Effective Dissemination

An Examination of Theories and Models of Change
for Research Dissemination in the AOD Field

Petra Bywood, Hiroe Terao, Ann Roche

Effective Dissemination

An Examination of Theories and Models of Change for Research Dissemination in the AOD Field

Petra Bywood, Hiroe Terao, Ann Roche

Effective Dissemination

An Examination of Theories and Models of Change for Research Dissemination in the AOD Field

Petra Bywood, Hiroe Terao, Ann Roche

This report is the third part of a 3-part series.

Part One: Effective Dissemination: A Systematic Review of Implementation Strategies for the AOD Field

Part Two: Effective Dissemination: An Examination of the Costs of Implementation Strategies for the AOD Field

Part Three: Effective Dissemination: An Examination of Theories and Models of Change for Research Dissemination in the AOD Field

All reports can be downloaded from the NCETA website www.nceta.flinders.edu.au or hard copies are available on request.

NCETA
Australia's National Research Centre
on AOD Workforce Development

Citation Details

ISBN

Design and Layout

Acknowledgments

Related Publications

Bywood PT, Lunnay B and Roche AM. (2008) Strategies for facilitating change in AOD professional practice: A systematic review of the effectiveness of reminders and feedback. Drug and Alcohol Review, 27:548-558.

Bywood PT, Lunnay B and Roche AM. (2009) Effectiveness of opinion leaders for getting research into practice in the alcohol and other drugs field: Results from a systematic literature review. Drugs, Education, Prevention and Policy, in press.

Bywood PT. (2006) Judging the research: Tools for best practice. Of Substance, 4 (3): 28-29.

Table of Contents

1. Executive Summary

Whenever a theory appears to you as the only possible one, take this as a sign that you have neither understood the theory nor the problem which it was intended to solve - Karl Popper (1902 – 1994).

This document is Part Three of a 3-part series by the National Centre for Education and Training on Addiction (NCETA) examining effectiveness, costs and theories related to dissemination and implementation of research into practice. Part One in the series is a systematic review that evaluated the effectiveness of 16 different dissemination strategies for implementing new research, programs and treatments into practice in alcohol- and other drug-related areas (Bywood, Lunnay & Roche, 2008a). Part Two is an examination of the costs associated with using such strategies (Bywood, Lunnay & Roche, 2008b).

In this part (Part Three), the theories and models of change underpinning the use of dissemination strategies and the implications for the alcohol and other drugs (AOD) field are examined. This report provides a summary of key theories and models that have been used in the development of dissemination strategies for facilitating uptake of innovations into practice, or to interpret the outcomes of an evaluation of such strategies.

While the focus of the systematic review (Part One) was on the *effectiveness* of dissemination strategies, Part Two (examination of costs) and the present report (Part Three) provide additional information that could be the subject of separate systematic literature reviews. Thus the present examination was exploratory rather than exhaustive.

Studies that were included in Part One were examined for any reference to theories, theoretical frameworks or models of behavioural and organisational change. A description of the identified theories and models of change is outlined and findings from relevant studies are summarised in the current report. Finally, some common elements across the different theories were identified, and the key dissemination theories and models are discussed in terms of their relevance for getting effective innovations implemented in the AOD.

Theories are classified into five broad types:

- Learning theories
- Motivational theories
- Stage models
- Process or planning models
- Ecological or organisational change theories.

A total of 20 theories and models were identified that appeared to have the greatest potential for use in dissemination and implementation of innovations. They are:

Operant conditioning	Adult Learning theory
Social Learning / Cognitive Learning theory	Elaboration Likelihood model
Theory of Planned Behaviour	Self-Determination theory
Trans-Theoretical model	Awareness-to-Adherence model
Precaution-Adoption Process model	Diffusion of Innovations
PRECEDE-PROCEED model	Commitment-to-Change model
Social Marketing	Systems theory
Organisational Development	Complexity theory
Social Worlds theory	Sticky Knowledge
Organisational Readiness for Change	Community Organisation and Participatory models

Theories and models, which focus on either the individual practitioner and/or the organisation as the unit of change, may address change at different levels, including:

- **Intrapersonal:** Theories or models that attempt to explain or predict change in an individual's attitudes, knowledge, behaviour or intentions to act

- **Interpersonal:** Theories or models that attempt to explain or predict change in the way individuals act in the context or their social environment

- **Ecological / Organisational:** Theories or models that attempt to explain or predict change at the level of the organisation or wider social system.

Identification of factors that may predict changes in behaviour or organisational systems and are amenable to change can be used to guide the development of such strategies, or to inform the selection of appropriate dissemination strategies in specific conditions. Theories allow researchers, managers and program designers to move beyond instinct and guesswork to develop and evaluate behaviour change interventions that are based on an understanding of human behaviour.

Thus, the key research questions for this study were:

1. Which theories / models of dissemination contribute to our understanding of dissemination and implementation of innovations in the AOD field?

2. Which theoretical concepts and constructs are potential targets for change that can be incorporated into dissemination and implementation strategies aimed at the individual and / or organisational level?

From the 25 systematic literature reviews and 85 additional studies that were included in Part One, only one systematic review and 24 additional primary studies discussed theories and models of change in the development or use of dissemination strategies[1]. Generally, studies provided little detail on their application of particular theories, and often it was only selected constructs that were used, or a theory was applied post hoc in the interpretation of results. Actual testing of specific theories in the use of dissemination strategies was rare.

While most theories or models of change focused on the individual behaviour change process, thus ignoring the sociocultural and environmental influences on behaviour, the ecological perspective takes into account the active interrelationship of factors within and between multiple levels of a particular problem.

Theories are dynamic. They are constantly refined, challenged and modified as systems, organisational culture and society itself changes over time. This is particularly relevant to practitioners working in the AOD field as factors, including the diversity of AOD workers, high turnover of staff and the emotive and challenging nature of AOD-related problems, need to be considered when developing or using implementation strategies to change practice or practitioners' behaviour.

No single theory or model accounted for all possible variables that might contribute to behaviour change and not all theories were useful in all circumstances. Thus, the use of multiple theories to change complex human behaviours may be needed. However, there were several theoretical elements that were common to multiple theories and may contribute to a change in practice. These common elements were:

Perceived control over behaviour (self-efficacy)	Perceived outcomes of behaviour (expectancy)
Motivation	Intention to act
Positive attitude	Personal values
Affect	Role of social influences (perceived norms)
Environmental barriers	Professional development (training)

One example of a framework for developing dissemination and implementation strategies is described. This framework identified and integrated theoretical constructs that are relevant to changing professional practice across multiple levels. The six key elements were:

---

1. Table 12 provides a summary of key theories and models.

1. Identify the problem or need to change
2. Examine the current context
3. Consider the relevant theoretical constructs
4. Develop a strategy
5. Implement change
6. Evaluate the process, seek feedback and maintain change.

Incorporating these elements into dissemination strategies may increase the potential for effective implementation of innovations into practice or for interpreting findings and refining strategies for specific situations, populations or target behaviours. Thus limited resources can be allocated to effective dissemination strategies with a higher probability of success.

2. Introduction

Although new research and effective interventions continue to be developed, the gap between the *generation* of innovations, such as treatments, interventions, programs, devices and therapies, and the *use* of such innovations remains problematic. New discoveries and effective innovations for improving the health and wellbeing of people with alcohol- and other drug-related problems are futile if they are not put to good use.

To increase the probability of adoption and utilisation, dissemination and implementation strategies have been developed and widespread use of innovations depends largely on the quality and suitability of an effective dissemination and implementation process. The key objective of any dissemination effort in the alcohol and other drugs (AOD) field should be sustained utilisation and timely uptake by those who intend to implement the innovation (NCDDR, 2001). However, implementing innovations typically requires substantial change to occur within an individual, organisation or system. Inevitably, introducing such changes is likely to meet some resistance.

This report examines some of the key theories and models of change that may enhance understanding of the factors that facilitate change at a number of different levels, including:

- Individual practitioners' behaviour - specifically the behaviour of professionals who interact with clients with AOD-related problems
- Health care groups or teams of people who treat / manage clients
- Organisations providing care - e.g. AOD treatment centres, rehabilitation facilities, hospitals
- The larger health care system or environment in which individual organisations are embedded.

Different theories may be relevant to dissemination strategies at different levels. For instance, theories concerning change in individual behaviour are more relevant to strategies directed at individual practitioners or teams while theories of organisational change may be more relevant to strategies directed at organisations, such as hospitals or the broader health care system (Eccles, Grimshaw, Walker, Johnston & Pitts, 2005).

The first part of this series of reports on dissemination and implementation strategies was a systematic literature review (Bywood et al., 2008a), which evaluated the effectiveness of 16 dissemination and implementation strategies (Table 1). That review provided a synthesis of the evidence of effectiveness for

each strategy, the key elements of successful strategies, and a discussion of the relevance of each strategy for the AOD field. Findings showed that:

- All strategies were effective to some extent
- Some strategies were more effective than others in bringing about change in practitioners' behaviour
- No single strategy was effective in all situations.

Table 1. Dissemination and implementation strategies

Professional interventions: **to change knowledge / behaviour of individual health care professionals**
Educational materials
Local consensus processes
Educational meetings (CME)
Educational outreach (academic detailing)
Local opinion leaders
Patient-mediated interventions
Prompts and reminders
Audit and feedback
Financial incentives
Electronic educational sources
Organisational interventions: **to change the setting or systems in which health care professionals work**
Record and office systems
Multi-disciplinary collaborative approaches
Alternative care approaches
Continuous quality improvement
Other interventions
Mass media
Multi-faceted interventions

The 16 strategies listed in Table 1 demonstrated considerable variability in their capacity to influence practitioners' behaviour, induce organisational change or improve patient / client outcomes. Those that were consistently effective were:

- Educational meetings (interactive CME)
- Educational outreach
- Prompts and reminders
- Audit and feedback.

Overall, successful strategies had only small-to-modest effects that varied across contexts in unpredictable ways. Determining the effectiveness of any particular strategy was hindered by substantial heterogeneity in the contexts and target behaviours of seemingly comparable strategies. Comparison across studies frequently showed mixed effects that may reflect important differences in the characteristics of the target behaviour (simple vs complex), motivation of the target audience (unaware vs aware of need to change), attributes of the recommended practice, and presence of organisational barriers to change. Each of these factors may act as effect modifiers[2]. Thus it was difficult to determine which strategies were optimal for a particular setting and circumstances.

One reason for this may be that dissemination and implementation strategies are generally developed and utilised without a theoretical basis for their success. Reviews of implementation research have suggested that evaluating implementation strategies using 'definitive RCTs' is premature when there is no *a priori* reason for using a particular strategy (Eccles et al., 2005; Grimshaw et al., 2004). It has been likened to conducting Phase III clinical trials for a new drug without understanding the pharmacology of the drug or the physiological response to it (Eccles et al., 2005). This trial-and-error attempt at dissemination and implementation may prove expensive if the additional costs of using such a strategy fail to translate into expected improvements in practice (for a discussion on costs of dissemination strategies see Bywood et al., 2008b).

A conceptual framework in the form of a theory or model, which identifies factors that affect the uptake of an innovation, may enhance understanding of the dissemination process by providing a more coherent and simplified view of behaviour, thereby revealing areas for potential change.

In this light, theories or models of change can play a role in framing and tailoring not only the development of innovations, but also the means by which such innovations may be disseminated most effectively to the target audience and implemented in routine practice. That is, *how* an innovation is transferred to the individual, organisation or system is likely to affect the level of uptake (NHS - Centre for Reviews and Dissemination, 1999).

---

2. Effect modification occurs when the effect measure depends on the level of another factor.

Including a coherent theoretical basis for understanding change in individual behaviour and at the organisational level may:

- provide valuable insights into why some dissemination strategies are effective in some circumstances and not in others
- help to identify aspects of the change process that have not been addressed in existing dissemination strategies
- reveal which components of effective strategies are critical and immutable to their success in influencing the decision to adopt an innovation.

2.1. Theories and models of change

Theories or models of change have been described as "visual representations or metaphors that seek to simplify complexity" (Bunton, Baldwin & Flynn, 1999). That is, they provide a simplified representation of complex concepts and, ideally, may be used to predict future behaviours at a degree beyond simple chance. Box 1 clarifies some of the terms used to discuss theories and models in this document.

Box 1. Common terms in theories and models

Theory	A set of concepts, definitions and propositions that explain or predict events by describing the relationships between variables
Concepts	The primary elements of a theory
Constructs	Concepts that have been developed or adopted for use in a specific theory
Variables	The operational forms of constructs that define the manner in which constructs are measured in particular circumstances
Theoretical framework	Theory that has not been fully developed or rigorously tested
Models	Models are not theories as they do not predict or explain factors linked to outcomes, but they draw on theories to aid understanding of a specific problem in a certain context and may offer a framework for identifying interventions to address the factors

(Source: National Cancer Institute, 2005).

There is a large number of behaviour change theories and it may be helpful to have a rationale for choosing between them (Eccles et al., 2005). Ideally, theories aiming to explain behaviour change should:

- Demonstrate effectiveness in predicting and explaining behaviour change in diverse settings
- Explain behaviour in terms of factors that are changeable – e.g. knowledge, belief, attitudes, motivation, actual or perceived external

constraints. Factors which may be highly predictive, such as age, gender and personality, are not modifiable and therefore not useful determinants

- Include non-volitional components – i.e. they should assume that individuals working within a larger organisation do not always have complete control over their actions and allow an examination of the influence of individuals' perceptions of external factors on their behaviour (e.g. patient's preferences or organisational barriers and facilitators).

Behavioural change theories have been applied to some extent in the health promotion field to provide insight into how individuals develop and maintain healthy lifestyles. Although a large number of different theories and models have been developed, only those that were potentially relevant to inducing behaviour change at the level of the practitioner or system change at the level of the organisation were examined[3]. Thus, only theories or models that have the potential to influence professional or organisational change were examined in this report. A brief outline of other well-known models of change that were considered less relevant to practice change and were, therefore, excluded from this review is provided in Appendix 1.

---

3. For example, the Health Belief Model (Sheeran & Abraham, 1996) and Protection Motivation Theory (Boer & Seydel, 1996) were not included in this report as they include elements that are more relevant to promoting healthy behaviours or understanding behaviour change in patients (e.g. severity of an illness or condition, patient's perceived susceptibility or vulnerability to a condition) than to changing the behaviour of health care professionals or changing organisational systems to facilitate implementation of innovations into practice.

3. Objectives and Research Questions

3.1. Aim of the study

The principal objective of this study was to identify, describe and appraise theories and models of change and to explore their relationship with the dissemination and implementation strategies that were evaluated in the associated systematic literature review (Bywood et al., 2008a).

Specifically, the aims were:

1. To understand the relevant theories and models of change and identify the constructs and processes that are important for changing behaviour of practitioners working in human services and clinical practice for the treatment and prevention of AOD-related harms

2. To understand the relevant theories and models of change and identify the constructs and processes that are important for changing organisational systems in human services and clinical practice for the treatment and prevention of AOD-related harms

3. To identify which theoretical constructs are used in successful dissemination strategies and determine which could be effectively incorporated into dissemination strategies for the AOD field.

To do this, the National Centre for Education and Training on Addiction (NCETA) examined the available information from a systematic literature review of the effectiveness of 16 different dissemination and implementation strategies for the AOD field (Bywood et al., 2008a) and synthesised the findings pertaining to the application of theories and models of change.

3.2. Research Questions

The key research questions were:

1. Which theories / models of dissemination contribute to our understanding of dissemination and implementation of innovations in the AOD field?

2. Which theoretical concepts and constructs are potential targets for change that can be incorporated into dissemination and implementation strategies aimed at the individual and / or organisational level?

4. Methods

Studies evaluated in the systematic review (Part One, Bywood et al., 2008a) were re-examined for information indicating the use of behavioural change theories in the development of a dissemination strategy, or for any other part of the dissemination and implementation process, including interpretation of an evaluation.

The theoretical bases that underpinned dissemination and implementation strategies identified in Part One were explored to determine the key concepts and constructs embedded in effective strategies. It is noted that the search strategy did not contain specific search terms for *theories* or *models* of change. The focus of the systematic review was on the *effectiveness* of dissemination strategies, whereas Part Two (examination of costs) and the current report (Part Three) provide additional information that could be the subject of separate systematic literature reviews. Including search terms for theories and models of behaviour change at the individual and organisational level, as well as terms for economic analyses for Part Two, would have generated a large and unmanageable number of citations for Part One. Thus the present examination was exploratory rather than exhaustive.

Relevant theories and models are described in brief, theoretical concepts and constructs identified, and their potential application for use in dissemination strategies for the AOD field discussed.

5. Findings

Results from the systematic review evaluating the effectiveness of dissemination strategies are provided in full in Part One (Bywood et al., 2008a). The review provides a summary of the evidence of effectiveness for each of 16 strategies, the key features of successful strategies, and a discussion of the relevance of each strategy to the AOD field. Table 2 describes the 16 dissemination strategies that were evaluated.

Table 2. List of interventions for dissemination and implementation (modified from EPOC taxonomy) [a]

Type of strategy	Description
1. Professional Interventions - oriented to changes in professional practice	
Educational materials	Distribution of published / printed recommendations for care, including clinical practice guidelines, audiovisual materials and electronic publications. Materials are delivered personally or through mass mailings.
Local consensus processes	Inclusion of participating providers in discussion to ensure that they agree that the chosen clinical problem is important and the approach to managing the problem is appropriate. E.g. modification of clinical practice guidelines to local setting
Educational meetings (continuing medical education)	Healthcare providers participate in conferences, lectures, workshops or traineeships *Didactic* – minimal participant interactions (lectures, seminars) *Interactive* – participation with discussion or practice (workshops)
Educational outreach visits (academic detailing)	Use of a trained person who meets with providers in their practice setting to give information with the intent of changing the provider's practice.
Local opinion leaders (includes product champions)	Use of providers nominated by their colleagues as 'educationally influential'. The investigators explicitly state that their colleagues identified the opinion leaders.
Patient-mediated interventions	New clinical information (not previously available) collected directly from patients and given to the provider.
Prompts and reminders (including decision support)	Patient- or encounter-specific information, provided verbally, on paper, or on electronically, which is designed to prompt a health professional to recall information. This usually occurs through general education, in medical records or by interactions with peers, reminding them to perform or avoid some action to aid individual patient care. Computer-aided decision support and drugs dosage are included.

Audit and feedback	Any summary of clinical performance of healthcare over a specified period. The summary may also include recommendations for clinical action. The information may be obtained from medical records, computerised databases or observations from patients.
Financial incentives	Any payment system that rewards health care providers for specified clinical actions. Examples include fee-for-service, target payments, and capitation.
Electronic educational sources	Healthcare providers use electronic, internet, ,or on-line databases to access information relevant to all levels of health care for patients.
2. Organisational interventions - oriented to changes in organisational practice	
Record and office systems	Any structured or unstructured system used for storage and exchange of information. Examples include electronic medical records, care plans, flow charts.
Multi-disciplinary collaborative approaches (integrated care)	Use of complementary inter-professional collaborations (nurses, physicians, psychologists, pharmacists, dieticians) to plan care for patients. Examples include integrated care, collaborative care, continuity of care.
Alternative care approaches	Use of alternative health professionals, such as nurse practitioners, or alternative settings, such as specialist clinics, to deliver specialised program of care. Examples include revision of professional roles; chronic care clinics; and therapeutic communities.
Continuous quality improvement	Any iterative process for improving the quality of health care that involves repeated cycles of 'plan-do-check-act'.
3. Other interventions	
Mass media	1. Varied use of communication that reaches great numbers of people including television, radio, newspapers, posters, leaflets and booklets, alone or in conjunction with other interventions. 2. Targeted at the population level.
Multi-faceted interventions	Use of more than one strategy in combination or sequentially.

[a] This table has been modified from the EPOC taxonomy (EPOC, 2002). Some strategies, which were described by EPOC, were not included here as no studies or existing reviews met the inclusion criteria for evaluation.

Of the 25 existing systematic reviews and 85 additional primary studies that were included in the systematic review (Bywood et al., 2008a), only one systematic review (Grimshaw et al., 2004) and 24 primary studies employed theories, models or specific theoretical constructs in the development, application or interpretation of evaluation of dissemination strategies. Table 3 provides a list of the available studies that used theory-based dissemination and implementation strategies.

