was no comparison intervention (i.e. comparison group received no treatment)
STUDY CHARACTERISTICS					
Publication status	Published	0.38	Unpublished	0.25	No significant differences in the relationship between published and unpublished studies
Type of sample	Non-student	0.33	Student	0.38	No significant differences in the relationship between student and non-student samples

Source: Webb and Sheeran (2006) [23]

Notes:

Δ: Change; d_+: Sample weighted effect size; PBC: Perceived behavioural control; BE: Behavioural Expectation ; I: Intention; B: Behaviour

Webb and Sheeran (2006) also examined the impact of the use of the different SCMs to develop the interventions, and the impact of different types of interventions on both intentions and behaviours.

- As shown in Table 55, there were no statistically significant differences between the impact of the TPB (and its forerunner the TRA) and the HBM. Both had medium effects on intention and small effects on behaviour.
- As shown in Table 6, incentives for behaving or remaining in a program had the largest impact on intention but there was no difference between incentives and social encouragement/pressure/support on behaviour. However, both these types of interventions had a larger impact on behaviour than the other types of intervention.[23]
- Although it has been argued that planning and forming implementation intentions narrows the gap between intention and behaviour,[24] the intervention involving planning and implementation intentions had the third largest effect on intention but the smallest effect on behaviour (Table 66).[23]

Table 5 Estimated effect sizes for intervention based on theoretical models

	Sample weighted effect sizes (d_+)	
	Intention	**Behaviour**
Protection Motivation Theory	0.69	0.46_a
Theory of Reasoned Action/Theory of Planned Behaviour	0.58	0.40_a
Health Belief Model	0.52	0.29_a
Stage Models (MAP, TTM, HAPA, ARRM)	0.53	0.22_a

Source: Webb and Sheeran (2006) [23]

Notes:
Stage models: Model of Action Phases (MAP), Transtheoretical Model (TTM), Health Action Process Approach (HAPA), Aids Risk Reduction Models (ARRM)
a: no statistically significant differences between the effect sizes

Table 6 Estimated effect sizes for types of interventions aimed at changing behaviour

	Effect sizes	
	Intention	**Behaviour**
Incentives[1]	0.96	0.58_a
Social encouragement/pressure/ support	0.64	0.54_a
Information on behaviour/outcome	0.60	0.32_b
Persuasive communication	0.38	0.29_b
Modelling/demonstration	0.41	0.28_b
Environmental changes	0.77	0.27_b
Personalised message	0.10	0.26_b
Risk awareness material	0.56	0.25_b
Planning, implementation	0.68	0.20_c

Source: Webb and Sheeran (2006) [23]
Notes:
1 Incentives for behaving or remaining in the program
a,b,c: similar subscripts: no statistically significant difference; different subscripts: statistically significant differences

There was a wide range of behaviour included in the Webb and Sheeran (2008) analysis (e.g. condom use, smoking, course enrolment, sun protection, exercise, testicular self-examination, cycle helmet use, breast self-examination, donating behaviour) and care needs to be taken in generalising the results to all types of behaviour.

Cooke and French (2008) undertook a quantitative review of applications of the TRA/TPB to screening attendance. Their review included nineteen tests of the relationship between intention and behaviour in the peer-reviewed literature. Their results indicated that intention differed in effectiveness as a predictor of behaviour depending on the screening test; intention was a better predictor of behaviour for colorectal cancer screening (not exclusively FOBT) and screening mammography than for Pap tests (Table 77). They also found that, across all screening tests, intention was a better predictor of attendance in paid contexts than in free contexts (Table 88).[17]

Table 7 Estimated effect sizes for type of screening test for intention behaviour relationships

	Participants	Number of tests	Sample weighted average correlation r_+
Overall (all types)	8148	19	0.42
Colorectal [1]	240	2	0.44
Screening mammography	4587	6	0.37
Cervical	1013	4	0.21[2]

Source: Cooke and French (2008) [17]

Notes:
1 Not exclusively faecal occult blood testing
2 Difference between cervical and other screening tests statistically significant; no statistically significant difference between colorectal and mammography screening
r_+: sample weighted average correlation

Table 8 Comparison of relationship between behaviour and intentions by cost of screening

