

**Using theoretical frameworks of behaviour to  
understand and improve health care delivery.**

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## **Abstract**

The development of new knowledge about patient care continues to progress at an ever-increasing rate but its transfer into clinical practice can be slow and unpredictable. This doctoral statement provides a critical overview of a substantial programme of work that has explored the utility of theoretical models of behaviour for promoting the uptake of research findings into routine care. Guided by the MRC Framework for the design and evaluation of complex interventions, the supporting publications describe the development and testing of an innovative and systematic approach to intervention design. As well as providing methods for identifying and applying behavioural theory, this work has also set standards for transparency in the intervention development processes. The work demonstrates that psychological theories of behaviour do have an important function for improving healthcare delivery by supporting clinical behaviour change, but important limitations remain. In my critical reflection of this body of work I discuss these challenges, considering in particular the omission of the patient perspective and the dynamic influence of the patient-professional interaction during the clinical encounter. I go on to propose an extended dual-perspective model supported by theory and evidence from other improvement literatures, epistemologies and disciplinary perspectives. The dual perspective model functions at the very core of healthcare delivery and illustrates the interdependency of professional and patient behaviour in determining healthcare decision making and patient outcomes. By formally including the patient perspective the revised model encompasses all three dimensions of the EBM paradigm. I argue for a focus on better understanding of the interactional and relational processes that are generated during the clinical encounter as an essential step forward for implementation and improvement science. The paradigm of patient-centred care is then revisited through the lens of capabilities thinking and is proposed as a vital mechanism for supporting the uptake of appropriate, evidence-based healthcare.

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## **Dedication**

To our beautiful grandchildren

*Seán Javier (2012)*

&

*Sophia Elizabeth (2014)*

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## Peer-reviewed journal articles submitted in support of PhD

1. **Hrisos S**, Eccles MP, Johnston M, Francis J, Kaner EFS, Steen IN, Grimshaw J. Developing the content of two behavioural interventions. Using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics#1. *BMC Health Services Research*. 2008, 8:11  
<http://www.biomedcentral.com/content/pdf/1472-6963-8-11.pdf>
2. **Hrisos S**, Eccles MP, Johnston M, Francis J, Kaner EFS, Steen IN, Grimshaw J. An intervention modelling experiment to change GPs' intentions to implement evidence-based practice: Using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics #2. *BMC Health Services Research*. 2008, 8:10  
<http://www.biomedcentral.com/content/pdf/1472-6963-8-10.pdf>
3. **Hrisos S**, Eccles MP, Johnston M, Francis J, Dickinson HO, Kaner EFS, Beyer F. Are there valid proxy measures of clinical behaviour? Systematic review. *Implementation Science*. 2009, 4:37  
<http://www.implementationscience.com/content/pdf/1748-5908-4-37.pdf>
4. **Hrisos S**, Eccles MP, Francis J, Bosch M, Dijkstra R, Johnston M, Grol R, Kaner EFS, Steen IN. Using psychological theory to understand the clinical management of type 2 diabetes in Primary Care: a comparison across two European countries. *BMC Health Services Research*. 2009, 9:140 <http://www.biomedcentral.com/1472-6963/9/140>
5. Eccles MP, **Hrisos S**, Francis J, Steen IN, Bosch M, Johnson. Can the collective intentions of individual professionals within healthcare teams predict the team's performance: developing methods and theory? *Implementation Science*. 2009. 4:24.  
<http://www.implementationscience.com/content/4/1/24>
6. Eccles MP, **Hrisos S**, Francis J, Stamp E, Johnston M, Hawthorne G, Steen IN, Grimshaw J, Elovainio M, Pesseau J and Hunter M. Instrument development, data collection, and characteristics of practices, staff, and measures in the Improving Quality of Care in Diabetes (IQuaD) Study. *Implementation Science* 2011, 6:61.  
<http://www.implementationscience.com/content/6/1/61>
7. Hawthorne G, **Hrisos S**, Stamp E, Elovainio M, Francis JJ, Grimshaw J, Hunter M, Johnston M, Pesseau, Steen N, Eccles MP. Diabetes Care Provision in UK Primary Care Practices. *PLoS ONE*. 2012. 7(7): e41562. doi:10.1371/journal.pone.0041562. <http://t.co/hxDcMJCJF>
8. **Hrisos S**, Thomson, RG. More required on the patient role and standardization *American Journal of Bioethics*. 2013, 13:8: 62-65  
<http://www.tandfonline.com/doi/abs/10.1080/15265161.2013.807184?journalCode=uajb20#.UspwYLRptfw>



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## Chapter One: Introduction

In the early days of my career as a health services researcher I was joint local co-ordinator for the national multi-centre MRC Cognitive Function and Ageing Study (CFAS) (1). Working on this study gave me a firm grounding in project management and provided me with extensive experience in the recruitment, consenting and interviewing of elderly research participants in the community. Though using a semi-structured interview schedule that was largely a standardised cognitive assessment of ageing participants, there was ample opportunity (and a very willing cohort!) for respondents to talk about their personal experience of ageing and changes in their cognitive and physical functioning. Not only do I look back on my experience of these encounters with fondness, but also with a tacit acknowledgement on my part of an invaluable insight into “getting older” that went beyond a dementia score generated by a computerised algorithm – a first glimpse at how clinical and lay perceptions of health and illness can be at odds.