Theories and models of change relevant to professional practice are summarised below. For each theory or model, a brief description is provided, followed by a synthesis of the evidence from studies (included in Part One) that discussed theories and models of change. Finally, common elements across theories have been identified and, where possible, the implications of different dissemination theories and models for facilitating adoption of innovations into the AOD field are discussed.

A total of 20 theories and models were identified that appeared to have the greatest potential for use in dissemination and implementation of innovations. The theories discussed in this report are:

Operant conditioning	Adult Learning theory
Social Learning / Cognitive Learning theory	Elaboration Likelihood model
Theory of Planned Behaviour	Self-Determination theory
Trans-Theoretical model	Awareness-to-Adherence model
Precaution-Adoption Process model	Diffusion of Innovations
PRECEDE-PROCEED model	Commitment-to-Change model
Social Marketing	Systems theory
Organisational Development	Complexity theory
Social Worlds theory	Sticky Knowledge
Organisational Readiness for Change	Community Organisation and Participatory models

Table 3. Theories / models of change used in dissemination strategies in primary studies

Type of strategy	Studies	Theories / models applied
1. Professional Interventions - oriented to changes in professional practice		
Educational meetings (continuing medical education (CME))	*General medicine:* (Suggs et al., 1998)	Adult learning theory
	HIV prevention: (Kelly et al., 2000)	Social cognitive theory
	Breast disease: (Young et al., 1998)	Problem-based learning based on Adult learning theory
	Smoking cessation: (Young & Ward, 2002)	Trans-theoretical model of change
	Diabetes management: (Pill, Stott, Rollnick & Rees, 1998)	Adult learning theory
	Cancer management: (Fallowfield et al., 2002; Fallowfield, Jenkins, Farewell & Solis-Trapala, 2003)	Learner-centred model based on Adult learning theory
	Asthma management: (White et al., 2004)	Problem-based learning based on Adult learning theory
	Arthritis management: (Glazier, Badley, Lineker, Wilkins & Bell, 2005)	Social cognitive theory
	General medicine: (Mazmanian, Johnson, Zhang, Boothby & Yeatts, 2001)	Commitment-to-change model
	Infection management (Onion & Bartzokas, 1998)	Problem-based learning
Educational outreach visits (academic detailing)	*Smoking cessation:* (Goldstein et al., 2003)	Trans-theoretical model of change
	Hypertension management: (Cranney, Barton & Walley, 1999)	Social marketing
	Lower back pain management: (Dey et al., 2004)	Elaboration likelihood model Social marketing
Local opinion leaders (including product champions)	*Asthma management:* (Finkelstein et al., 2005)	Social marketing
Prompts and reminders (including decision support)	*Immunisation:* (Shaw, Samuels, Larusso & Bernstein, 2000)	Adult learning theory
	Heart failure management: (Murtaugh, Pezzin, McDonald, Feldman & Peng, 2005)	PRECEDE-PROCEED model
	Diabetes management: (Sanders & Satyvavolu, 2002)	Awareness-to-Adherence model Social cognitive theory

Audit and feedback	*Diabetes management:* (Kiefe et al., 2001)	Social cognition models of change
Electronic educational sources	*Adolescent drug abuse prevention:* (Di Noia, Schwinn, Dastur & Schinke, 2003)	Learning theory Self-efficacy (Bandura)
2. Organisational Interventions - oriented to changes in organisational practice		
Record and office systems	*Adolescent alcohol use*: (Boekeloo et al., 2003; Boekeloo et al., 2004)	Social cognitive theory
	Cancer prevention: (Carney, Dietrich, Keller, Landgraf & O'Connor, 1992; Dietrich et al., 1992)	Social cognitive theory
3. Other Interventions		
Multi-faceted	*Use of research information:* (Bywood et al., 2008a; Forsetlund et al., 2003)	Diffusion of innovations Social cognitive theory
	Induced abortion care: (Foy et al., 2004)	Theory of planned behaviour
	Dementia management: (Bero et al., 1998; Bywood et al., 2008a; Grimshaw et al., 2004; Oxman, Thomson, Davis & Haynes, 1995; Waldorff, Almind, Makela, Moller & Waldemar, 2003)	Diffusion of innovations

NB: Please refer to intervention strategy sections in Part One (Bywood et al., 2008a) for detailed information and data (eg. outcomes, setting, etc).

Theories and models of change have been categorised in a number of different ways and some of these are listed in Table 4. However, not all theories and models fit comfortably within specific categories, and theories are often categorised differently by different investigators. Therefore, some theories (marked with an asterisk) appear in more than one category.

Table 4. Types of theories and models

Type	Description	Examples
Learning theories (Section 5.1.)	Propose the way adults learn best.	Adult learning theory Operant conditioning Social Learning/Cognitive theory* Elaboration Likelihood model*
Motivational theories (Section 5.2.)	Explain how individuals intend or decide to change their behaviour. Motivational theories focus primarily on the individual and their receptiveness or readiness to change within the context of a broader social system.	Theory of planned behaviour Social Learning/Social Cognitive theory* Self-Determination theory
Stage models (Section 5.3.)	Propose that behavioural change occurs through cyclic sequential stages that are qualitatively different from each other.	Trans-theoretical model Precaution-Adoption process model Awareness-to-adherence model* Diffusion of innovations*
Process and Planning models (Section 5.4.)	Propose a set of techniques derived from theoretical frameworks.	Elaboration Likelihood model* Diffusion of innovations* PRECEDE-PROCEED model Awareness-to-adherence model* Commitment-to-change model Social marketing
Ecological / Organisational change theories (Section 5.5.)	Explain change at the higher order level of systems.	Diffusion of innovations* Organisational Development Complexity theory Social Worlds theory Systems theory Sticky knowledge Organisational Readiness for Change Community organisation

* Theories and models appear in more than one category.

A small number of studies discussed theoretical frameworks. In a large systematic review of the effectiveness and efficiency of dissemination strategies, less than 10% of 235 studies provided an explicit theoretical rationale for selecting a particular dissemination and implementation strategy (Grimshaw et al., 2004). Similarly, another systematic review reported that studies that explicitly used theoretical models and methods of behaviour change in interventions (to prevent weight gain) were poorly reported and comparisons and contrasts

between such heterogeneous studies limited the conclusions that could be drawn (Hardeman, Griffin, Johnston, Kinmonth & Wareham, 2000)[4].

Most strategies incorporated some principles of particular theories / models. However, it was not always apparent which theoretical components were measured. Theories / models were used in the following three areas pertaining to the use of dissemination strategies:

- Designing / implementing the strategy (Boekeloo et al., 2003; Boekeloo et al., 2004; Carney et al., 1992; Cranney et al., 1999; Dey et al., 2004; Dietrich et al., 1992; Fallowfield et al., 2002; Fallowfield et al., 2003; Forsetlund et al., 2003; Glazier et al., 2005; Kelly et al., 2000; Margolis et al., 2004; Mazmanian et al., 2001; Murtaugh et al., 2005; Onion & Bartzokas, 1998; Pill et al., 1998; Sanders & Satyvavolu, 2002; White et al., 2004)

- Designing the methodology for the intervention, such as developing questionnaires or resources (Finkelstein et al., 2005; Forsetlund et al., 2003; Foy et al., 2004; Suggs et al., 1998; Waldorff et al., 2003; Young et al., 1998)

- Interpreting study findings (Kiefe et al., 2001; Murtaugh et al., 2005; Pill et al., 1998; Shaw et al., 2000).

Identification and description of behaviour change theoretical models and methods used in the intervention is crucial as it allows replication of effective interventions in different settings. However, underreporting of such crucial information was common. Some studies briefly reported how theories / models were used (Cranney et al., 1999; Fallowfield et al., 2002; Fallowfield et al., 2003; Margolis et al., 2004; Mazmanian et al., 2001; Pill et al., 1998). However, often there were no clear indications regarding which theories / models had been incorporated in strategies.

The following sections (5.1 – 5.5) provide a brief description of the key theories listed in Table 4 and how most (but not all) of the 20 theories were used in the studies listed in Table 3.

5.1. Learning theories

Early behaviourists (e.g. BF Skinner) developed learning theories to explain the development of complex behaviour based on the concepts of imitation and reinforcement. Some key learning theories are described below in sections 5.1.1 – 5.1.4.

---

4. This review was not included in Part One, as it was not specifically aimed at changing behaviour of practitioners. However, it is useful for this discussion as the principles pertaining to the use of theory are relevant.

5.1.1. Operant conditioning

Operant conditioning proposes that behaviours with positive consequences for an individual are more likely to be strengthened, whereas those with negative or unpleasant consequences will diminish. Positive consequences include financial, social, or personal incentives. The rationale is that positive consequences promote repetition of a behaviour while negative consequences lead to avoidance of a behaviour. The concept of positive consequences reinforcing behaviour is well accepted and often used to explain behaviour and behaviour change (Walker et al., 2003). Rewarded behaviours, which are repeated, form habits and the frequency of past rewarded behaviour predicts future behaviour. Rewards can take many different forms and can be intrinsic or extrinsic.

While not explicitly stated in studies evaluating the effectiveness of dissemination and implementation strategies, operant conditioning underlies several strategies, including:

- Prompts and reminders
- Audit and feedback
- Financial incentives.

5.1.2. Adult learning theory

Many dissemination and implementation strategies are underpinned in part by adult learning theory which proposes that personal motivation is critical to achieving behaviour change. An underlying assumption of learning theory is that practitioners are rational information seekers and decision makers and that once the information has been disseminated, behaviour change will simply follow. However, evidence clearly shows that simple distribution of information is insufficient for sustained behaviour change (Bero et al., 1998; Bywood et al., 2008a; Grimshaw et al., 2004; Oxman et al., 1995).

Adult learning theory suggests that adults have specific needs that should be met in order to enhance their learning capacity. Elements that should be incorporated into the adult learning process include:

- Autonomy and self-direction. Adults are more likely to commit to learning if they have some control over the process, without criticism of their competence.
- Life experience and prior knowledge. Adults incorporate their life experiences into learning and need to see examples of how concepts are applied in 'real world' situations.
- Goal-oriented. Adults learn more effectively when there are clearly defined elements, requirements, goals and objectives.
- Relevancy-oriented. Learning should be applicable, practical and relevant to their work or responsibilities to be of value.

Evidence from the literature review revealed that adult learning theory was most frequently integrated in continuing medical education (CME) strategies (Fallowfield et al., 2002; Fallowfield et al., 2003; Onion & Bartzokas, 1998; Pill et al., 1998; Suggs et al., 1998; White et al., 2004; Young et al., 1998). CME aims to increase knowledge and understanding about research and innovations and requires more active participation compared to simple distribution of materials. In this context, learning theories have the potential to enhance knowledge acquisition. However, the overall effect of theory-based CME was moderate and did not reach significance, except for one strategy, which demonstrated a significant improvement in the area of practice safety using a problem-based learning approach (Onion & Bartzokas, 1998) (Table 3).

While gaps in knowledge and skills need to be addressed if behaviour is to change, the effectiveness of educational sessions is proportional to the level of active participation of the learner. That is, passive or didactic educational sessions have had limited success compared with more interactive participatory sessions (Davis, Thomson, Oxman & Haynes, 1992; Davis, Thomson, Oxman & Haynes, 1995; Grimshaw et al., 2004).

5.1.3. Social Cognitive / Social Learning Theory

Social Cognitive (or Social Learning) theory focuses on the interactions between an individual's cognitions and their behaviour (Bandura, 1989; Riemsma et al., 2002). This theory extends the concept of environmental influence on an individual's behaviour to include 'reciprocal determinism'. That is, the environment is also influenced by the person's behaviour, and both environment and behaviour influence, and are influenced by, the individual's personal characteristics[5]. These form a three-way relationship as illustrated in Figure 1.
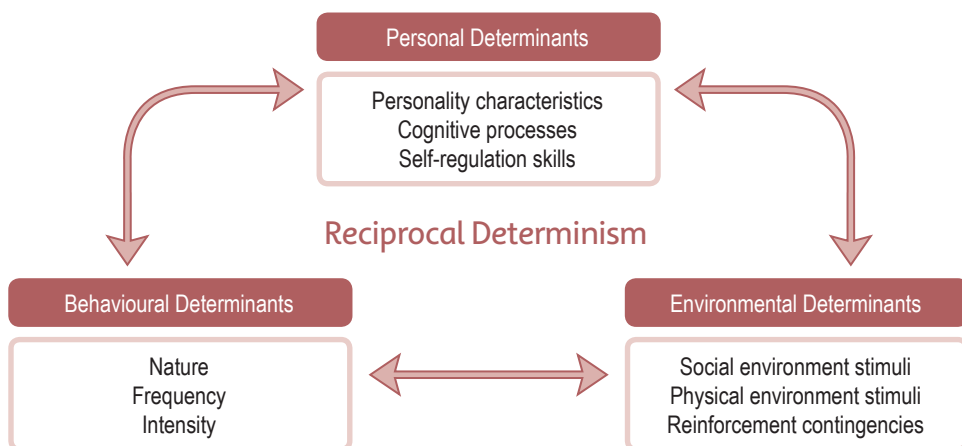

Figure 1. Key components of Social Learning Theory

5. For the purposes of this report, the term 'individuals' refers to individual practitioners, not patients or clients.

Social Learning theory also argues that knowledge and attitudes are socially constructed and shared meanings develop through a process of social interaction and social influence. This theory proposes that individuals learn in three different ways:

1. Directly, by 'trial and error'

2. Vicariously, by observing the behaviour of others

3. Through self-management, by monitoring their own behaviour.

The perceived opinions of others, including peers, opinion leaders, other health professionals, policy makers, researchers, and the media, and patients' preferences, may each influence practitioners' decisions to act on new information (Moulding, Silagy & Weller, 1999). Certain members of a group have more influence on change within the group than others. These 'change agents' are often referred to as gate-keepers or opinion leaders as they may informally control a group's access to new information (Borbas, Morris, McLaughlin, Asinger & Gobel, 2000). This is particularly true in circumstances where the group is cohesive and homogeneous, the information received is unclear, and the group is uncertain about proposed changes. In addition, if the information resonates well with existing norms and values, its adoption into practice is more likely to occur.

Social Learning theory proposes that incentives and expectancies[6] influence individuals to change their behaviours (Bandura, 1989; Riemsma et al., 2002). Seeing another individual receive a reward (or punishment) for their behaviour will influence individuals to repeat (or avoid) that behaviour themselves. For example, educational outreach visits provide practitioners with special interactive time in which they agree on norms for behaviour change and get an opportunity to experiment while being guided by the outreach expert. For CME, practitioners who may contemplate changing their behaviour get an opportunity to validate and test the new behaviour, develop consensus about behaviour change, or to confirm that what they are already doing is appropriate. This probably works best with individuals who are motivated and / or already aware of the need to change their behaviour or the organisational system in use.

The interactions between cognition and behaviour occur through the processes of self-efficacy and outcome expectancies. Expectancies include:

- Situation-outcome expectancies: make connections between behaviour or events (e.g. screening patients for risky alcohol use) and outcomes (e.g. rate of alcohol-related problems in patients)

- Outcome expectancies: focus on the consequences of behaviour and represent the expectancy that a positive outcome will occur as a result of the behaviour

---

6. Expectancies are people's unconscious, subjective expectations about processes, events and social situations.

- **Self-efficacy expectancies**: relate to the individual's confidence in their ability to behave in a particular manner (e.g. general practitioner's confidence in their ability to advise a patient to stop smoking). Self-efficacy expectancies are reported to be a powerful and consistent predictor of behaviour (Conner & Norman, 1996; Walker et al., 2003).

Self-efficacy is a key concept that has also been integrated into other theories and models (e.g. 'perceived behavioural control' in the Theory of Planned Behaviour). An individual's level of self-efficacy is dependent on their feelings of competency (efficacy expectations) and their belief in the benefit of the outcomes of their behaviour (outcome expectations).

Strategies to facilitate implementation may target the following constructs:

- **Self-efficacy**: Train practitioners to engage in a particular behaviour and master it through rehearsal, modelling and feedback (interactive CME, educational outreach, audit and feedback, local opinion leaders)

- **Outcome expectancies**: Provide practitioners with good quality evidence of effectiveness of an innovation (distribution of educational materials, electronic educational sources, CME).

Adult and Social Learning theories may underpin a range of dissemination and implementation strategies, including:

- Distribution of educational materials
- CME (interactive small group sessions)
- Educational outreach visits
- Local opinion leaders
- Electronic educational sources
- Audit and feedback
- Mass media.

Overall, strategies that incorporated adult or social learning theories into development, design, and / or implementation of a behaviour change intervention had a modest effect. There was a significant effect in the preventive care setting using CME (Social Cognitive Theory, Kelly et al., 2000), opinion leaders (Adult Learning theory, Borbas et al., 2000) and electronic educational sources (Social Cognitive theory, Di Noia et al., 2003), whereas Glazier et al. (2005) reported mixed effects in the use of Social Cognitive theory-based CME for management of arthritis (see Table 3).

Opinion leaders (and feedback on performance) that were used to influence treatment of acute myocardial infarction induced an increase in appropriate prescribing (Borbas et al., 2000; Soumerai et al., 1998)[7]. Di Noia et al. (2003) used learning theory to develop electronic educational resources for

---

7. These two studies were included in the Grimshaw et al. systematic review (2004).

disseminating adolescent drug abuse prevention programs. Self-efficacy was a key construct in the design of this strategy. The use of electronic educational sources made a clinically and statistically significant improvement to policy makers, school personnel and community providers' support for youth-orientated drug abuse prevention programs (Di Noia et al., 2003).

Using an audit and feedback strategy based on Social Cognitive theory, one study also reported mixed effects in the management of diabetes (Kiefe et al., 2001). Kiefe et al. (2001) suggested that the audit and feedback strategy worked on the premise that practitioners' awareness of their personal performance compared with an achievable benchmark, or in comparison to their peers' performance, was a good motivator for change. However, others suggest that feedback is most effective in populations that are already motivated and that believe the change in behaviour is necessary or desirable (Eccles et al., 2005; Jamtvedt, Young, Kristoffersen, O'Brien & Oxman, 2006).

Similarly, there were mixed effects in studies using a theory-based office system to reduce adolescent use of alcohol (Boekeloo et al., 2004) and provide cancer preventive care (Dietrich et al., 1992).

5.1.4. Elaboration Likelihood Model (ELM)

The Elaboration Likelihood model of persuasion (ELM) is based on the assumption that attitudes guide decisions and behaviours. Although many factors may contribute to the formation of particular attitudes, persuasion is thought to be the primary shaper of attitudes. ELM attempts to depict how attitudes are formed and changed by persuasive messages (Petty & Cacioppo, 1986) (Hardeman et al., 2002). According to ELM, the process of interpreting information (message) occurs in two distinct routes to persuasion: the Central Route and the Peripheral Route (Figure 2).

The *Central Route* process requires effortful cognitive activity and involves scrutinising and evaluating the arguments presented. Through this route, people are more likely to form long-lasting changes in attitudes, thus leading to behavioural changes. For this to occur, a person needs to be motivated beforehand and have the ability to process the perceived benefits of the information provided. When a person's level of motivation and ability to scrutinise the perceived benefit of any given information is low, persuasion may occur by the Peripheral Route.

The *Peripheral Route* requires little cognitive activity in decision making. Often simple cues and associations, such as judgemental decision rules, influence attitudes. Examples of cues that lead to the peripheral route include:

- Reciprocation (return a favour)
- Consistency (usual behaviour / attitude)
- Social proof (others do same)
- Liking (attractiveness)

- Authority (requirement to act)
- Scarcity (limited resource).