	Number of tests(1)	Sample weighted average correlation	
		r_+	95% CI
Paid	4	0.58	0.53–0.61
Free	15	0.40	0.38–0.41
p value		<0.001	

Source: Cooke and French (2008) [17]

Notes:
1 Types of screening included in the analysis were: cervical, colorectal, genetic test, health check, mammography, and prenatal. There was significant heterogeneity in the r_+ values between tests but the r_+ values for each type of test were not reported

In a conceptual and empirical review of the intention–behaviour relationship, Sheeran (2002) divided people conceptually into four groups according to their intention and subsequent behaviour. Conceptually it was the 'disinclined actors' and the 'inclined abstainers' who were responsible for the discrepancy between intention and behaviour (Table 9).

Table 9 Conceptual schema of actors and abstainers in the intention–behaviour relationship

	Subsequently screened	Subsequently not screened
Intention to screen	Inclined actors	Inclined abstainers
Do not Intend to screen	Disinclined actors	Disinclined abstainers

Source: Sheeran (2002)[27]

Empirically, Sheeran (2002) found that, except for screening mammography, the proportion of inclined abstainers (those people who intended to screen but subsequently did not) was larger than the 'disinclined screeners' (those who did not intend to screen but subsequently did so).[27] In one study of FOBT in France a similar effect was also seen (Table 100).[29]

Table 10 Empirical results for actors and abstainers in the intention–behaviour relationship

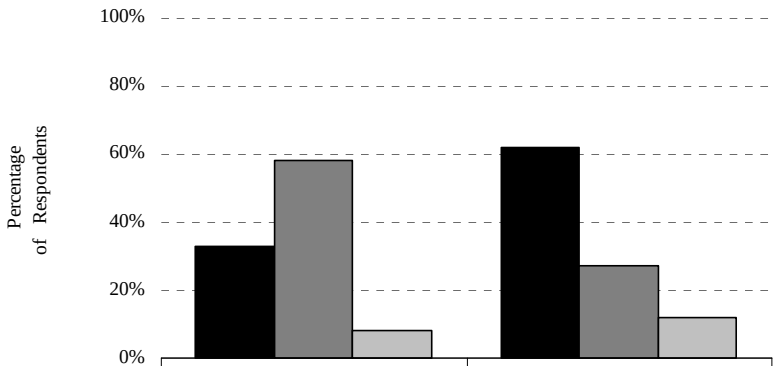
	Inclined to screen (100%)		Do not intend to screen (100%)	
	Screened	Not screened	Not screened	Screened
Cervical	43%	57%	88%	12%
Cervical	70%	30%	100%	0%
Breast	74%	26%	65%	35%
FOBT	48%	52%	82%	27%

Sources: Cervical and Breast Sheeran (2002)[27]; FOBT Herbert et al. (1997)[29]

Notes:
FOBT: Faecal occult blood testing

Although these results are interesting, they should be treated with some caution. They are based on a small number of studies, and, as shown in Figure 10, people do not always fit neatly into a dichotomised version of intentions. In Australia, there is a not insignificant 'unsure' group.[13]

Figure 10 Breast cancer screening: differences in the intentions between never-screened and under-screened Australian women



	Never-Screened (N=61)	More than 2 years since last screen (N=57)
Likely	33%	62%
Unlikely	58%	27%
Others	8%	12%

Source: King et al. (2003)[13]
Notes:
Post-hoc statistical significance test based on three response categories undertaken by CHPPE: Chisq = 12.31, df = 2, p = 0.002; Others: Neither likely nor unlikely + don't know

5 IMPLICATIONS AND CONCLUSIONS

As was shown in Volume 2 of the literature review, a broad range of factors have been shown to be associated with uptake of cancer screening. These include demographic factors, cognitive factors, psychosocial factors, health and lifestyle factors, cultural factors and health system factors. SCMs have been used to understand and identify reasons for low compliance rates with cancer screening. The justifications that have been advanced for focusing on cognitions (cognitive) are that cognitions are:

- important determinants that mediate other determinants, such as demographic factors
- more amenable to change than other factors including psychological factors.

These justifications imply that effective interventions should be based on manipulations of the cognitive factors that have been shown to determine health behaviours.[1, 5]A number of issues need to be considered in relation to how the models can be used to help design interventions.