Attitude change through the peripheral route is often temporary. Figure 2 illustrates the processes that occur in the ELM.
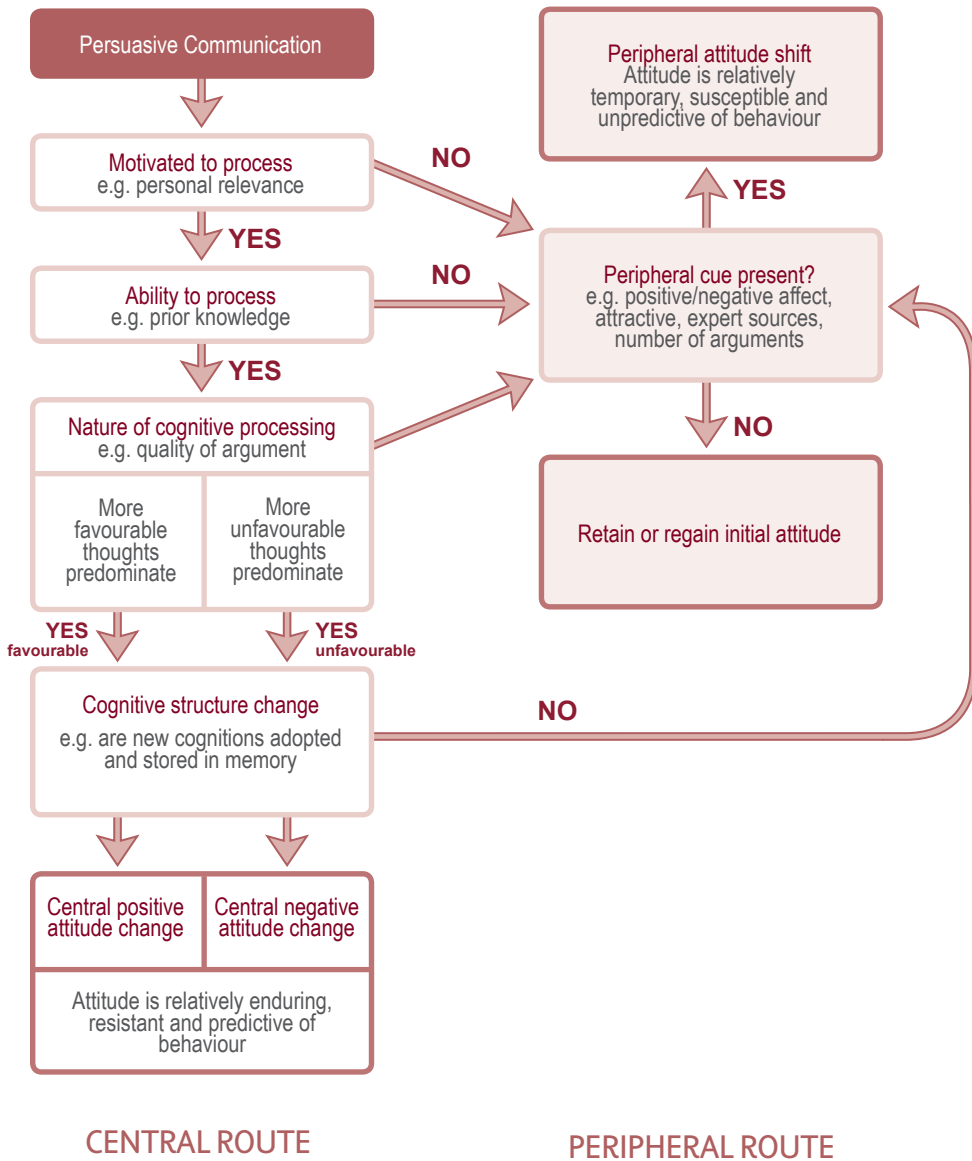

Figure 2. Key components of the Central and Peripheral Routes of the Elaboration Likelihood Model of Persuasion

Motivating people to take the central route involves making the 'message' personal and relevant to them. Then, having captured their attention, they are more likely to carefully consider arguments for and against changing attitudes / behaviour before making a decision. The strength of ELM is that it is clear and simple and explains both routes to persuasion. However, its internal consistency and validity have not been adequately determined.

One good quality study used educational outreach visits to implement guidelines for acute lower back pain (Dey et al., 2004) (Table 3). The outreach visits involved an interactive discussion based on ELM concepts. Outreach visits improved patient referrals to physiotherapy, but other outcomes (opioid or muscle relaxant prescribing, issue of sick certificates, referrals for X-ray or secondary care) were not improved by ELM-based outreach visits.

5.2. Motivational Theories

Motivational theories explain how individuals intend or decide to change their behaviour. The key theories of this type are the Theory of Planned Behaviour and Self Determination Theory. However, Social Cognitive theory (described above) has also been described as a motivational theory. The key theories are described below in sections 5.2.1 and 5.2.2.

5.2.1. Theory of Planned Behaviour (TPB)

Adapted from the Theory of Reasoned Action[8], the Theory of Planned Behaviour (TPB) places emphasis on the concept of 'behavioural intention', which is predicted by an individual's outcome expectancies, their attitude toward the behaviour and their normative beliefs as to whether others (influential or respected peers) think they should engage in the behaviour (Ajzen, 1991). That is, "perceived behavioural control is a function of beliefs about factors likely to facilitate or inhibit the behaviour" (Riemsma et al., 2002). This is closely related to the concept of self-efficacy in social cognitive theory. TPB includes measures of control beliefs and perceived behavioural control. Perceived behavioural control is thought to influence both intention and behaviour.

TPB (Figure 3) is predicated on the belief that behavioural intentions are determined by:

- **Attitudes**: an individual's favourable or unfavourable evaluation of a particular behaviour. Attitudes are determined by the individual's behavioural beliefs, which represent the perceived consequences of the behaviour.
- **Subjective norms**: an individual's beliefs about whether significant others think the individual should perform a behaviour. Subjective norms

---

8. The Theory of Reasoned Action is subsumed within the Theory of Planned Behaviour, which contains the additional concept of 'perceived behavioural control' (beliefs about control, perceived power and actual behavioural control).

are determined by normative beliefs, which represent the individual's perceptions of significant others' preferences for the individual to engage in the behaviour.

- Perceived behavioural control: the extent to which an individual feels capable of performing a particular behaviour. Perceived behavioural control is determined by the individual's belief in their skills, abilities, and opportunities to successfully perform the behaviour (Conner & Sparks, 1996).
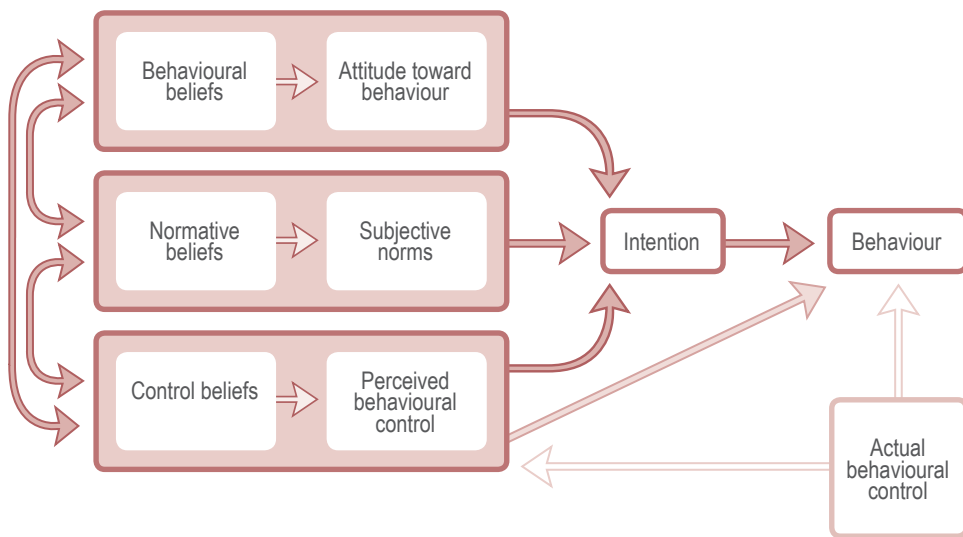

Figure 3. Theory of Planned Behaviour (Ajzen, 1991)

The TPB, which is the most extensively studied motivational theory, proposes that the proximal determinant of behaviour is the *intention* to act, which is influenced by the attitude towards the behaviour, subjective norms, and the perception of control over the behaviour (Hardeman et al., 2002). While focusing on the proximal determinants of behaviour, the TPB leaves the distal determinants (e.g. socio-demographic, cultural, personality factors) unspecified and assumed to influence behaviour via their effects on the proximal determinants.

The TPB has been used rarely in the development of interventions or in predicting intention to participate in an intervention. It has been used most frequently for predicting behaviour change. The most common TPB components are information, persuasion, increasing skills, goal setting, rehearsal of skills, modelling, planning / implementing and social support. In particular, the TPB is used most often for identifying cognitive targets for change.

The behaviour of interest is defined in terms of its:

- **T**arget
- **A**ction
- **C**ontext
- **T**ime.

For example, if the behaviour of interest is to persuade practitioners to advise women to stop drinking alcohol during pregnancy, then:

- Target = general practitioners / obstetricians
- Action = advise pregnant female patients to stop drinking
- Context = during a routine visit
- Time = in practice hours.

The principle of compatibility[9] requires that all other constructs (attitude, subjective norms, perceived behavioural control, and intention) be defined in terms of the same elements.

The advantage of the TPB compared to other motivational and social cognitive theories lies in the inclusion of *intention* to change behaviour, which allows for use of the theory in contexts where the intention to change behaviour has not yet been established or may be very low.

The limitations of the TPB are that it deals with *perceptions* of control rather than control itself. It is not certain whether measures of perception of control (due to the use of self-report) are an accurate reflection of actual control. In the broad social environment many factors may influence people's behaviour. Factors that do not impact on an individual's perceptions of control will be inaccessible to analysis by the TPB. While the TPB is concerned with proximal influences on behaviour, broader social structures, such as organisation- or system-based requirements for practitioners to deliver a range of other preventive care measures, may also influence behaviours (Conner & Sparks, 1996).

Strategies to facilitate implementation may target the following constructs:

- Perceived behavioural control: As for self-efficacy (see above, Social Cognitive Theory, section 5.1.3)
- Normative beliefs: Provide practitioners with feedback on how they perform compared to their peers (audit and feedback).

The TPB has been used most commonly in interventions aiming to change behaviour in patient populations. A systematic review explored the use of the TPB on behaviour change in a range of different interventions aiming to prevent weight gain in participants (Hardeman et al., 2002). Six of 13 studies using the

---

9. Principle of Compatibility holds that the proper behaviour for an intervention must be identified, and that the proper "behaviour" is composed of four elements: target, action, context, and time.

TPB in an intervention showed positive effects for intention to change behaviour (2 small effects, 2 moderate effects, 2 large effect sizes). Seven of 13 studies showed positive effects for changing behaviour (mostly small-moderate effect size). Study quality was generally poor, with high dropout and / or loss to follow-up, subjective measures, and poor description of the intervention. Overall, there was insufficient evidence to indicate that the TPB was associated with behavioural change. Hardeman et al. (2002) reported that it was difficult to determine whether the theory was actually applied to an intervention or whether a convenient sample of participants in an intervention was used to test the predictive power of the theory.

Meta-analyses of TPB research conducted in a patient population have shown consistent changes in both intention (35-50% of variance explained) and behaviour (26-35% of variance explained) (Sutton, 2004).

In terms of behaviour change in practitioners, one good quality RCT examined the effectiveness of reminders and feedback to improve practitioners' decisions to refer patients for lumbar X-rays (Bonetti et al., 2005). This study replicated the design of the NEXUS[10] trial (Eccles et al., 2001)[11]. However, instead of measuring practitioners' referral behaviour by auditing patient records, Bonetti et al. provided practitioners with a suite of different scenarios that required a decision to refer (or not) for lumbar X-ray. Behavioural intention was used as a proxy outcome measure of simulated behaviour. Predictive measures that corresponded to theoretical constructs from the TPB (attitude, subjective norm, perceived behavioural control) and Social Cognitive theory (self-efficacy) were also assessed by surveys in control groups and those receiving reminders and / or feedback on their clinical decisions. Results showed that both reminders and feedback significantly influenced simulated behaviour (referral rate), but neither influenced behavioural intention. In addition, practitioners in the feedback group significantly increased their perceived behavioural control. The TPB predicted 30% of the variance in behavioural intention and 14% of the variance in referral rates. Overall, this modelling experiment suggested that both reminders and feedback were likely to improve practitioners' referral rates. Although the original NEXUS study reported little improvement in referrals with the use of feedback strategy (Eccles et al., 2001), this type of modelling may be still be useful to identify interventions that have potential utility. If an intervention fails under simulated or 'ideal' experimental conditions, it may be less likely to be successful in the 'real world'.

---

10. The NEXUS (National Emergency X-Radiography Utilization) study was a decision instrument used for obtaining cervical spine radiography in trauma victims.
11. See Part One in this series for results of evaluation of effectiveness (Bywood et al., 2008a).

5.2.2. Self-Determination Theory (SDT)

Human beings can be proactive and engaged or, alternatively, passive and alienated, largely as a function of the social conditions in which they develop and function. Accordingly, research guided by self-determination theory has focused on the social-contextual conditions that facilitate versus forestall the natural processes of self-motivation and healthy psychological development (Ryan & Deci, 2000).

Self-Determination Theory (SDT) is a theory of motivation and personality that is grounded in the concept that people are happiest and most productive when they feel that they can control their own lives. SDT postulates that intrinsic motivation, self-regulation and wellbeing may be enhanced or undermined by three psychological needs:

1. Competence – the desire to be proficient in one's environment
2. Relatedness – the importance of feeling supported by and connected to others
3. Autonomy – the sense of having choice in one's behaviour.

These needs are purported to be essential for optimal social development, self-motivation and psychological wellbeing. Social environmental factors that thwart these three basic needs may have deleterious effects on an individual's self-motivation, social functioning and wellbeing.

SDT distinguishes different types of motivation (Figure 4). *Intrinsic* motivation is the "inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, 2000). While people are naturally inclined to be motivated toward activity and exploration, social and environmental factors, such as negative feedback on performance, demeaning evaluations and threats may subdue this tendency. In contrast, positive feedback, communication and rewards enhance feelings of competence; strong sense of security, caring and supportive context enhance feelings of relatedness; while choice, acknowledgment of feelings and providing opportunities for self-direction enhance feelings of autonomy. Together, enhanced competence, relatedness and autonomy increase intrinsic motivation. It must be noted that people are intrinsically motivated only for activities that hold inherent value or appeal to them.

For activities or behaviours that may be requested or encouraged by others (e.g. parent, teacher, boss), an individual's level of motivation for performing a behaviour may range from unwillingness and amotivation through passive compliance to full commitment to the new behaviour. According to SDT, different

levels of motivation are proportional to the individual's internalisation[12] and integration[13] of the requested behaviour (Ryan & Deci, 2000).

In contrast to intrinsic motivation, which involves performing an activity for the innate satisfaction that it brings to the individual, *extrinsic* motivation involves performing an activity in order to gain a particular outcome. Extrinsic motivation may also vary substantially in the degree of autonomy from external regulation (least autonomous) to integrated regulation (most autonomous). Figure 4 illustrates different types of motivation in the self-determination continuum.

The least motivated individuals lack intention to act as a result of not valuing the behaviour, not feeling competent to act, or not believing it will be beneficial to do so. The most motivated individuals are intrinsically motivated to act as a result of their own interest, enjoyment and satisfaction from performing a behaviour. Between these extremes lies extrinsic motivation, which varies according to the degree of autonomy, perceived competence and relatedness or connectedness with others who are important to them.

Autonomous motivation, which tends to yield greater psychological health, improved performance and longer-term behaviour change (Ryan & Deci, 2008), comprises both intrinsic and some types of extrinsic motivation (darker shading in Figure 4) whereby individuals identify with the value of an activity and voluntarily participate.

In contrast, *controlled* motivation comprises extrinsic motivation (lighter shading in Figure 4) that is externally regulated and is contingent on factors such as reward or punishment, self-esteem, approval, and shame avoidance. Controlled motivation is associated with diminished wellbeing, poor functioning, and short-term compliance with behaviour change.

A recent study explored the use of SDT to explain factors that influence clinicians' decision-making about preventive care delivery (obesity counselling) (Sussman, Williams, Leverence, Gloyd & Crabtree, 2008). Using both qualitative and quantitative data, results showed that clinicians providing obesity counselling had a strong sense of autonomy and intrinsic motivation. With respect to competence, clinicians expressed diminished sense of competency due to a number of external barriers, including: lack of effective counselling strategies, competing demands for time, patient socioeconomic circumstances and lack of community resources to support patients' efforts to change. Clinicians also expressed a general lack of social connectedness to colleagues within their practice settings regarding obesity prevention counselling (relatedness). Sussman et al. (2008) suggested that high levels of autonomy and intrinsic motivation were not sufficient to sustain preventive care counselling efforts while clinicians had low sense of competency and lack of relatedness with professional colleagues.

---

12. Internalisation refers to the extent to which a person accepts and incorporates a value or regulation.
13. Integration refers to the extent to which a person transforms the value or regulation into their own sense of self.

Thus, in addition to the interconnection between different levels, such as the health care system, the clinical practice and the clinical encounter, the social and cognitive contexts in which clinical decision-making occurs may also mediate the behaviour change of individual practitioners. SDT provides a useful lens through which to examine how environmental conditions may facilitate or constrain practitioners' natural inclinations to improve practice in areas that are relevant to them.
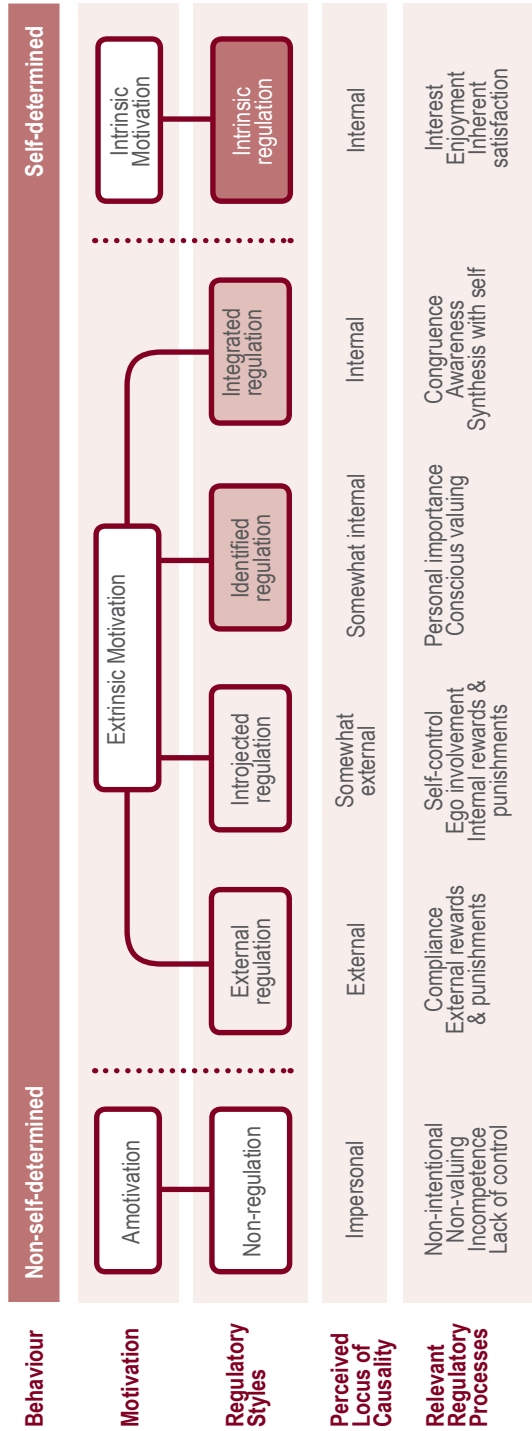
Figure 4. The Self-Determination continuum showing types of motivation with their regulatory styles, loci of causality and corresponding processes (Source: Ryan & Deci, 2000)

5.3. Stage Models

Stage-based models propose that behaviour change occurs in a series of qualitatively different stages, rather than as a continuous process, and barriers that influence change are thought to differ at different stages. Therefore, an intervention, which is tailored to the individual's current 'stage' in the change process, may be more likely to be effective than a 'one size fits all' approach (Riemsma et al., 2002). Stages-of-change theories, which include the Trans-theoretical model (TTM) (Prochaska & DiClemente, 1986), and the Precaution-Adoption Process model (Riemsma et al., 2002) differ in the details, but they distinguish individuals according to those who have not yet decided to change, those who have decided to change and those who have already changed. Diffusion of Innovations (Rogers, 1995), which is also described as a 'process' model comprises similar stages. The key stage models are described below in sections 5.3.1 to 5.3.4.

5.3.1. Trans-theoretical model (TTM)

The Trans-theoretical Model (TTM), originally developed by Prochaska and Di Clemente (1986) is also known as the 'wheel of change', 'cycle of change', 'stages of change', and 'revolving door model'. This model has been applied to a variety of behaviours, particularly lifestyle changes (smoking cessation, alcohol consumption, diet, exercise, sexual practices), but also for changing behaviour of practitioners to deliver preventive care (smoking cessation advice, cancer screening) and is the most widely used in this category of theories. Individuals are designated to one of five discrete stages:

1. Pre-contemplation: no intention to change
2. Contemplation: change is intended in the future
3. Preparation: change is intended in the immediate future and information about the change is being sought
4. Action: modifications to behaviour have been made
5. Maintenance: change has been established.

Moving from pre-contemplation to contemplation requires changing knowledge and attitudes, whereas moving from contemplation through preparation and action stages involves changing internal processes, such as emotions, positive beliefs about self-efficacy, and developing the necessary skills to undertake the change. Finally, progressing to the maintenance stage requires re-organising the environment in which the behaviour takes place, gathering social support, and introducing reward systems (Prochaska & DiClemente, 1986).

According to TTM, it is essential to tailor interventions to match an individual's readiness for change. For example, those who are not yet aware of an innovation, or not considering changing their behaviour may require a different approach compared to those who have accepted the need to make changes and are prepared to do so. Questionnaires to determine individuals' readiness

to change have been developed, followed by targeted intervention strategies (Cohen, Halvorson & Gosselink, 1994). These questionnaires may be modified and applied in a range of settings to identify the practitioners in each stage and guide the selection of dissemination and implementation strategies.

Once the stage of readiness to change has been determined, dissemination and implementation strategies may be differentially effective. Examples of strategies for different stages of readiness include:

1. Pre-contemplation stage: distribution of educational materials, CME, and educational outreach to raise awareness

2. Contemplation stage: educational outreach, local opinion leaders, interactive CME

3. Preparation stage: interactive CME, audit and feedback, patient education, modification of practice environment to support change (e.g. computerised record systems)

4. Action stage: audit and feedback, prompts and reminders

5. Maintenance stage: Audit and feedback, prompts and reminders, record systems to support and encourage sustained behaviour change.

Table 5 shows the five main stages of behaviour change relevant to smoking cessation, and the 10 social and psychological processes of change that are proposed to influence the transition between stages. The model assumes a spiral pattern in behavioural change, allowing people to make linear progressions from one stage to the next then relapse, regressing back to an earlier stage, either pre-contemplation, contemplation, or preparation stage before reaching the maintenance stage (Prochaska, DiClemente & Norcross, 1992). For example, an average of three to four attempts are required for smokers to become successful long-term maintainers (Schachter 1982 cited in Prochaska et al., 1992). However, individuals generally do not regress all the way back to where they started, while others can get stuck in particular stages of change and never make progress (Prochaska et al., 1992). A similar process may occur in professional practice change and examples related to practitioners' delivery of smoking cessation advice are shown in the right-hand column in Table 5.

Table 5. Trans-theoretical Model of smoking cessation

Stages of change	Processes of change	Description of stages and examples of processes of change	Examples of processes of change for practitioners' delivery of smoking cessation advice
1. Pre-contemplation		Individual has not thought about stopping smoking for at least 6 months	Practitioner has not thought about providing smoking cessation advice to patients
	Consciousness raising	I recall information people have given me on how to stop smoking	I recall information about providing smoking cessation advice to patients
	Emotional arousal	I react emotionally to warnings about the dangers of smoking	I react emotionally to the risks of smoking for patients
	Social re-appraisal	I think that my smoking behaviour may be harmful to the environment (e.g passive smoking)	I think that my patients' smoking behaviour may be harmful to the environment
2. Contemplation		Individual plans to stop smoking in 1-6 months	Practitioner plans to deliver smoking cessation advice to patients in the next 1-6 months
	Environmental opportunities	I find society changing in ways that make it easier to give up smoking (e.g. non-smoking venues)	I find medical practice changing in ways that make it easier to provide smoking cessation advice (e.g. nicotine replacement)
	Self-re-appraisal	My smoking behaviour makes me feel disappointed in myself	My failure to provide smoking cessation advice makes me feel disappointed in myself
3. Preparation		Individual has tried to stop smoking for 24 hours in the past year and plans to stop within 30 days	Practitioner has gathered smoking cessation materials and plans to deliver it to patients within 30 days
	Self-liberation	I am committed to becoming a non-smoker	I am committed to encouraging patients to give up smoking
4. Action		Individual has stopped smoking for between 0 and 6 months	Practitioner has provided smoking cessation advice to patients for 1-6 months
	Stimulus control	I make my home more conducive to giving up smoking (e.g. no smoking inside)	I make my practice more conducive to supporting smoking cessation (e.g. posters, QUIT brochures)
	Supporting relationships	I have someone who listens when I need to talk about giving up smoking	I have colleagues to talk to about strategies for providing patients with smoking cessation advice
5. Maintenance		Individual has stopped smoking for more than 6 months	Practitioner routinely provides smoking cessation advice to patients (for more than 6 months)

(Adapted from Adams & White, 2005).

The strength of the TTM lies in its capacity to explain why broad-based interventions, such as mass media campaigns aimed at the general public, fail to generate widespread behavioural change. In addition, the model is intuitively appealing in its simplicity and the optimistic concept of progressive movement towards appropriate behaviour has been readily accepted by practitioners.

The main weaknesses of the TTM relate to problems of validity, both internal and external and the integrity of the stages. The model is descriptive rather than predictive (Davidson, 2002; Whitelaw, Baldwin, Bunton & Flynn, 2000). For example, in studies of smoking cessation, when compared with other known predictors of smoking cessation, such as those related to the level of addiction (e.g. number of cigarettes smoked per day, number and length of previous quit attempts) stage membership was not a significant predictor of future smoking cessation (Farkas et al., 1996). The model also assumes uni-directional advancement in behavioural change, whereas human behaviour may change abruptly, without progression through stages (Prochaska et al., 1992). People may oscillate between stages, or remain at one particular stage for varying periods of time. To date, the assumption of progression through stages as a prerequisite for long-term behavioural change has not been fully supported (Davidson, 2002). In addition, stage progression, as an outcome, is not always associated with a change in behaviour (Adams & White, 2005; Whitelaw et al., 2000), therefore, it is difficult to assess and interpret the distinctions between different stages (Davidson, 2002).

Despite its popularity, the effectiveness of TTM for promoting behavioural change and its validity and the integrity of the stages are uncertain (Davidson, 2002; Whitelaw et al., 2000). Moreover, its fundamental tenet, the differentiation between stages has been severely criticised as arbitrarily determined (cut-off points on continuous variables – time, intention) (Davidson, 2002), inadequately defined, ethically questionable (deprives pre-contemplators of effective treatment), haphazardly utilised in research, and lacking useful meaning (West, 2005). West (2005) suggests that the model ignores the role of reward and punishment and the concept of addiction or habit.

The model originally focussed on substance use and misuse (smoking and alcohol) (DiClemente et al., 1991) and its transference to other domains, particularly the promotion of healthy lifestyles (physical activity, dietary behaviour) or professional practice change has limited or no evidence of effectiveness (Jeffery, 2004; van Sluijs, van Poppel & van Mechelen, 2004; Whitelaw et al., 2000). In addition, since the model focuses on the intentional or cognitive aspects of individual's behavioural change, it neglects the social and environmental contexts that influence behaviour.

A systematic review examined the effectiveness of interventions, based on the stages of change approach, used in a variety of settings and populations to bring about improvements in health-related behaviour (Riemsma et al., 2002). This review was excluded from the general assessment of effectiveness in Part One (Bywood et al., 2008a) as it provided data on patient outcomes alone and

interventions were aimed at changing lifestyle behaviours of patients, particularly in the area of smoking cessation, alcohol consumption, diet and exercise. However, the same principles apply to assessment of stage-based interventions used for practitioners and measure of process outcomes, such as practitioners' behaviour and organisational efficiency. Overall, Riemsma et al. (2002) reported little evidence of effectiveness of stage-based interventions compared to either non-stage-based interventions or to no intervention / usual care. The evidence base was highly variable, with inconsistencies in the descriptions of stage-based interventions, use of the model, validation of the stage classification instruments, and outcome measures. Another review of stage-based interventions for promoting physical activity found that stage-based interventions were more effective for promoting physical activity compared to controls, but only in the short-term (<6 months) (Adams & White, 2005).

In the context of changing behaviour of practitioners or practices, TTM was used in two educational strategies for smoking cessation:

1. CME: to improve practitioners' knowledge and skills for providing smoking cessation advice (Young & Ward, 2002) (Table 3). The CME strategy incorporated measures of self-efficacy, confidence and readiness to change.

2. Educational outreach visits: to improve practitioners' counselling behaviour for smoking cessation (Physicians Counseling Smokers Project) (Goldstein et al., 2003) (Table 3). Outreach visits based on TTM aimed to improve physician-delivered smoking cessation counselling in community-based practices.

Neither strategy showed significant improvement in practitioners' behaviour in these two studies.

5.3.2. Awareness-to-Adherence Model

Traditionally, it was believed that information or innovations that had been developed by credible sources and disseminated to practitioners would be implemented reliably (Lomas, 1991). This was the rationale underlying the development and dissemination of clinical practice guidelines. However, it has become apparent that information alone is insufficient to change practitioner behaviour.

The Awareness-to-Adherence Model, illustrated in Figure 5, was developed to explain the cognitive and behavioural steps that practitioners use to implement clinical practice guidelines (Pathman, Konrad, Freed, Freeman & et al., 1996). Pathman et al. suggest that practitioners must first become *aware* of the guidelines, then *agree* with them, before deciding to *adopt* the recommendations, and *adhere* to them over time.
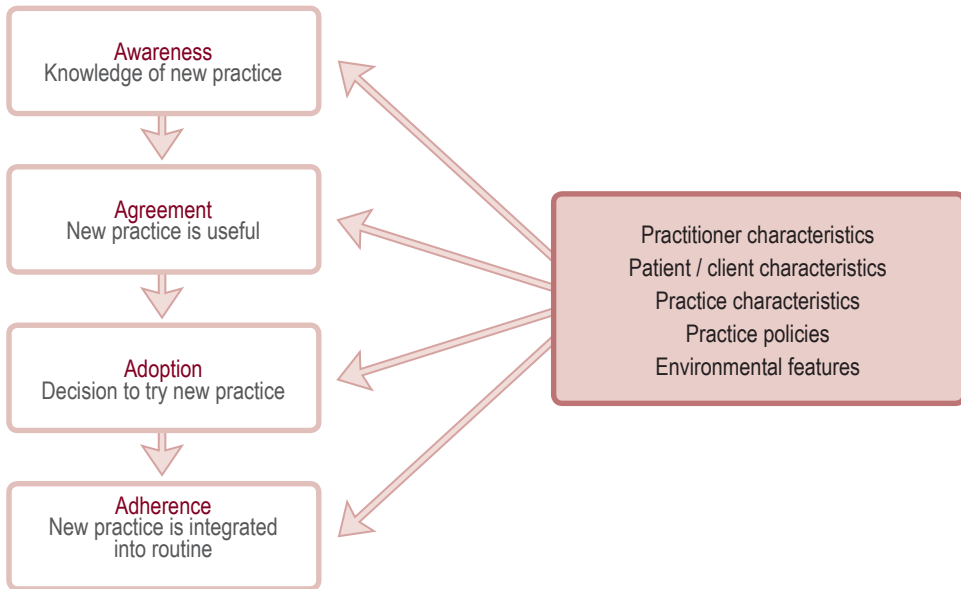
Figure 5. Awareness-to-Adherence Model illustrates the steps and the barriers / facilitators to progress (modified from Pathman et al., 1996)

The Awareness-to-Adherence model was used in one strategy using prompts and reminders, which had no significant effect in increasing physicians' compliance with a clinical practice guideline for improving blood pressure control in diabetes management (Sanders & Satyvavolu, 2002) (Table 3).

5.3.3. Precaution-Adoption Process Model

The Precaution-Adoption Process Model (PAPM) is described as a continuum model that comprises seven qualitatively different cognitive stages ranging from complete ignorance of an issue to routine performance of a particular behaviour (Weinstein, 1988; Weinstein & Sandman, 1992). PAPM is used predominantly for health-related behaviours, such as preventive care (mammography, colorectal screening) and lifestyle changes (smoking cessation). However, it may be useful for changing the behaviour of individual or groups of practitioners, particularly where there is strong resistance to change and separate messages can be tailored for different stages.

The Precaution-Adoption Process model is similar to the TTM and the Awareness-to-Adherence model in several respects, although the stages are not perfectly aligned (Figure 6). For example, pre-contemplation in TTM includes people not aware of the issue as well as those who are aware, but have decided not to change their behaviour. In addition, contemplation combines those who have yet to decide with those who have decided, but not yet acted.
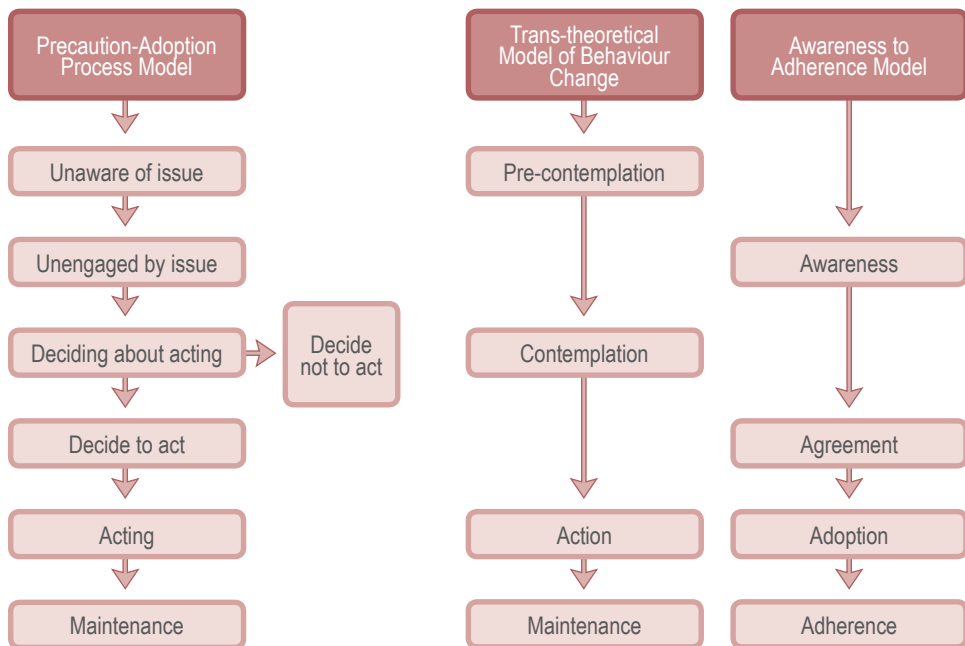
Figure 6. Stage models of behaviour change

The empirical evidence for PAPM is limited as this model has not been well tested. PAPM has been used most commonly for developing tailored interventions for lifestyle changes, such as preventing weight gain (Ezendam, Oenema, van de Looij-Jansen & Brug, 2007), exercise for prevention of osteoporosis (Elliott, Seals & Jacobson, 2007; Mauck et al., 2002), smoking cessation (Borrelli et al., 2002), cancer screening (Costanza et al., 2005; Costanza et al., 2007) and home radon testing (Weinstein & Sandman, 1992).

While this model focuses on individual health behaviour change, the stages may be relevant to behaviour change in practitioners and / or organisations. In particular, this model may be useful for developing interventions for behaviours that are difficult or resistant to change, as it considers the individual's readiness to change to inform a more tailored approach.

5.3.4. Diffusion of Innovations

Diffusion of Innovations theory "describes the process by which an innovation is communicated through certain channels over time to members of a social system" (Rogers, 1995).

While Rogers' Diffusion of Innovations theory is generally described as a 'process' theory (Rogers, 1995), it includes five stages in the innovation-adoption process that parallel the stages of change described by Prochaska and DiClemente (1986). These stages are shown in Table 6.

Table 6. Stages in Diffusion of Innovations and Trans-theoretical Model of behaviour change

Stages in Rogers' Diffusion of Innovations theory	Prochaska and DiClemente's TTM
Knowledge stage • Recall of information • Comprehension of messages • Knowledge/skill for effective adoption	*Pre-contemplation stage*
Persuasion stage • Liking innovation • Discuss new behaviour with others • Accept message about innovation • Form positive image of message and innovation • Seek support for innovative behaviour from system	*Contemplation stage*
Decision stage • Intend to seek additional information about innovation • Intend to try innovation	*Preparation*
Implementation stage • Acquire additional information about innovation • Use innovation regularly • Maintain use of innovation	*Action*
Confirmation • Recognise benefits of using innovation • Integrate innovation into routine practice • Promote innovation to others	*Maintenance*

Largely a descriptive theory, Rogers identified four main elements of diffusion:

1. The innovation itself: Relative advantage of the innovation compared to existing practice, compatibility with values and needs, and complexity

2. Communication channels: Mass media, face-to-face exchange

3. Time: Time from awareness to adoption or rejection, relative to the number of individuals in the system

4. The social system: System norms, opinion leaders and change agents.

Rogers also emphasised the role of 'change agents' and identified five different adopter categories according to how quickly an individual adopted an innovation compared to others. Adopter categories are:

1. Innovators (active information seekers)
2. Early adopters (e.g. opinion leaders)
3. Early majority
4. Late majority
5. Laggards.

Following an S-shaped curve, diffusion begins slowly with innovators who are the gate-keepers of new ideas into the system. Adoption increases more rapidly as the majority accept the innovation on advice of the opinion leaders and decelerates for the late adopters and laggards who oppose change. Rather than seeking empirical evidence of effectiveness for themselves, practitioners frequently seek out opinion leaders for guidance when new information or innovations are introduced (Moore et al., 2004).

Other factors, such as self-efficacy and the need to develop necessary skills for implementing change are not addressed in this theory.

Two studies explicitly used elements from Rogers' theory to develop a multi-faceted intervention (Forsetlund et al., 2003; Waldorff et al., 2003) (Table 3). In both studies, the tailored interventions were no more effective in changing practitioners' behaviour compared with usual practice. Evidence that change in knowledge does not guarantee change in behaviour was demonstrated by Forsetlund et al. (2003), where a positive effect on health care providers' knowledge of evidence-based practice did not translate to the use of that knowledge in practice.

5.4. Process and Planning Models

Process theories explain the process of dissemination of innovations and attitude formation. Understanding the process of dissemination may allow identification of target areas where uptake of innovations can be enhanced.

Planning models incorporate theories into the actions or steps required for implementation of an intervention. Needs of the population, available resources and the context in which a problem or issue arises are central to planning models. The key process and planning models are described below in sections 5.4.1 to 5.4.3.

5.4.1. PRECEDE-PROCEED Model

The PRECEDE-PROCEED model is a planning model that integrates theoretical constructs for designing a situation-specific intervention (Green & Kreuter, 1999). The PRECEDE-PROCEED model (Figure 7) begins by engaging the target population or organisation in a process of identifying their most important needs

and problems. The model then guides practitioners or researchers to determine the underlying causes or factors that precede the issues. Thus, interventions can be developed based on a clear idea of the factors that contribute to the problems in that population, and the intervention can be evaluated against the criteria that were identified.

Figure 7. PRECEDE-PROCEED Model (Green & Kreuter, 1999)

In practice, these stages function in an iterative cycle, as information gathered from PRECEDE informs and guides the development of an intervention (Green & Kreuter, 1999).

PRECEDE (Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation) is the first stage, which proposes that an 'educational diagnosis' is required before developing an intervention in the same way that a medical diagnosis is needed before deciding on a treatment plan. The PRECEDE stage comprises five phases:

1. Social diagnosis: determine the problems and needs of a given population
2. Epidemiological diagnosis: identify the determinants of the problems and needs
3. Behavioural / environmental diagnosis: analyse the behavioural and environmental determinants of the problems and needs
4. Educational / organisational diagnosis: identify the factors that predispose, enable and reinforce the desired behaviour
   a. Predisposing factors: include a variety of individual practitioner characteristics, such as training, knowledge and beliefs that affect motivation to change
   b. Enabling factors promote conditions that are conducive to change
   c. Reinforcing factors include positive consequences, both tangible and intangible, that reward selected behaviours and reinforce the change, once it is made (Sanders & Satyvavolu, 2002, p 24).
5. Administrative and policy diagnosis: ascertain which interventions would be most appropriate to encourage the desired change in behaviour or environment and the factors that support those changes.