5.1 Issues impacting on the utility of the models

- **Integrity of the underlying assumptions**
  Both the models presented in this review emphasise the rationality of human behaviour. Intentions in the TPB and behaviour in the HBM are considered to be the end result of a rational decision-making process based upon a 'deliberative, systematic processing of the available information'. The most transparent examples of this underlying assumption are the threat and behavioural assessments in the HBM.[1] It cannot be judged from the evidence presented whether or not this is an adequate model for screening behaviour. However, the following quote by Lende and Lachiondo (2009) indicates that models based on cost–benefit analysis may not be appropriate.

  > '*We saw a sharp divergence between what a person understands about breast cancer and screening and how that person actually deals with these things on a personal level. It was usually easy to talk about others in purely biomedical terms. That afforded a distance and a perspective from which it was easy to explain what needs to be done to maintain health. However, this biomedical model became clouded when the conversation turned personal, forcing women to leave behind bodies in general and focus on their own body specifically. Each woman brought an embodied understanding of breast cancer to the table, as the experiences they had in their bodies and the subsequent meanings they held for their bodies guided many of their thoughts about their bodies… Consequently, their explanations moved well beyond a cost–benefit analysis that weighed time and money against the upside of early detection*.'[30]

  Both the models are health-oriented. They assume that health decisions and behaviour are fuelled by motives to protect one's health and to regulate threats associated with health. But there is another line of research in which perceptions of the 'self' (not health) assume a major role in influencing health judgements and

behaviours. A small number of findings suggest that people's conceptions of their physical bodies can have implications for health behaviours. For example, research by Burris and Rempel (2004) indicates that people's sensitivity to activities involving penetration of the boundaries of the physical self predicts decreased blood donation.[31] Although no research specifically relating to cancer screening was included in the article to demonstrate this point, the authors indicate that the findings suggest that there may be psychological implications associated with the physicality of many health behaviours that will have an impact on screening behaviour.[32]

- **Specificity of the constructs**
  As Yarbrough and Braden (2000) pointed out in relation to the HBM, the theoretical descriptions of the key constructs in the models (e.g. barriers, benefits, risk) are not specific enough to use for targeting interventions. If, for example, an intervention were to be implemented targeting 'attitudes' towards screening behaviour, there is nothing in the model to suggest what the key attitudes are and how they can be changed. The analyses for the impact of different types of interventions on intentions and behaviour in the TPB indicated that they are not all equal. For example, social encouragement/pressure/support would appear to have a greater impact on intentions than either persuasive communications or personalised messages. However, this was discovered empirically and cannot be adduced from the model.

- **Relationships between the constructs**
  There is very little in the descriptions of the models and the accompanying analyses to determine how the constructs (and underlying factors) combine to produce behaviour change. Yet there is no reason to assume that they will combine either additively or multiplicatively to produce a desired change in behaviour. For example, there was an example in the analysis for the TPB which indicated that interventions that resulted in significant changes in intentions had a larger impact on behaviour than those that produced significant changes in both intentions and perceived behavioural control.[23]

  There are a number of instances where the data analyses relating to the relationship between intentions and behaviour indicated that the relationships between the constructs varied according to: (i) the type of screening test; (ii) factors associated with the health system (e.g. issuing screening invitations and the cost of the test). It cannot be automatically assumed, therefore, that the evidence obtained in one health system will generalise to another with different structural features.

5.2 Conclusions

Overall, the models are interesting and provide a way of visualising or thinking about how to intervene to increase screening rates, but cannot provide the finer details. On balance, the analysis in relation to the TPB appears to have somewhat greater utility for designing interventions. Some tentative conclusions arising from this model are as follows:

- interventions that succeed in changing intentions to screen will also succeed in changing behaviour but the impact on behaviour will be much smaller than on intentions
- people who are inclined to screen but who, for whatever reason, do not ultimately attend screening, are the major reason for the lack of concordance between intentions and behaviour
- whether the intervention should target attitudes, social norms or perceived behavioural control (self-efficacy) will depend to some extent on the screening test

- there is nothing to indicate that targeting all three constructs will produce a greater effect and a very small amount of data to indicate that it may be counter-productive
- issuing invitations to screen appears to strengthen the relationship between attitudes and intentions.

Financial incentives would appear to have the largest impact on intentions but both incentives and social encouragement/pressure/support appear to have the greatest impact on behaviour.

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