PROCEED (Policy, Regulatory and Organisational Constructs in Educational and Environmental Development) is the second stage, which comprises four additional phases:

6. Implementation: interventions identified in phase five are implemented
7. Process evaluation: implementation of the interventions is evaluated
8. Impact evaluation: impact of the interventions on the behaviour and the factors supporting the behaviour is evaluated
9. Outcome evaluation: effects of the intervention on health and wellbeing of the target population is evaluated.

The model has been used to plan, facilitate, implement and evaluate a diverse range of programs in the public health field. Examples include cancer screening (breast, prostate, cervical), heart health, weight control, injury prevention, smoking cessation, alcohol and drug use, physical activity, and training for health care professionals.

The PRECEDE-PROCEED model was used in the development and implementation of a multi-faceted dissemination strategy in one study (Murtaugh et al., 2005) (Table 3). Murtaugh et al. (2005) reported mixed effects of a strategy with reminders for implementing heart failure clinical recommendations. This strategy included clinical nurse specialist outreach visits, patient education and provider prompts.

While the Awareness-to-Adherence Model represents the perspective of the user (practitioner, practice, policy-maker), the PRECEDE-PROCEED Model is developed from the perspective of the healthcare system (health promotion).

Table 7 illustrates how these two models may operate for a range of different dissemination strategies (Davis et al., 2003).

Table 7. Implementation strategies for different stages of the Awareness-to-Adherence and PRECEED-PROCEED models

	Awareness	Agreement	Adoption	Adherence
Pre-disposing	Distribution of educational materials Mass media Educational sessions (CME) Educational outreach			
Enabling		Local opinion leaders CME (interactive)	CME (interactive) Educational outreach Flowcharts/ algorithms	
Reinforcing			Audit and feedback	Prompts and reminders Multi-faceted interventions

5.4.2. Commitment-to-Change model

The Commitment-to-Change model is a "planning model for enabling and measuring behavioural change" (Mazmanian et al., 2001, p 642). It is based on the assumption that an individual who understands why change is necessary, how it is to be achieved, and is motivated to act, is more likely to change their behaviour than one who is uninformed, uncertain and unmotivated. Similar to the 'readiness-to-change' questionnaires used in TTM, a series of questionnaires is used to measure the strength of an individual's commitment to implement change.

This model comprises three developmental phases, with progressive commitment stages in each phase.

1. Inform Phase forms the basis for development of support for change. In this phase, individuals are made aware of the need for change

2. Educate Phase marks the transition to understanding what the change will mean and how it will impact directly on individuals and organisations. The information received enables people to decide whether to accept or reject change

3. Commit Phase involves implementation. In this phase, changes are made and incorporated into routine activities.

Within these phases are seven progressive commitment stages:

1. Contact: First indication that change will occur

2. Awareness: Individual knows about the change

3. Understanding: Individual (or organisation) understands what is expected

4. Positive perception: Individual develops positive view of the impending change

5. Adoption: Change has been implemented and has demonstrated its benefits and impact

6. Institutionalisation: Change has endured and is formally incorporated into the organisation's systems and procedures

7. Internalisation: Individuals and the organisation are fully committed to the change, which is congruent with their personal beliefs and values.

One study, which applied the Commitment-to-Change model to a CME intervention, reported that practitioners who expressed an intention to change practice were more likely to do so. However, although the intention was greater, those assigned to the signature group[14] were not more likely to change than those assigned to the control group (Mazmanian et al., 2001) (Table 3).

This model may be useful for identifying the climate for change within an organisation in order to tailor implementation interventions for the target population.

5.4.3. Social Marketing

Social marketing uses commercial marketing techniques to influence a target population to voluntarily change their behaviour. While not a theory in itself, the principles of social marketing were derived from a wide body of knowledge in multiple disciplines (psychology, sociology, anthropology, communications theory) and provide a framework for understanding how to influence an individual's behaviour (Gordon, McDermott, Stead & Angus, 2006).

---

14. Practitioners specified and signed their intentions to change practice.

Social marketing is the application of commercial marketing technologies to the analysis, planning, execution and evaluation of programs designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of society (Andreasen 1995 in Gordon et al., 2006).

There are six essential criteria in social marketing (Andreasen 1995 in Gordon et al., 2006):

1. Voluntary behaviour change: there is no coercion or directive

2. Consumer research: target audience's perceptions, needs and preferences are canvassed

3. Segmentation and targeting: target audience is segmented into smaller sub-groups with unifying characteristics and needs

4. Marketing mix: an effective mix of product (appropriate behaviour change), price (exchange of costs and benefits), place (accessibility and convenience or program) and promotion (delivery of message to audience) is identified

5. Principle of exchange: there must be a clear benefit for the individual if change is to occur

6. Competition: examination of the environment in which target audience will make behavioural decisions (e.g. barriers, facilitators, competing messages).

Social marketing may be applied upstream as well as downstream. For example, social marketing may be used to persuade health care professionals to be more proactive in screening for alcohol misuse and persuade policy-makers to develop legislation to restrict alcohol advertising to children.

There are eight key factors that contribute to successful social marketing:

1. Interview practitioners to assess their motivation for current practice and potential barriers to change

2. Develop programs for specific practitioners and their opinion leaders

3. Develop educational and behavioural objectives

4. Establish credibility

5. Encourage practitioner participation in educational interaction

6. Use concise and visually stimulating educational materials

7. Repeat key messages

8. Provide support through subsequent interactions (Soumerai & Avorn, 1990; Thomson O'Brien et al., 2000).

A recent review of 35 studies evaluated interventions that used social marketing for client-focussed interventions in AOD-related settings (Stead, McDermott,

Gordon, Angus & Hastings, 2006). Stead et al. (2006) reported significant improvements in rates of smoking cessation, alcohol prevention and harm minimisation, cannabis use prevention, and in the adoption of policies to reduce AOD use.

In terms of practitioner behaviour change, social marketing was also applied in educational outreach visits strategies for management of hypertension in the elderly (Cranney et al., 1999) and management of lower back pain (Dey et al., 2004) (Table 3). In another study (Finkelstein et al., 2005), opinion leaders were used to deliver educational outreach visits and the content was also based on social marketing. Overall, social marketing based interventions demonstrated statistically significant improvements with modest effect sizes.

5.5. Ecological / Organisational Change Theories

Change is an ever-present feature of organisational life, both at an operational and strategic level (Burnes 2004 in By, 2005).

Most theories or models of change focus on the individual behaviour change process, thus ignoring the sociocultural and environmental influences on behaviour. Behaviour theories are focused primarily on understanding an individual's 'motivation' to change behaviour rather than their actual 'ability' to do so. Even those that address the social milieu, such as social cognitive theory and TTM, address the intrapersonal psychological variables related to how people deal with information they have received.

In contrast, the ecological perspective takes into account the active interrelationship of factors within and between multiple levels of a particular problem (National Cancer Institute, 2005). That is, "environments influence individual behaviour and, in turn, individuals modify and influence their environments" (Moulding et al., 1999, p 180). This synergistic approach emphasises the use of multi-level interventions to facilitate change. For example, integrating prompts and reminders into existing organisational systems and consulting with practitioners to determine the type and level of organisational support required is more likely to maximise the adoption of innovations into practice (Moulding et al., 1999).

Transfer of knowledge and best practice into organisations is often slow, costly and prone to failure, with approximately 70% of all change programs failing after initiation (By, 2005).

There are two key concepts in the ecological perspective that may help to identify targets for intervention:

1. Multiple levels of influence: an individual's behaviour affects, and is affected by, intrapersonal, interpersonal, organisational, community, and public policy factors

2. Reciprocal causation: an individual's behaviour shapes, and is shaped by,

their social environment.

Organisational factors, such as staff turnover, leadership attitudes, management styles, stress and burnout, regulatory and financial pressures and openness to change, may also influence the ease with which innovations are adopted into practice.

A supportive environment (physical and cultural) may lead to greater and longer-lasting changes among a group of individuals compared to individual-oriented approaches. However, few studies have examined behaviour change in the wider social context.

The ecological approach has been used mainly in tobacco control programs and alcohol interventions, which entail multiple strategies that target individual behaviour change (e.g. smoking cessation for patients), environmental restrictions (to deter smoking and underage drinking), and policies (to limit sale and supply).

There are four main theories of organisational change:

- Systems theory
- Organisational Development
- Complexity theory
- Social Worlds theory (Rhydderch, Elwyn, Marshall & Grol, 2004).

These theories emphasise the role of people, goals, conflict and evolution as drivers of organisational change. Other relevant models of change (e.g. Sticky Knowledge, Organisational Readiness for Change, Community and Participatory models) explain the barriers to organisational change and propose a framework or steps for facilitating the transfer of knowledge at the organisational level.

Diffusion of innovations theory (Rogers, 1995) described above has also been used to study how innovations are adopted into a community over time (Bonetti et al., 2006; Eccles et al., 2007). This theory also requires a multilevel change approach including individual behaviour change, change in procedures and roles at the organisational level, and change in policies at the community level.

Stage theories may also be useful for explaining how organisations implement innovations. A process of passing through stages, with each stage requiring a different set of strategies or tasks to progress, may apply to organisational change in a manner similar to that proposed for individual behaviour change. Using Pathman's model as an example, organisational change may occur as follows:

1. Awareness: problems are recognised and analysed; solutions are suggested and evaluated

2. Adoption: policies are formulated; resources for implementing change are allocated

3. Implementation: the innovation is implemented; people in the organisation

respond; changes in roles and tasks occur

4. Institutionalisation: the policy or program becomes integrated into the organisation; new goals and values form part of the organisational structure.

Within an organisation, individuals may take leading roles at different stages of the change process. For example, higher-level decision-makers may be more important in the earlier stages, while 'coal-face' workers are essential at the implementation stage.

Ecological models take a more holistic approach that includes individual and social environmental factors as targets for intervention (reciprocal causation). As important sources and transmitters of norms and values, organisations, communities and public policy may provide opportunities to build social support for desirable behaviour change.

There are two types of change that occur at the organisational level: *planned* change and *emergent* change. The planned approach recognises that old behaviours, systems and cultures may need to be discarded before new behaviours and processes can be adopted. It focuses on understanding the different states or stages that an organisation moves through in the change process. Typically, this involves three steps (By, 2005):

1. Unfreezing the current practice

2. Moving to a new practice

3. Re-freezing the new practice.

However, this approach is not suitable in situations that require rapid change, or conditions that are in a constant state of flux. The need for change at the organisational level is often unpredictable, tends to be reactive, discontinuous, ad hoc and triggered by a crisis (emergent change).

There are three main models of *emergent* change that contain from seven to ten steps or 'commandments':

• Seven steps (Luecke, 2003 in By, 2005)

• Eight-stage process for successful organisational transformation (Kotter, 1996 in By, 2005)

• Ten commandments for executing change (Kanter, 1992 in By, 2005).

Although the terms used differ between these models, the key concepts are similar. These concepts are listed in Table 8.

Table 8. Key concepts of organisational change theories and models

1. Why is there a need for change?	Identify problem or improved practice
2. What should the change look like?	Define change
3. What is the current culture and context?	Evaluate climate for change
4. What resources and tools are needed?	Identify barriers and facilitators
5. Who has the power to facilitate change?	Identify and cultivate leaders or change agents
6. Who is the target population?	Create awareness and engage the audience
7. Who will implement changes?	Develop a team that is competent and committed to change
8. How can success be recognised?	Develop criteria for evaluation and celebrate milestones
9. What is happening?	Foster team communication and feedback
10. How much has changed?	Measure progress regularly
11. How can changes stay on track?	Monitor, reinforce changes and make adjustments when necessary
12. How can change be sustained in the long-term?	Integrate changes into the system

Relevant theories and models of organisational change are described below in sections 5.5.1 – 5.5.7.

5.5.1. Systems Theory

Systems theory focuses on the interrelatedness of the different parts of an organisation (Rhydderch et al., 2004). Infrastructure, tasks, technologies and resources are deemed of equal importance and any changes in one part require consideration of the other parts of the system as well as the relationships between them. Systems theory may be relevant to developing multidisciplinary interventions.

5.5.2. Organisational Development

Organisational development is a "discrete episode of planned change" (Rhydderch et al., 2004) that assumes that organisational goals and individual goals are synchronised. The focus is on effective teamwork, with evidence supporting empowerment, communication and flexibility in successful organisational change. Organisational development theory may be relevant to continuous quality improvement and multidisciplinary interventions.

Organisational development principles guided a successful agency-wide change effort in a US substance abuse agency (Amodeo, Ellis, Hopwood & Derman, 2007). Five key principles of organisational change were employed from the initial development of "Standards of excellence in client care" through the agency-wide implementation of those standards to an evaluation of the change.

Those principles were:

1. Listening to the organisation: All affected organisational levels and units were involved in developing the standards of care that were the basis for change (identified need).

2. Empowering the implementation teams: Individual employees who were required to implement the change had key roles in defining the nature of the change and how it was implemented. Adequate tools and resources (e.g. standards manual, training, supervision) were provided to enable changes required to meet objectives.

3. Promoting cross-functional, multi-level involvement in solutions: Change was reinforced at multiple levels by supervisors, administrators and peers and information about the change was communicated repeatedly in various ways. Focus was on changing employee behaviour rather than changing attitudes or knowledge.

4. Collectively owning issues and obstacles: Transparency and communication between organisational levels clarified expectations and facilitated the change process.

5. Examining successes and failures: Evaluation of outcomes provided opportunities to define change objectives, clarify change outcomes, specify change activities and plan for future organisational improvement.

5.5.3. Complexity Theory

Complexity theory focuses on the non-linear dynamics of adaptive systems such as health practices. "Change emerges as a result of interactions between agents at a local level in the complex system and between the system and its environment" (Rhydderch et al., 2004, p 214). The processes and structures in a practice are reviewed to determine what works well and what needs to be improved. Thus, subsequent changes are informed by a fuller understanding of the practice. Review data are collected and interpreted against criteria set by the practice. Dissemination and implementation of innovations is viewed as a highly organic and adaptive process whereby the organisation adapts to the innovation and the innovation is modified for the organisation (Greenhalgh, Robert, Macfarlane, Bate & Kyriakidou, 2004). Complexity theory may be relevant to development of record or office systems and continuous quality improvement interventions.

5.5.4. Social Worlds Theory

Social Worlds theory is based on negotiation and renegotiation between two or more social worlds[15] to implement change. This approach assumes that complexity and evolution are normal and focuses on understanding the consequences of interactions between different interest groups. However, it has

---

15. Action and interaction between a range of different entities, such as research, medicine, administration and policy-making, with diverse perspectives and expectations.

not been tested empirically to any great extent. Social Worlds theory may be relevant to multidisciplinary interventions.

5.5.5. Sticky Knowledge

The Sticky Knowledge approach suggests that many of the difficulties involved in implementing innovations into practice in organisations occur because knowledge is sticky and difficult to move (Elwyn, Taubert & Kowalczuk, 2007).

Elwyn et al. (2007) describe the phases or milestones of knowledge transfer as:

1. Formation of the transfer seed: early recognition that a gap or problem exists or that there is a better way of doing things

2. Decision to implement: a decision process involving gathering the appropriate resources and organising administrative matters

3. First day of use: knowledge is activated, old systems are abandoned and new equipment, procedures, roles are introduced

4. Achievement of satisfactory performance: processes are integrated into normal routine.

Stickiness is purported to be a product of the transfer process, which involves four elements and nine predictors that are listed in Table 9.

Table 9. Predictors of stickiness at different phases of knowledge transfer

Communication elements	Predictors of stickiness	
Knowledge	1. Causal ambiguity	Reasons for success or failure of knowledge transfer are unknown and cannot be replicated elsewhere
	2. Unproven knowledge	Evidence base is lacking
Source	3. Motivation of source	Culture of knowledge-hoarding or unwillingness to share knowledge may sabotage transfer process
	4. Credibility of source	Status and trustworthiness of source is lacking
Recipient	5. Recipient motivation	Reluctance of recipients to change
	6. Recipient absorptive capacity	Recipients' existing knowledge, skills and ability recognise value of change is lacking
	7. Recipient retentive capacity	Long-term retention is poor if new knowledge is not used sufficiently
Context	8. Barren organisational context	Unfavourable conditions for change exist within organisation
	9. Arduous relationship between source and recipient	Capacity for change is modified by past relationship between source and recipient in terms of past experience with communication, support and recognition for success

(Source: Elwyn et al., 2007).

This is a relatively new model that has not been well tested. However, early findings suggest that causal ambiguity and recipients' absorptive and retentive capacity are significantly more important than recipients' motivation (Szulanski, 2003 in Elwyn et al., 2007). Thus, the main responsibility for successful change lies with organisational management, structure, resourcing and support for the change process.

Elwyn et al. (2007) suggest that transfer of knowledge is difficult and stickiness is normal and requires ongoing problem-solving at multiple levels. The Sticky Knowledge model provides description and explanation of the potential barriers, which need to be addressed in order to allow change to occur.

5.5.6. Organisational Readiness for Change

Organisational Readiness for Change is purported to be central to change and implementation of innovations at the level of the organisation. The program change model developed by the Texas Christian University (TCU) integrates a number of different concepts into a model for improving practice in the substance abuse treatment area (Simpson & Flynn, 2007). Figure 8 illustrates the model, which focuses on three key stages of planning, preparation and implementation. The implementation process comprises four steps that begin with *training*, followed by *adoption* and *implementation*. Ultimately, the goal is *improvement* in practice. The model identifies individual and organisational factors that influence the change process and points at which efforts can be directed to facilitate required changes.

An Organisational Readiness for Change survey has been developed and this tool is used to assess organisational readiness and functioning and has been tailored for the drug treatment and health services fields.
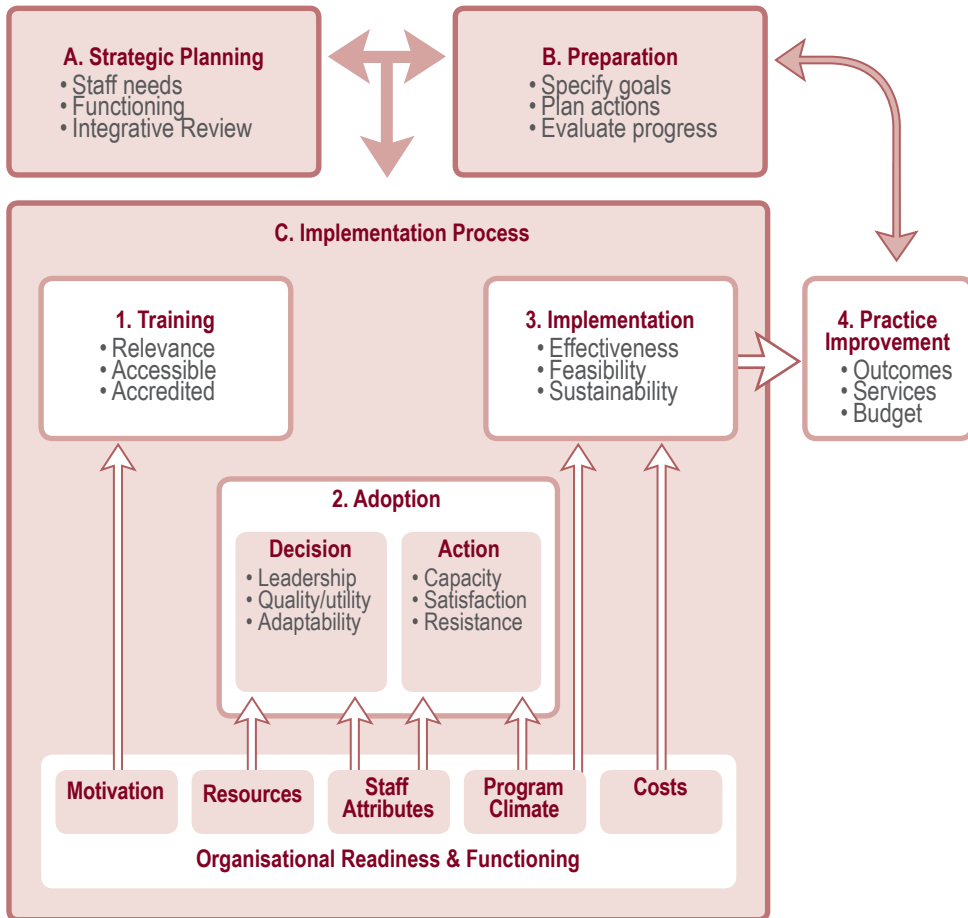
Figure 8. Program Change Model for planning and implementing innovations for treatment improvement (Source: Simpson & Flynn, 2007)

5.5.7. Community organisation and participatory models

Community organisation involves a process of helping a group to identify common problems, gather resources and develop and implement strategies to achieve specific mutual goals (National Cancer Institute, 2005). While some innovations may be imposed by an external source (e.g. public health policy makers), it is suggested that those that are generated by the community itself are more likely to succeed and endure.

Different approaches may be taken to effect change using a community organisation model. These approaches, which are not mutually exclusive, include:

- Community development: A process-oriented approach that aims to develop group identity and cohesion

- Social planning: A task-oriented approach that focuses on problem-solving and relies on expert practitioners
- Social action: A process- and task-oriented approach that aims to increase the community's capacity to solve problems (Rothman 2001 in National Cancer Institute, 2005).

The concepts that are common to all community organisation models are shown in Table 10.

Table 10. Community organisation elements and potential strategies

Term	Definition	Potential change strategies
Empowerment	A social action process through which individuals, organisations and communities develop skills, knowledge and confidence to improve their lives	Community members assume greater power, or expand their power from within, to create desired changes
Community capacity	Characteristics of a community that facilitate identification of problems and allow it to address them	Community members participate actively in community life, gaining leadership skills, social networks, and access to power
Participation	Engagement of community members as equal partners to gain leadership and problem-solving skills	Community members develop leadership skills, knowledge, and resources through their involvement
Relevance	Activating community members to address issues that are most important to them	Community members create their own agenda based on felt needs, shared power, and awareness of resources
Issue selection	Identifying immediate, specific, and realisable targets for change that unify and build community strength	Community members participate in identifying issues; targets are chosen as part of a larger strategy
Critical consciousness	Helping community members to identify root causes of problems (e.g. social, political, and economic forces)	Community members discuss the root causes of problems and plan actions to address them

No studies were identified that used a community organisation approach for dissemination and implementation strategies.

6. Common theoretical elements

Theories are dynamic. They are constantly refined, challenged and modified as systems, organisational culture and society itself changes over time. Despite differences in the terms used and the position or prominence of particular concepts within a model, there were a number of common elements that emerged from the theories examined above. Some of the common elements that may influence a change in practice at different levels are described in Table 11.

Table 11. Common theoretical elements

	Theoretical element	Alternate terms	Relevant theories	
Intrapersonal level	Perceived control over behaviour	Self-efficacy Perceived behavioural control	Social Cognitive Theory Theory of Planned Behaviour Trans-theoretical model	Individual's perception of their own ability to perform an action. This is based on their prior success in equivalent or related actions, their physiological state, and external sources of persuasion. This concept is thought to predict how much effort an individual will put into implementing and sustaining behavioural change.
	Perceived outcomes of behaviour	Outcome expectations Expectancy	Social Cognitive Theory Theory of Planned Behaviour	Individual's perception of whether outcomes are likely to be positive or negative. That is, costs and benefits of changing behaviour (e.g. lost convenience of inaction).
	Motivation	Predisposing factors	Social Cognitive Theory Self-Determination Theory PRECEDE-PROCEED model Elaboration Likelihood model Organisational Readiness for Change	Individuals believe the issue is of personal relevance to them and they are motivated to change behaviour
	Intention to act	Intention	Theory of Planned Behaviour Diffusion of Innovations	Strength of an individual's intention to perform a behaviour is related to actual behaviour.

Intrapersonal level	Positive attitude	Attitude Positive perception	Elaboration Likelihood model Theory of Planned Behaviour Awareness-to-Adherence Precaution-Adoption Process model Commitment-to-change model Diffusion of Innovations Social Marketing	An individual believes that the advantages of performing the behaviour outweighs the disadvantages
	Personal values	Predisposing factors	PRECEDE-PROCEED model	An individual perceives that performing a behaviour is more consistent than inconsistent with his or her self-image
	Affect	Positive/ negative affect	Elaboration Likelihood model	An individual's emotional reaction to performing the behaviour is more positive than negative
Interpersonal level	Role of social influences	Observational learning Perceived norms Social support and interpersonal influences	Social Cognitive Theory Theory of Planned Behaviour	An individual's impression of the way their peers (or society) perceive the behaviour. Individuals perceive greater social pressure to perform a behaviour than not to do so
Organisational level	Environmental barriers	Environment Program climate	PRECEDE-PROCEED model Awareness-to-Adherence model Social Marketing Sticky knowledge Organisational Development Organisational Readiness for change model	Workplaces maintain a physical and cultural setting that supports evidence-based practice
	Professional development	Training	Organisational Readiness for change model Community Organisation and Participatory models	Practitioners are provided with the appropriate skills to perform a desired behaviour

While studies provided different explanations for how motivation determines behavioural change, self-efficacy was a key construct in many of those that evaluated the effectiveness of dissemination strategies (Boekeloo et al., 2003; Boekeloo et al., 2004; Carney et al., 1992; Di Noia et al., 2003; Dietrich et al., 1992; Forsetlund et al., 2003; Foy et al., 2004; Glazier et al., 2005; Kelly et al., 2000; Kiefe et al., 2001; Sanders & Satyvavolu, 2002).

Two studies (Bonetti et al., 2006; Eccles et al., 2007)[16] that formed part of a larger study (Walker et al., 2003) investigated variables from a range of theories, including TPB, Social Cognitive Theory, TTM, the Precaution-Adoption Process model and Implementation Intentions[17], as well as using a theoretically-driven outcome measure – behavioural intention (TPB). Using clinical scenarios in behavioural simulation tasks, general practitioners (GPs) made decisions about managing antibiotic prescribing for upper respiratory tract infections (Eccles et al., 2007) and dentists made decisions about use of intra-oral radiographs for detection of lesions (Bonetti et al., 2006).

Results from stepwise regression analyses showed that significant variance in behavioural intention could be explained by TPB (28%), Social Cognitive Theory (39%), Operant Conditioning (43%) and Implementation Intentions (28%) (Bonetti et al., 2006). The variables that significantly predicted behavioural intention and explained 53% of the variance were self-efficacy, outcome expectancies, risk perception, control (over dental caries) and habit. Similarly, Eccles et al. (2007) reported that significant variance in behavioural intention could be explained by TPB (30%), Social Cognitive Theory (29%), and Operant Conditioning (43%). Variables that significantly predicted behavioural intention and explained 49% of the variance were attitudes, risk perception, and perceived behavioural control (in managing antibiotic prescribing). Evidence of habit was also a significant predictor, explaining 6% of the variance in predicting behaviour.

These studies showed that theories and models of behavioural change may be useful for predicting behaviour change and designing interventions that target specific behaviours. They also highlight that no single theory adequately accounts for factors that might contribute to behaviour change. Rather, they underscore the contribution of several theories in concert.

---

16. These studies did not meet the inclusion criteria for the systematic review reported in Part One of this series (Bywood et al., 2008a) as they were published outside the search period, used a cross-sectional survey design and did not specifically evaluate a dissemination strategy.
17. Implementation intentions are the plans of action that specify when, where and how an action will be performed on a future occasion or opportunity. Actions are based primarily on previous behaviour or habits. While the theory of planned behaviour includes the specific goal-directed behaviours that are necessary to achieve a particular goal, implementation intentions are the specific plans created to meet those goals. By mentally linking 'how' a particular behaviour will be initiated to 'when' and 'where' (environmental context) it will occur is thought to establish an automated response to environmental cues, strengthen the intentions-behaviour relationship and increase the likelihood of initiating the behaviour (Casper, 2008; Gollwitzer & Schaal, 1998).

7. Limitations of dissemination theories

Selecting appropriate theories / models for implementation interventions remains a challenge in dissemination and implementation research and may limit the use of theories / models in interventions. Jones and Donovan (2004) argue that the use of multiple theories is necessary as no single theory can explain complex behaviour (Jones & Donovan, 2004). However, there are problems associated with selecting an appropriate set of theoretical constructs. First, a key theory may be missed. Second, it is impossible to apply all theories that may be relevant, and third, there is not sufficient justification for choosing one over the others (Michie et al., 2005). Furthermore, there seems to be a lack of appropriate measures for some theories.

Therefore, to incorporate theory in interventions, it is essential to clarify the nature of the desired behaviour involved in the intervention and critically examine the relevant theories, model and constructs. Incorporating a theory or model of change is only useful when the quality of studies demonstrating its appropriateness and validity is sufficiently high. A need for good quality, well-designed studies still remains. Further investigation to establish an appropriate way to apply theories is recommended.

Figure 9 illustrates one way in which theoretical constructs that are relevant to change in professional practice across multiple levels (intrapersonal, interpersonal and ecological) may be integrated in a framework for developing strategies for dissemination and implementation of innovations. While the change process is not necessarily sequential (as depicted in the illustration), this framework identifies the important elements that need to be addressed and proposes a multi-level approach to implementing change as well as a process for monitoring and evaluating the effectiveness of a dissemination strategy. The six key elements in this approach are:

1. Identify the problem or need to change: The need to change may be generated internally or externally.

2. Examine the current context: Familiarity with the individual practitioners, management style, organisational structure, physical setting, access to resources and overall culture of the setting in which proposed changes will occur may identify strengths and limitations of the target population and setting.

3. Consider the relevant theoretical constructs: Knowledge of the target population and context may identify specific targets for change. For example, a highly motivated and well-informed population may require a different approach compared to one that is unaware and / or resistant to change of any sort.

4. **Develop a strategy:** Combining an understanding of the context with knowledge of the potential target constructs, a strategy for implementing the proposed changes may be developed. This may involve close interaction with the target population to engage them in the intervention design and development and identification of potential change agents.

5. **Implement change:** The procedures for implementing change are initiated, including disseminating relevant materials, modifying the physical setting, and consolidating management and organisational support.

6. **Evaluate, feedback and maintain:** Monitoring the process and impact outcomes are essential to determine whether the intervention is effective and assessing the theory-based variables may help to understand why the intervention works (or not). Results from evaluation may inform modifications and refinements to the intervention.
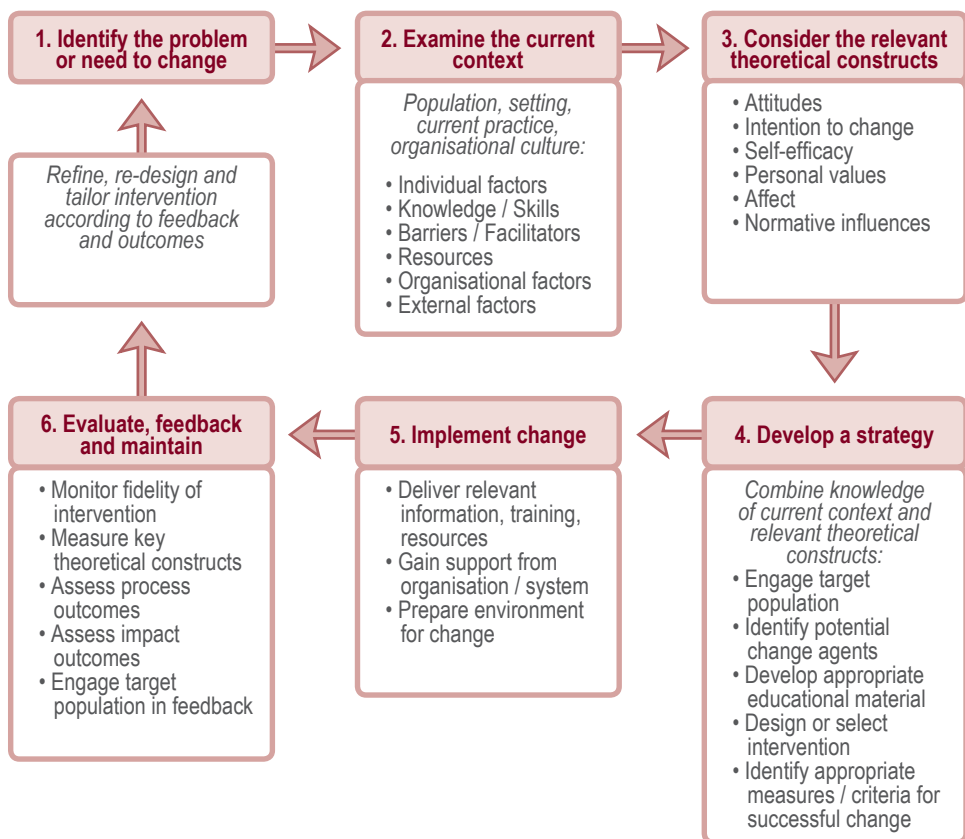

Figure 9. Model of dissemination incorporating theoretical concepts and constructs (adapted from Ashford, Eccles, Bond, Hall & Bond, 1999)

8. Relevance of dissemination theories for the AOD field

The evidence base for this series of reports on dissemination and implementation strategies was drawn primarily from the general health field as few studies centred on organisational or professional practice change in an AOD setting. Of the few AOD-related studies, one average quality study explored the dissemination of adolescent drug abuse prevention programs to agency workers in community-based settings including policy makers, school personnel and community providers that influence public attitudes and support for youth-oriented programs (Di Noia et al., 2003). Bandura's self-efficacy construct was used to design the intervention and a single measure was used to assess the theoretical components of the intervention. Results showed improved use of prevention programs that were disseminated electronically compared to pamphlets. Using appropriate theoretical constructs in the development and implementation phases to increase the likelihood of achieving change should be considered as it has potential to predict future behaviours at a degree beyond simple chance.

The heterogeneity of AOD workers may further complicate dissemination research in this field. AOD workers have different levels of training, professional identification, treatment philosophies (Morgenstern, Morgan, McCrady, Keller & Carroll, 2001), and often have logistical, economic, and informational constraints to adopting evidence-based practice (Brown, 1987; Kelly et al., 2000; Morgenstern et al., 2001; Sorensen & Midkiff, 2000). Negative perceptions toward AOD clients held by health practitioners such as GPs (NCETA, 2006; Skinner, Feather, Freeman & Roche, 2007) may not only affect the effectiveness of a dissemination and implementation strategy, but also can have adverse effects for the clients (Anderson et al., 2004). It is pivotal to take these individual and organisational factors into consideration as they may significantly influence the success of dissemination interventions.

One area of research that has used several elements of behaviour theory is that of interventions for treatment of obesity. There are some useful parallels in this research area that may contribute to our understanding of behaviour change in the AOD field. The epidemiology, aetiology and treatment of obesity and some drug- and alcohol-related problems include some common features, including:

- Physical and psychological factors play a role
- Complex multi-factorial aetiology
- Potential for addiction
- High drop-out rate during treatment

- High relapse rate
- Strong environmental and social influence
- Social stigma
- Negative attitudes of practitioners toward patients / clients (e.g. their problems are due to their lifestyle choices)
- Reluctance of practitioners to deal with clients' AOD-related or obesity-related problems.

However, results from obesity research, which is primarily concerned with client outcomes, are generally mixed and theoretical constructs, such as self-efficacy, have limited capacity to predict outcomes. For example, there was little evidence to demonstrate that targeting theoretical constructs for intervention improved and maintained weight loss in patients (Jeffery, 2004). Moreover, the factors that did have significant effects on initial weight loss (e.g. length of treatment and balance of energy intake and output) were not derived from theory. Jeffery (2004) suggests that: "What is needed to advance health behaviour intervention is theory that addresses relationships between modifiable aspects of the environment and behaviour" (Jeffery, 2004). While results from theory-based obesity research are not robust, given the parallels with AOD-related problems, evidence on obesity research may help to guide the direction of theory-based AOD research.

With respect to changing the behaviour of practitioners working in the AOD field or dealing with AOD-related problems, additional factors need to be considered, including the diversity of AOD workers, high turnover of staff and the emotive and challenging nature of AOD-related problems.

9. Summary of theories and models of change

Dissemination strategies to increase the adoption of innovations into practice may miss their intended target and thus fail to be effective if they do not recognise and address the barriers to uptake. Implementation of innovations may be hindered at any stage of the dissemination process by a wide range of factors. It cannot be assumed that practitioners who fail to adopt an effective innovation are uninformed or unwilling to do so. They may be unconvinced of an innovation's efficacy or unsupported in their efforts to change.

Behaviour change theories provide constructs that researchers, program developers and innovation disseminators can use to design research, interventions, educational programs and dissemination strategies, and to explain how and why such interventions are likely to be effective, or to interpret the findings from evaluations of innovations and dissemination strategies. While many theories are not well tested, they may still be useful for identifying potential barriers and facilitators for behaviour change.

No single theory accounts for all possible variables that contribute to an individual's behaviour or to an organisational change culture and not all theories are useful in all circumstances. This is not surprising given the diversity in problems, behaviours, populations and contexts.

Overall, an examination of the literature showed that:

- Theories are not mutually exclusive
- Many theories share similar characteristics and elements
- No one element was common and crucial to all theories.

Interventions based on a theoretical framework have the potential to improve transfer of evidence to practice. However, it was difficult to ascertain which theory / model was most effective in which strategy as there was no consistency in the use of theoretical frameworks. Few interventions based their theory-based interventions on past effective interventions implemented in similar clinical areas (Kelly et al., 2000) or strategy type (Cranney et al., 1999). Some reported the rationale for selecting a particular theoretical framework (Boekeloo et al., 2003; Boekeloo et al., 2004; Suggs et al., 1998; White et al., 2004; Young et al., 1998; Young & Ward, 2002), yet none reported sufficient justification for choosing one theory over others. There is a clear need to compare and contrast theories in well-designed studies.

Just as dissemination strategies may be used at different levels to induce change in individual practitioner behaviour (professional interventions) or in the efficiency

of organisations or systems (organisational interventions), some theories also focus on individuals as the unit of change, whereas others address change at the level of the community, organisation or system. These different levels include:

1. Intrapersonal: Theories or models that attempt to explain or predict change in an individual's attitudes, knowledge, behaviour or intentions to act

2. Interpersonal: Theories or models that attempt to explain or predict change in the way individuals act in the context of their social environment

3. Ecological / Organisational: Theories or models that attempt to explain or predict change at the level of the organisation or wider social system.

Table 12 provides an overview of the relevant theories and models identified in the available literature, including the levels at which they operate and the concepts and constructs that underpin them.

Table 12. Summary of key theories and models

Theory / model	Reference	Level	Brief description	Type of theory	Concepts & Constructs
Operant Conditioning	BF Skinner	Intrapersonal	Positive consequences reinforce behaviour while negative consequences extinguish behaviour.	Learning	Reinforcement
Adult Learning theory	M Speck	Intrapersonal	Adults commit to learning when the goals and objectives are realistic and relevant to their needs.	Learning	Autonomy and self-direction Life experience and knowledge Defined goals Relevance
Social Cognitive theory (also Social Learning theory)	(Bandura, 1989)	Intrapersonal Interpersonal	Three factors contribute to behaviour change: • self-efficacy • goals • outcome expectancies People must believe that their behaviour will result in improvement. They must have the skills and the belief that they will perform the action successfully. Social and physical environments may be barriers or facilitators to change.	Learning Motivational	Reciprocal determinism Behavioural capability Expectations Self-efficacy Modelling Observational learning Reinforcement
Elaboration Likelihood model	(Petty & Cacioppo, 1986)	Intrapersonal	Attitude change that occurs via a thoughtful consideration process (central) is longer lasting and less influenced by counterargument compared to attitude change that occurs via a more reactive process (peripheral).	Learning Process	Persuasive communication Central processing Peripheral processing Motivation to process Ability to process Cognitive structure change Attitude change Peripheral cue

Theory/Model	Reference	Level	Description	Type	Constructs/Stages
Theory of Planned Behaviour (TPB)	(Ajzen, 1991)	Intrapersonal	People express an intention to perform a behaviour. This entails developing a positive attitude toward the behaviour, perceiving approval or encouragement to perform the behaviour, and believing in their ability to perform the behaviour.	Motivational	Behavioural intention Attitude toward behaviour Subjective norms Perceived behavioural control
Self-Determination theory	(Ryan & Deci, 2000)	Intrapersonal	People are more likely to change their behaviour if they have internalised the need to change and integrated the value of changing.	Motivational	Autonomy Competence Relatedness
Trans-theoretical model (TTM)	(Prochaska & DiClemente, 1986)	Intrapersonal Ecological	Behaviour change occurs in non-linear stages, with processes or strategies that facilitate movement between stages.	Stage	1. Pre-contemplation 2. Contemplation 3. Planning 4. Action 5. Maintenance
Awareness-to-Adherence	(Pathman et al., 1996)	Intrapersonal Ecological	This model describes the cognitive and behavioural steps that practitioners take when they comply with a change in practice. Practitioners must become aware of an innovation, or the need to change, then agree with the principle before deciding to adopt the changes into their own practice and adhere to it over time.	Stage	1. Awareness 2. Agreement 3. Adoption 4. Adherence
Precaution-Adoption Process model	(Weinstein, 1988)	Intrapersonal Ecological	People need to become aware of an issue and move through a decision-making process to take action (or not).	Stage	1. Unaware of issue 2. Unengaged by issue 3. Deciding about acting 4. Decided not to act 5. Decided to act 6. Acting 7. Maintenance

				Stage Process Organisational	Stages of diffusion • Knowledge • Persuasion • Decision • Implementation • Confirmation Adopter categories • Innovators • Early adopters • Early majority • Late majority • Laggards
Diffusion of Innovations	(Rogers, 1995)	Interpersonal	Diffusion of innovations (concepts, behaviours, technologies) occurs in stages. Some people adopt innovations earlier than others. Attributes of the innovation may influence the rate of adoption.		
PRECEDE-PROCEED model	(Green & Kreuter, 1999)	Interpersonal Ecological	This model comprises two main stages: PRECEDE (Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation) is the educational diagnosis stage that informs PROCEED (Policy, Regulatory and Organisational Constructs in Educational and Environmental Development), which is the implementation and evaluation stage.	Process Planning	PRECEDE • Social diagnosis • Epidemiological diagnosis • Behaviour / environmental diagnosis • Educational / organisational diagnosis (pre-disposing, enabling & reinforcing factors) • Administrative / policy diagnosis PROCEED • Implementation • Process evaluation • Impact evaluation • Outcome evaluation

Commitment-to-change	(Mazmanian & Mazmanian, 1999)	Intrapersonal Ecological	Individuals' are assessed on their understanding of the rationale for proposed changes to determine their commitment-to-change. This data informs the approach used to implement change.	Planning	Inform phase Educate phase Commit phase
Social Marketing	(Andreasen, 1995)	Interpersonal Ecological	Marketing principles in the commercial sector are adapted for use to address social and health problems. These principles include: voluntary behaviour change, without coercion principle of exchange, where there is a clear benefit to the individual marketing techniques to target specific populations end goal to improve individual welfare and society, not just benefit to an organisation	Process	Behaviour change Consumer research Segmentation and targeting Marketing mix Exchange Competition
Systems theory	(Rhydderch et al., 2004)	Ecological	Focus of change is on the interrelatedness of different elements of an organisation, with equal importance given to infrastructure, tasks, technologies and resources.	Organisation	Equal interrelationships between organisational units
Organisational Development	(Rhydderch et al., 2004)	Ecological	Focus of change is on teamwork within and between organisational levels, with communication, flexibility and empowerment of teams.	Organisation	Listen to the organisation Empower implementation teams Promote multi-level involvement Collectively own issues Examine success / failures
Complexity theory	(Rhydderch et al., 2004)	Ecological	Focus is on iterative monitoring and review of interactions between elements of an organisation to determine what works well and what needs improvement.	Organisation	Understanding current practice to inform change

Social Worlds theory	(Rhydderch et al., 2004)	Ecological	Focus is on negotiation and interaction between different 'social worlds', such as research, medicine, administration and policy-making, to implement change.	Organisation	Inter-disciplinary interaction
Sticky Knowledge	(Elwyn et al., 2007)	Ecological	Knowledge is difficult to transfer and 'stickiness' is due to range of barriers at different levels within an organisation.	Organisation	Knowledge Source Recipient Context
Organisational Readiness for Change	(Simpson & Flynn, 2007)	Ecological	Change within an organisation is a function of the organisation's readiness to accept and implement the change.	Organisation	1. Planning 2. Preparation 3. Implementation
Community Organisation	(Bracht, Kingsbury & Rissel, 1999)	Ecological	Community-level change is effected following a process of community involvement in determining agreed goals and using local resources and structures.	Process Organisation	1. Conduct community analysis 2. Design and initiate campaign 3. Implement campaign 4. Refine and consolidate program 5. Dissemination and durability

Once a change in practice has been introduced, maintenance of such change is important, and since most current theories or models focus on initial change, there is a clear need to extend theoretical frameworks to include an understanding of how behaviour change is sustained over a long period. New models or theories need to be developed that integrate individual behaviour change with systemic change in the broader environment; and that address the issue of maintenance in the longer term, particularly in the context of a dynamic environment, such as the AOD field, where staff, policy, environmental and social influences are constantly shifting.

Selecting an appropriate theoretical basis for developing an intervention is difficult, given the plethora of theories and models, many of which have not been well tested. Therefore, finding a single theory to 'fit' a specific problem may be ideal, but impractical.

Interventions that are designed to change individual behaviour or organisational systems are seldom guided by a theoretical framework that predicts or explains how the intervention is expected to elicit the changes. Concomitantly, the preponderance of behaviour change theories and the suite of theoretical concepts and constructs embedded in those theories make it difficult for researchers and developers to determine which factors are effective targets for intervention. Moreover, theories and models are often vague about how the targeted factors can be modified to achieve desired behaviour.

It is not enough to simply improve how theories are used, but rather it is important to engage in a more dynamic interrelationship between theory and practice. That is, while theory may be used to underpin and / or test implementation of interventions, practice may also inform and refine theory by providing feedback on which elements are useful and should be retained, which are not useful and should be discarded, and which additional effective elements need to be integrated into the theory.

Incorporating theories and models into dissemination strategies should not be prescriptive, but rather they should be used as a tool to promote effective and efficient use of resources and to facilitate changes that foster improvements in uptake and sustained implementation of effective innovations.

While it may be unacceptable to theorists, an alternative approach may be to identify the relevant constructs for a particular problem, setting, population or context, and to evaluate the effectiveness of an intervention against the identified constructs. It is likely that more than one theory may be useful for developing interventions and innovations that address issues across multiple levels or for changing complex and challenging behaviours. It is possible that the different theoretical elements may be combined and tailored for particular purposes. Some factors may be essential for effective implementation of interventions, whereas others may be critical under specific conditions. For example, self-efficacy may be more potent for initiating a change in behaviour, but have less impact on maintaining the behaviour over time (Rothman, 2004).

From the perspective of a theorist, the value of a theory depends on its ability to accurately account for the factors that influence people's behaviour. "Theory testing tends to occur in controlled contexts, typically a laboratory setting, that afford the social and behavioural version of a Petri dish" (Rothman, 2004). From the perspective of the researcher or practitioner delivering an intervention, the theory needs to be both predictive and applicable across a variety of routine circumstances in complex social environments. Increasingly, AOD practitioners must deal with complex cases that require a multi-faceted approach and coordination with a variety of specialists and services. Thus an iterative process of development, evaluation, feedback and refinement or rejection of well-defined critical constructs may lead to development of more applicable and practical theoretical models that are relevant to implementation of innovations in the AOD field. Unless the findings generated by evaluating the theoretical constructs in interventions are reported back to the theorists and responded to, then the commitment of time and use of resources for testing theories will be wasted.

10. References

Adams, J., & White, M. (2005). Why don't stage-based activity promotion interventions work? *Health Educ Res*, *20*(2), 237-243.

Ajzen, I. (1991). The theory of planned behavior. *Organ Behav Hum Decis Process, 50*(2), 179-211.

Amodeo, M., Ellis, M. A., Hopwood, J., & Derman, L. (2007). A model for organizational change: Using an employee-driven, multilevel intervention in a substance abuse agency. *Fam Soc, 88*(2), 223-232.

Anderson, P., Kaner, E., Wutzke, S., Funk, M., Heather, N., Wensing, M., et al. (2004). Attitudes and managing alcohol problems in general practice: an interaction analysis based on findings from a WHO collaborative study. *Alcohol Alcohol, 39*(4), 351-356.

Andreasen, A. (1995). *Marketing social change: changing behavior to promote health, social development, and the environment.* San Francisco, CA: Jossey-Bass.

Ashford, J., Eccles, M., Bond, S., Hall, L. A., & Bond, J. (1999). Improving health care through professional behaviour change: introducing a framework for identifying behaviour change strategies. *Br J Clin Gov, 4*(1), 14-23.

Bandura, A. (1989). *Social cognitive theory.* (Vol. 6). Greenwich, CT: JAI Press.

Bero, L. A., Grilli, R., Grimshaw, J. M., Harvey, E., Oxman, A. D., & Thomson, M. A. (1998). Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. The Cochrane Effective Practice and Organization of Care Review Group. *BMJ, 317*(7156), 465-468.

Boekeloo, B. O., Bobbin, M. P., Lee, W. I., Worrell, K. D., Hamburger, E. K., & Russek-Cohen, E. (2003). Effect of patient priming and primary care provider prompting on adolescent-provider communication about alcohol. *Arch Pediatr Adolesc Med, 157*(5), 433-439.

Boekeloo, B. O., Jerry, J., Lee-Ougo, W. I., Worrell, K. D., Hamburger, E. K., Russek-Cohen, E., et al. (2004). Randomized trial of brief office-based interventions to reduce adolescent alcohol use. *Arch Pediatr Adolesc Med, 158*(7), 635-642.

Boer, H., & Seydel, E. R. (1996). Protection motivation theory. In M. Conner & P. Norman (Eds.), *Predicting health behaviour. Research and practice with social cognition models* (pp. 95-120). Buckingham: Open University Press.

Bonetti, B., Eccles, M., Johnston, M., Steen, N., Grimshaw, J., Baker, R., et al. (2005). Guiding the design and selection of interventions to influence the implementation of evidence-based practice: an experimental simulation of a

complex intervention trial. *Soc Sci Med, 60*, 2135-2147.

Bonetti, D., Pitts, N. B., Eccles, M., Grimshaw, J., Johnston, M., Steen, N., et al. (2006). Applying psychological theory to evidence-based clinical practice: Identifying factors predictive of taking intra-oral radiographs. *Soc Sci Med, 63*(7), 1889-1899.

Borbas, C., Morris, N., McLaughlin, B., Asinger, R., & Gobel, F. (2000). The role of clinical opinion leaders in guideline implementation and quality improvement. *Chest, 118*(2 Suppl), 24S-32S.

Borrelli, B., McQuaid, E. L., Becker, B., Hammond, K., Papandonatos, G., Fritz, G., et al. (2002). Motivating parents of kids with asthma to quit smoking: the PAQS project. *Health Educ Res, 17*(5), 659-669.

Bracht, N., Kingsbury, L., & Rissel, C. (1999). A five stage community organization model for health promotion: Empowerment and partnership strategies. In N. Bracht (Ed.), *Health promotion at the community level: New advances.* Thousand Oaks, CA: Sage Publications.

Brown, B. S. (1987). Networking between research and service delivery. *Int J Addict, 22*(4), 301-317.

Bunton, R., Baldwin, S., & Flynn, D. (1999). *The Stages of Change model and its use in health promotion: a critical review.* Edinburgh: Health Education Board for Scotland.

By, R. T. (2005). Organisational change management: A critical review. *Journal of Change Management, 5*(4), 369-380.

Bywood, P. T., Lunnay, B., & Roche, A. M. (2008a). *Effective dissemination: A systematic review of implementation strategies for the AOD field*. Adelaide: National Centre for Education and Training on Addiction (NCETA), Flinders University, Adelaide Australia.

Bywood, P. T., Lunnay, B., & Roche, A. M. (2008b). *Effective dissemination: An examination of the costs of implementation strategies for the AOD field.* Adelaide: National Centre for Education and Training on Addiction (NCETA), Flinders University, Adelaide Australia.

Carney, P. A., Dietrich, A. J., Keller, A., Landgraf, J., & O'Connor, G. T. (1992). Tools, teamwork, and tenacity: an office system for cancer prevention. *J Fam Pract, 35*(4), 388-394.

Casper, E. S. (2008). Using implementation intentions to teach practitioners: changing practice behaviors via continuing education. *Psychiatr Serv, 59*(7), 747-752.

Cohen, S. J., Halvorson, H. W., & Gosselink, C. A. (1994). Changing physician behavior to improve disease prevention. *Prev Med, 23*(3), 284-291.

Conner, M., & Norman, P. (1996). The role of social cognition models in health behaviours. In M. Conner & P. Norman (Eds.), *Predicting Health Behaviour. Research and practice with social cognition models* (pp. 1-22). Buckingham:

Open University Press.

Conner, M., & Sparks, P. (1996). The theory of planned behaviour and health behaviours. In M. Conner & P. Norman (Eds.), *Predicting health behaviour. Research and practice with social cognition models* (pp. 121-162). Buckingham: Open University Press.

Costanza, M. E., Luckmann, R., Stoddard, A. M., Avrunin, J. S., White, M. J., Stark, J. R., et al. (2005). Applying a stage model of behavior change to colon cancer screening. *Prev Med, 41*(3-4), 707-719.

Costanza, M. E., Luckmann, R., Stoddard, A. M., White, M. J., Stark, J. R., Avrunin, J. S., et al. (2007). Using tailored telephone counseling to accelerate the adoption of colorectal cancer screening. *Cancer Detect Prev, 31*(3), 191-198.

Cranney, M., Barton, S., & Walley, T. (1999). Addressing barriers to change: an RCT of practice-based education to improve the management of hypertension in the elderly. *Br J Gen Pract, 49*(444), 522-526.

Davidson, R. (2002). Cycle of Change: ideas, issues and implications. *Drugs: Education, Prevention & Policy, 9*(1), 7-14.

Davis, D., Evans, M., Jadad, A., Perrier, L., Rath, D., Ryan, D., et al. (2003). The case for knowledge translation: shortening the journey from evidence to effect. *BMJ, 327*(7405), 33-35.

Davis, D., Thomson, M., Oxman, A., & Haynes, R. (1992). Evidence for the effectiveness of CME: A review of 50 randomized controlled trials. *JAMA, 268*(9), 1111-1117.

Davis, D. A., Thomson, M. A., Oxman, A. D., & Haynes, R. B. (1995). Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA, 274*(9), 700-705.

Dey, P., Simpson, C. W., Collins, S. I., Hodgson, G., Dowrick, C. F., Simison, A. J., et al. (2004). Implementation of RCGP guidelines for acute low back pain: a cluster randomised controlled trial. *Br J Gen Pract, 54*(498), 33-37.

Di Noia, J., Schwinn, T. M., Dastur, Z. A., & Schinke, S. P. (2003). The relative efficacy of pamphlets, CD-ROM, and the Internet for disseminating adolescent drug abuse prevention programs: an exploratory study. *Prev Med, 37*(6 Pt 1), 646-653.

DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: an analysis of precontemplation, contemplation, and preparation stages of change. *J Consult Clin Psychol, 59*(2), 295-304.

Dietrich, A. J., O'Connor, G. T., Keller, A., Carney, P. A., Levy, D., & Whaley, F. S. (1992). Cancer: improving early detection and prevention. A community practice randomised trial. *BMJ, 304*(6828), 687-691.

Eccles, M., Grimshaw, J., Walker, A., Johnston, M., & Pitts, N. (2005). Changing

the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. *J Clin Epidemiol, 58*(2), 107-112.

Eccles, M., Steen, N., Grimshaw, J., Thomas, L., McNamee, P., Soutter, J., et al. (2001). Effect of audit and feedback, and reminder messages on primary-care radiology referrals: a randomised trial. *Lancet, 357*(9266), 1406-1409.

Eccles, M. P., Grimshaw, J. M., Johnston, M., Steen, N., Pitts, N. B., Thomas, R., et al. (2007). Applying psychological theories to evidence-based clinical practice: Identifying factors predictive of managing upper respiratory tract infections without antibiotics. *Implement Sci, 2*, 26.

Elliott, J. O., Seals, B. F., & Jacobson, M. P. (2007). Use of the Precaution Adoption Process Model to examine predictors of osteoprotective behavior in epilepsy. *Seizure, 16*(5), 424-437.

Elwyn, G., Taubert, M., & Kowalczuk, J. (2007). Sticky knowledge: A possible model for investigating implementation in healthcare contexts. *Implement Sci, 2*, 44.

EPOC. (2002, August 4, 2004). *Cochrane Effective Practice and Organisation of Care Review Group (EPOC): The data collection checklist.* Retrieved 24th February, 2005, 2005, from http://www.epoc.uottawa.ca/checklist2002.doc

Ezendam, N. P., Oenema, A., van de Looij-Jansen, P. M., & Brug, J. (2007). Design and evaluation protocol of "FATaintPHAT", a computer-tailored intervention to prevent excessive weight gain in adolescents. *BMC Public Health, 7*, 324.

Fallowfield, L., Jenkins, V., Farewell, V., Saul, J., Duffy, A., & Eves, R. (2002). Efficacy of a Cancer Research UK communication skills training model for oncologists: a randomised controlled trial. *Lancet, 359*(9307), 650-656.

Fallowfield, L., Jenkins, V., Farewell, V., & Solis-Trapala, I. (2003). Enduring impact of communication skills training: results of a 12-month follow-up. Br J *Cancer, 89*(8), 1445-1449.

Farkas, A. J., Pierce, J. P., Zhu, S. H., Rosbrook, B., Gilpin, E. A., Berry, C., et al. (1996). Addiction versus stages of change models in predicting smoking cessation. *Addiction, 91*(9), 1271-1280; discussion 1281-1292.

Finkelstein, J. A., Lozano, P., Fuhlbrigge, A. L., Carey, V. J., Inui, T. S., Soumerai, S. B., et al. (2005). Practice-level effects of interventions to improve asthma care in primary care settings: the pediatric asthma care patient outcomes research team. *Health Serv Res, 40*(6 Pt 1), 1737-1757.

Forsetlund, L., Bradley, P., Forsen, L., Nordheim, L., Jamtvedt, G., & Bjorndal, A. (2003). Randomised controlled trial of a theoretically grounded tailored intervention to diffuse evidence-based public health practice. *BMC Med Educ, 3*(1), 2.

Foy, R., Penney, G. C., Grimshaw, J. M., Ramsay, C. R., Walker, A. E., MacLennan, G., et al. (2004). A randomised controlled trial of a tailored

multifaceted strategy to promote implementation of a clinical guideline on induced abortion care. *BJOG, 111*(7), 726-733.

Glazier, R. H., Badley, E. M., Lineker, S. C., Wilkins, A. L., & Bell, M. J. (2005). Getting a Grip on Arthritis: an educational intervention for the diagnosis and treatment of arthritis in primary care. *J Rheumatol, 32*(1), 137-142.

Goldstein, M. G., Niaura, R., Willey, C., Kazura, A., Rakowski, W., DePue, J., et al. (2003). An academic detailing intervention to disseminate physician-delivered smoking cessation counseling: smoking cessation outcomes of the Physicians Counseling Smokers Project. *Prev Med, 36*(2), 185-196.

Gollwitzer, P. M., & Schaal, B. (1998). Metacognition in action: the importance of implementation intentions. *Pers Soc Psychol Rev, 2*(2), 124-136.

Gordon, R., McDermott, L., Stead, M., & Angus, K. (2006). The effectiveness of social marketing interventions for health improvement: what's the evidence? *Public Health, 120*(12), 1133-1139.

Green, L. W., & Kreuter, M. W. (1999). *Health Promotion Planning: An Educational and Ecological Approach* (3rd ed.). Mountain View, CA: Mayfield.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Q, 82*(4), 581-629.

Grimshaw, J. M., Thomas, R. E., MacLennan, G., Fraser, C., Ramsay, C. R., Vale, L., et al. (2004). Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess, 8*(6), iii-iv, 1-72.

Hardeman, W., Griffin, S., Johnston, M., Kinmonth, A. L., & Wareham, N. J. (2000). Interventions to prevent weight gain: a systematic review of psychological models and behaviour change methods. *Int J Obes Relat Metab Disord, 24*(2), 131-143.

Hardeman, W., Johnston, M., Johnston, D. W., Bonetti, D., Wareham, N. J., & Kinmonth, A. L. (2002). Application of the theory of planned behaviour in behaviour change interventions: A systematic review. *Psychol Health, 17*(2), 123-158.

Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the Health Belief Model with adults. *Health Educ Res, 7*(1), 107-116.

Jamtvedt, G., Young, J. M., Kristoffersen, D. T., O'Brien, M. A., & Oxman, A. D. (2006). Does telling people what they have been doing change what they do? A systematic review of the effects of audit and feedback. *Qual Saf Health Care, 15*(6), 433-436.

Jeffery, R. W. (2004). How can Health Behavior Theory be made more useful for intervention research? *Int J Behav Nutr Phys Act, 1*(1), 10.

Jones, S. C., & Donovan, R. J. (2004). Does theory inform practice in health promotion in Australia? *Health Educ Res, 19*(1), 1-14.

Kelly, J. A., Somlai, A. M., DiFranceisco, W. J., Otto-Salaj, L. L., McAuliffe, T. L., Hackl, K. L., et al. (2000). Bridging the gap between the science and service of HIV prevention: transferring effective research-based HIV prevention interventions to community AIDS service providers. *Am J Public Health, 90*(7), 1082-1088.

Kiefe, C. I., Allison, J. J., Williams, O. D., Person, S. D., Weaver, M. T., & Weissman, N. W. (2001). Improving quality improvement using achievable benchmarks for physician feedback: a randomized controlled trial. *JAMA, 285*(22), 2871-2879.

Lomas, J. (1991). Words without action? The production, dissemination, and impact of consensus recommendations. *Annu Rev Public Health, 12*, 41-65.

Margolis, P. A., Lannon, C. M., Stuart, J. M., Fried, B. J., Keyes-Elstein, L., & Moore, D. E., Jr. (2004). Practice based education to improve delivery systems for prevention in primary care: randomised trial. *BMJ, 328*(7436), 388.

Mauck, K. F., Cuddihy, M. T., Trousdale, R. T., Pond, G. R., Pankratz, V. S., & Melton, L. J., 3rd. (2002). The decision to accept treatment for osteoporosis following hip fracture: exploring the woman's perspective using a stage-of-change model. *Osteoporos Int, 13*(7), 560-564.

Mazmanian, P. E., Johnson, R. E., Zhang, A., Boothby, J., & Yeatts, E. J. (2001). Effects of a signature on rates of change: a randomized controlled trial involving continuing education and the commitment-to-change model. *Acad Med, 76*(6), 642-646.

Mazmanian, P. E., & Mazmanian, P. M. (1999). Commitment to change: Theoretical foundations, methods, and outcomes. *J Contin Educ Health Prof, 19*(4), 200-207.

Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., & Walker, A. (2005). Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Health Care, 14*(1), 26-33.

Moore, K. A., Peters, R. H., Hills, H. A., LeVasseur, J. B., Rich, A. R., Hunt, W. M., et al. (2004). Characteristics of opinion leaders in substance abuse treatment agencies. *Am J Drug Alcohol Abuse, 30*(1), 187-203.

Morgenstern, J., Morgan, T. J., McCrady, B. S., Keller, D. S., & Carroll, K. M. (2001). Manual-guided cognitive-behavioral therapy training: a promising method for disseminating empirically supported substance abuse treatments to the practice community. *Psychol Addict Behav, 15*(2), 83-88.

Moulding, N. T., Silagy, C. A., & Weller, D. P. (1999). A framework for effective management of change in clinical practice: dissemination and implementation of clinical practice guidelines. *Qual Health Care, 8*(3), 177-183.

Murtaugh, C. M., Pezzin, L. E., McDonald, M. V., Feldman, P. H., & Peng, T. R. (2005). Just-in-time evidence-based e-mail "reminders" in home health care: impact on nurse practices. *Health Serv Res, 40*(3), 849-864.

National Cancer Institute. (2005). *Theory at a glance: A guide for health promotion practice (Second edition):* US Department of Health and Human Services, National Institutes of Health.

NCDDR. (2001). *Developing an Effective Dissemination Plan.* Austin, Texas: National Institute on Disability and Rehabilitation Research.

NCETA. (2006). *Health professionals' attitudes towards licit and illicit drug users.* Adelaide, South Australia: National Centre for Education and Training on Addiction, Flinders University.

NHS - Centre for Reviews and Dissemination. (1999). Getting Evidence into Practice. *Eff Health Care, 5*(1), 1-16.

Onion, C. W., & Bartzokas, C. A. (1998). Changing attitudes to infection management in primary care: a controlled trial of active versus passive guideline implementation strategies. *Fam Pract, 15*(2), 99-104.

Oxman, A. D., Thomson, M. A., Davis, D. A., & Haynes, R. B. (1995). No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. *CMAJ, 153*(10), 1423-1431.

Pathman, D. E., Konrad, T. R., Freed, G. L., Freeman, V. A., & et al. (1996). The awareness-to-adherence model of the steps to clinical guideline compliance: The case of pediatric vaccine recommendations. *Med Care, 34*(9), 873-889.

Petty, R. E., & Cacioppo, J. T. (1986). *The Elaboration Likelihood Model of persuasion*. New York: Academic Press.

Pill, R., Stott, N. C., Rollnick, S. R., & Rees, M. (1998). A randomized controlled trial of an intervention designed to improve the care given in general practice to Type II diabetic patients: patient outcomes and professional ability to change behaviour. *Fam Pract, 15*(3), 229-235.

Prochaska, J. O., & DiClemente, C. C. (1986). Toward a comprehensive model of change. In W. R. Miller & N. Heather (Eds.), *Treating addictive behaviors. Processes of change* (pp. 3-27). New York: Plenum Press.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviors. *Am Psychol, 47*(9), 1102-1114.

Rhydderch, M., Elwyn, G., Marshall, M., & Grol, R. (2004). Organisational change theory and the use of indicators in general practice. *Qual Saf Health Care, 13*(3), 213-217.

Riemsma, R. P., Pattenden, J., Bridle, C., Sowden, A. J., Mather, L., Watt, I. S., et al. (2002). A systematic review of the effectiveness of interventions based on a stages-of-change approach to promote individual behaviour change. *Health Technol Assess, 6*(24), 1-231.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Rothman, A. J. (2004). "Is there nothing more practical than a good theory?": Why innovations and advances in health behavior change will arise if interventions are used to test and refine theory. *Int J Behav Nutr Phys Act, 1*(1), 11.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol, 55*(1), 68-78.

Ryan, R. M., & Deci, E. L. (2008). A self-determination theory approach to psychotherapy: The motivational basis for effective change. *Can Psychol, 49*(3), 186-193.

Sanders, K. M., & Satyvavolu, A. (2002). Improving blood pressure control in diabetes: limitations of a clinical reminder in influencing physician behavior. *J Contin Educ Health Prof, 22*(1), 23-32.

Shaw, J. S., Samuels, R. C., Larusso, E. M., & Bernstein, H. H. (2000). Impact of an encounter-based prompting system on resident vaccine administration performance and immunization knowledge. *Pediatrics, 105*(4 Pt 2), 978-983.

Sheeran, P., & Abraham, C. (1996). The health belief model. In M. Conner & P. Norman (Eds.), *Predicting health behaviour. Research and practice with social cognition models* (pp. 23-61). Buckingham: Open University Press.

Simpson, D. D., & Flynn, P. M. (2007). Moving innovations into treatment: A stage-based approach to program change. *J Subst Abuse Treat, 33*(2), 111-120.

Skinner, N., Feather, N. T., Freeman, T., & Roche, A. M. (2007). Stigma and discrimination in health-care provision to drug users: The role of values, affect and deservingness judgments. *J Appl Soc Psychol, 37*(1), 163-186

Sorensen, J. L., & Midkiff, E. E. (2000). Bridging the gap between research and drug abuse treatment. *J Psychoactive Drugs, 32*(4), 379-382.

Soumerai, S. B., & Avorn, J. (1990). Principles of educational outreach ('academic detailing') to improve clinical decision making. *JAMA, 263*(4), 549-556.

Soumerai, S. B., McLaughlin, T. J., Gurwitz, J. H., Guadagnoli, E., Hauptman, P. J., Borbas, C., et al. (1998). Effect of local medical opinion leaders on quality of care for acute myocardial infarction: a randomized controlled trial. *JAMA, 279*(17), 1358-1363.

Stead, M., McDermott, L., Gordon, R., Angus, K., & Hastings, G. (2006). *A review of the effectiveness of social marketing alcohol, tobacco and substance misuse interventions.* Stirling: National Social Marketing Strategy for Health, Institute for Social Marketing.

Suggs, P. K., Mittelmark, M. B., Krissak, R., Oles, K., Lane, C., & Richards, B. (1998). Efficacy of a self-instruction package when compared with a traditional continuing education offering for nurses. *J Contin Educ Health Prof, 18*(4), 220-226.

Sussman, A. L., Williams, R. L., Leverence, R., Gloyd, P. W., Jr., & Crabtree, B. F. (2008). Self determination theory and preventive care delivery: a Research Involving Outpatient Settings Network (RIOS Net) study. *J Am Board Fam Med, 21*(4), 282-292.

Sutton, S. (2004). Determinants of health-related behaviours: Theoretical and methodological issues. In S. Sutton, A. Baum & M. Johnston (Eds.), *The SAGE handbook of health psychology* (pp. 94-126). London: SAGE Publications Ltd.

Thomson O'Brien, M. A., Oxman, A. D., Davis, D. A., Haynes, R. B., Freemantle, N., & Harvey, E. L. (2000). Educational outreach visits: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*(2), CD000409.

van Sluijs, E. M., van Poppel, M. N., & van Mechelen, W. (2004). Stage-based lifestyle interventions in primary care: are they effective? *Am J Prev Med, 26*(4), 330-343.

Waldorff, F. B., Almind, G., Makela, M., Moller, S., & Waldemar, G. (2003). Implementation of a clinical dementia guideline. A controlled study on the effect of a multifaceted strategy. *Scand J Prim Health Care, 21*(3), 142-147.

Walker, A. E., Grimshaw, J., Johnston, M., Pitts, N., Steen, N., & Eccles, M. (2003). PRIME--PRocess modelling in ImpleMEntation research: selecting a theoretical basis for interventions to change clinical practice. *BMC Health Serv Res, 3*(1), 22.

Weinstein, N. D. (1988). The precaution adoption process. *Health Psychol, 7*(4), 355-386.

Weinstein, N. D., & Sandman, P. M. (1992). A model of the precaution adoption process: evidence from home radon testing. *Health Psychol, 11*(3), 170-180.

West, R. (2005). Time for a change: putting the Transtheoretical (Stages of Change) Model to rest. *Addiction, 100*(8), 1036-1039.

White, M., Michaud, G., Pachev, G., Lirenman, D., Kolenc, A., & FitzGerald, J. M. (2004). Randomized trial of problem-based versus didactic seminars for disseminating evidence-based guidelines on asthma management to primary care physicians. *J Contin Educ Health Prof, 24*(4), 237-243.

Whitelaw, S., Baldwin, S., Bunton, R., & Flynn, D. (2000). The status of evidence and outcomes in Stages of Change research. *Health Educ Res, 15*(6), 707-718.

Young, C., Chart, P., Franssen, E., Tipping, J., Morris, B., & Davis, D. (1998). Effective continuing education for breast disease: A randomized trial comparing home study and workshop formats. *J Contin Educ Health Prof, 18*(2), 86-92.

Young, J. M., & Ward, J. (2002). Can distance learning improve smoking cessation advice in family practice? A randomized trial. *J Contin Educ Health Prof, 22*(2), 84-93.

Appendix 1

Other theories and models

Health Belief Model

The health belief model (HBM) is based on the premise that individuals consider the advantages and disadvantages of changing their behaviour and make a rational decision accordingly (Riemsma et al., 2002). The decision to change behaviour depends on two key factors:

- Threat perception: an individual's perceived susceptibility to disease or danger and the expected severity of the consequences of such illness. In more general terms, this may also refer to the probability of particular consequences (e.g. likelihood of losing weight following change in lifestyle)

- Behavioural evaluation: the costs and benefits of changing health behaviour.

These key factors, combined with motivation to change health behaviour and cues to trigger behaviour change, form the six constructs of the health belief model shown in Figure 10. A trigger, such as a mass media campaign or health scare, is often the 'cue to action'. An individual's motivation or 'readiness to be concerned' about health is included in this model (Sheeran & Abraham, 1996).
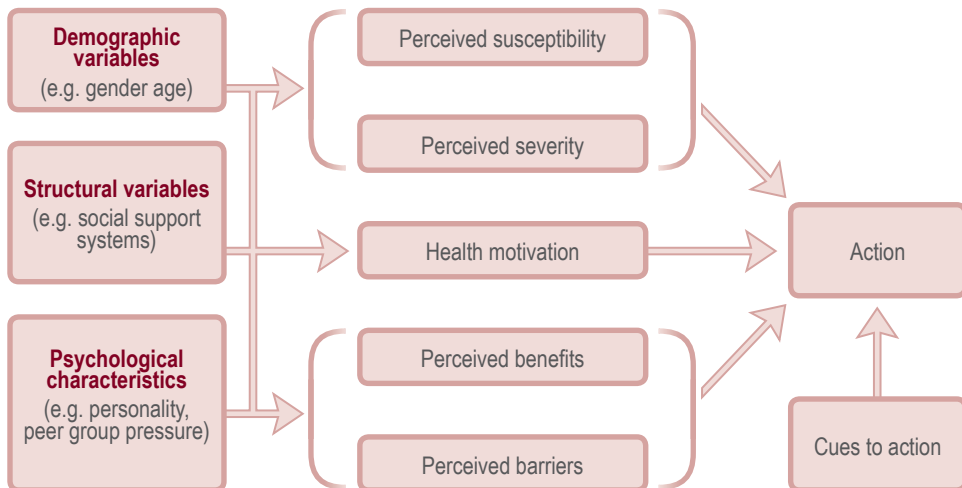

Figure 10. Health Belief Model (Adapted from Sheeran & Abraham, 1996)

The health belief model has been applied across a broad range of health behaviours, including preventive care (screening, lifestyle issues, vaccinations, and contraception), compliance with specific disease regimens, and physician visits (Sheeran & Abraham, 1996). The predictive utility of the health belief model has been explored in a meta-analysis (Harrison, Mullen & Green, 1992). Results showed small, but significant, correlations between four HBM constructs (susceptibility, severity, benefits, and barriers) and behaviour in 16 good quality studies, accounting for 0.5-4% of variance in behaviour. There was considerable heterogeneity across studies, reflecting differences in design, measurement, and the conceptualisation of constructs. The remaining constructs, health motivation and cues to action, have received limited attention in research, with mixed findings on predictive utility (Sheeran & Abraham, 1996). The constructs influence behaviour indirectly by impacting on behavioural intentions, which are purported to be the main predictors of behaviour.

The limitations of the HBM are:

- It does not include the effect of previous experience with a behaviour
- It ignores the effect of cognition, particularly the importance of intentions and the influence of others' approval
- It ignores the effect of social and financial influences on decision-making
- Reliance on self-report measures exposes the research to bias, particularly social desirability bias
- It does not adequately address multiple risk behaviours, such as smoking, drinking, poor nutrition/obesity and high cholesterol, where individuals may prioritise risks. It may be necessary to seek individual's preferences for which risk factor to tackle first, or tailor interventions to individual needs in order to optimise their motivation to change behaviour.

The HBM has made way for more comprehensive conceptual frameworks that include notions of perceived control and self-efficacy, such as protection motivation theory, and the theories of reasoned action and planned behaviour.

Protection Motivation Theory

Protection motivation theory (PMT) is described as a hybrid theory, which comprises three components from the health belief model (vulnerability, severity, and response efficacy) and one (self-efficacy) from social learning theory.

Like the HBM, the PMT proposes that an individual's perception of the risk of disease, their susceptibility to the disease, the effectiveness of the proposed health behaviour, and their self-belief in changing their behaviour will influence their decision to change (Riemsma et al., 2002). In contrast to the HBM, however, PMT proposes that behaviour is influenced indirectly by individuals' intentions and emotions, particularly fear.

PMT (Figure 11 over page) describes adaptive and maladaptive coping with a health threat as the result of two appraisal processes - threat appraisal and coping appraisal - whereby the behavioural options to reduce the threat are evaluated (Boer & Seydel, 1996). Appraisal of the health threat and coping responses result in the intention to perform adaptive responses (protection motivation), or lead to maladaptive responses, which put the individual at a health risk. Examples include behaviours leading to negative consequences (smoking, drug-taking) and the absence of behaviours that may lead to negative consequences (failing to participate in cancer screening). Perceptions of vulnerability to, or severity of, a disease are expected to inhibit the probability of maladaptive responses, whereas the advantages of maladaptive behaviour (e.g. time saved by not attending breast cancer screening) facilitate the probability of a maladaptive response. Adaptive behaviour (protection motivation) is enhanced by the belief that the behaviour is effective in reducing the threat (response efficacy) and by the expectation that the individual can successfully perform the required adaptive behaviour (self-efficacy) (Boer & Seydel, 1996). Six main components of the model (in bold) are commonly measured in studies. In health-related behaviours, PMT has been used mainly for reducing alcohol use, enhancing healthy lifestyles, enhancing diagnostic health behaviours and preventing disease. For example, high school students in the 'high fear' group, which received persuasive messages describing the unpleasant consequences of abusive drinking, exhibited greater short-term intentions to remain abstinent compared to the 'low fear' group. Boer and Seydel (1996) suggest that PMT is more likely to be effective when it is aimed at enhancing the health behaviours of specific at-risk groups.
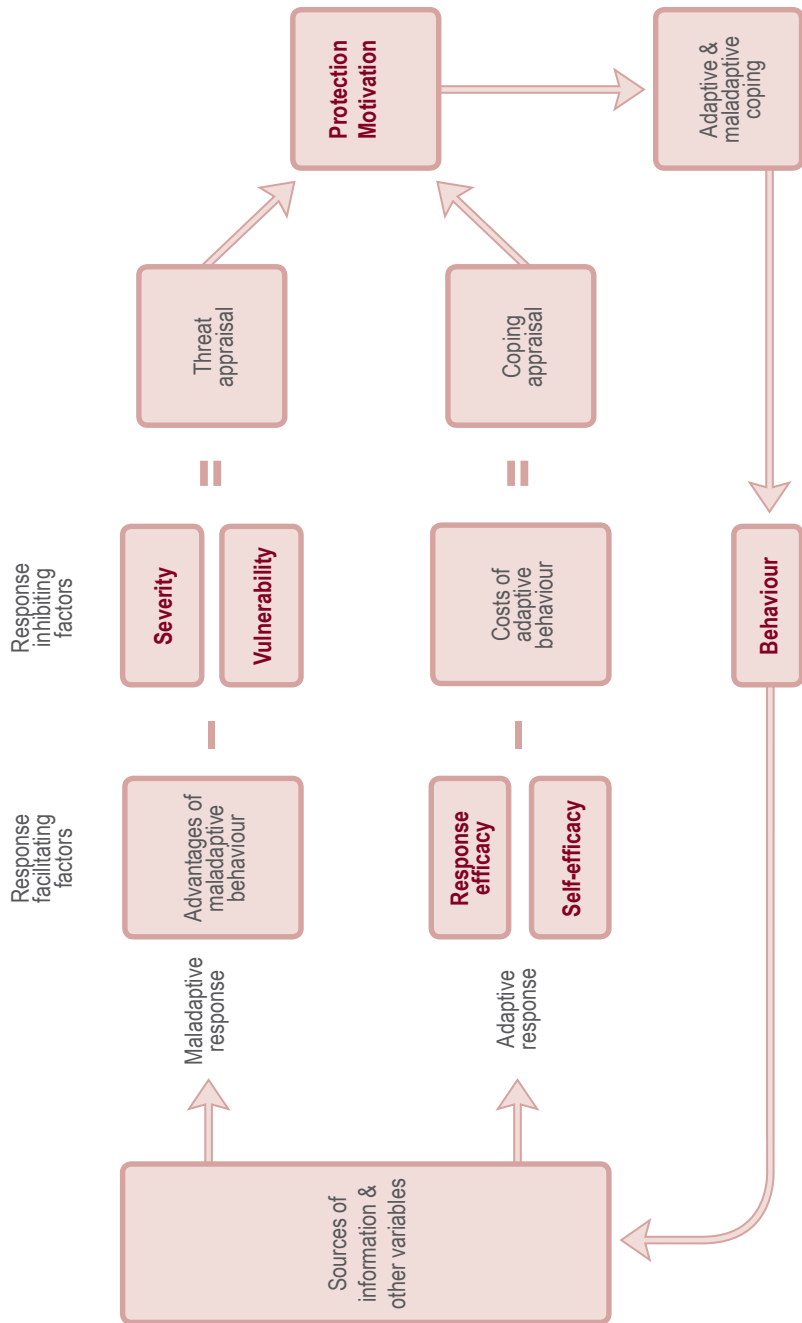
Figure 11. Protection Motivation Theory