Following this large epidemiological study, I joined a research team in clinical paediatric ophthalmology as the national co-ordinator of a UK wide multi-centre randomised controlled trial (RCT) of treatment (2). Working on this trial not only introduced me to evidence-based medicine, a relatively new concept in the literature at that time, but also took me into the realm of knowledge uptake and variance in clinical behaviour. This, and further studies undertaken with this research team, also fuelled my growing academic interest in the psycho-social aspects of healthcare.

The multi-centre RCT was a pragmatic trial of treatment for unilateral visual impairment (UVI) in pre-school children and it was the first ever study that included an untreated control group to scrutinise the 100 year old, mainstay treatment for this condition (patching of the “good” eye). Drawing upon my original discipline of psychology, I developed and undertook two complementary studies alongside the trial, which placed the target treatment into a more social context (3,4). The latter study (4), which was the basis of my Masters of Philosophy degree, provided an objective assessment of functional impairment in children with UVI.

The first study, (3) however, provided valuable insight into the subjective experience of patients and carers, whilst also identifying potential barriers to treatment compliance. The study showed that getting a child to wear an eye patch was a difficult, and often distressing, process for both parent and child, but found no evidence of significant or enduring emotional disturbance in treated children. As the RCT found a beneficial effect of wearing a patch in children with moderate UVI, but not for those with mild UVI (approximately 60% of children detected at screen), these are important observations on two counts: Firstly, for the parents and practitioners treating children with moderate UVI, the study offers re-assurance that patching is not only worthwhile but that it is also safe. The value of this message became more apparent when it was featured on Reuter's Health (New York) information webpage ([www.reutershealth.com](http://www.reutershealth.com)), and then rapidly cascaded to a number of other similar public health webpages. Secondly, the results of the RCT were adopted by the UK National Screening committee and included in their recommendations for practice (<http://www.screening.nhs.uk/vision-child>),

However, there was varied acceptance and confidence in the findings by practitioners – mainly because the evidence presented to them appeared to be at odds with their clinical experience. Their personal experience was one of 'witnessing' improvement in children's vision, that could sometimes be quite dramatic and rapid (sometimes immediate with the use of lenses or glasses). These examples illustrate how an understanding of the wider social context in which healthcare is delivered can provide insight into factors that may facilitate or inhibit the uptake of new research evidence into practice.

Having been alerted to potential "internal" factors that could influence the clinical behaviour of the health professional (e.g. firmly held beliefs about treatment efficacy) and the health behaviour of the service user (e.g. parental fear of harm from treatment), my experience on a later study illustrated the importance of an additional dimension; the potential of the patient perspective – real or assumed - to act as a powerful "external" influence on clinical decision making. While conducting a feasibility study for another RCT, this time to evaluate the management of a childhood squint, it became apparent to me that

there was wide variation in the clinical management of this condition. While differences in clinical opinion about best practice contributed to this variation, I found it striking to learn that clinicians' decisions for surgical management of this squint were often based on a strong perception of parental pressure for surgical re-alignment rather than on observable clinical signs. As no reliable outcome measure was readily available for the planned trial, a standardised index was developed by our research team. The resulting weighted instrument necessarily takes into account both clinical indicators for management and parental observations, and quantifies these into a single score (5–7).

While the clinical behaviour of individual healthcare providers is only one level at which behaviour change operates in complex organisations such as the NHS, it remains central to the delivery of high quality care to patients. The work submitted in support of this thesis was undertaken with colleagues who formed a multidisciplinary team of researchers exploring the application of psychological behavioural theories to professional behaviour change. The doctoral statement will discuss this work and provide a critical analysis of this as an approach to developing scientifically sound interventions to improve clinical practice.

## Chapter Two: What is the role of theory in improving healthcare?

### 2.1 “Evidence-based medicine should be complemented by evidence-based implementation.” *Richard Grol. 1997*

Prior to the 1970's, clinical practice was generally autonomous and self-regulated. Doctors leaving medical schools with qualifications endorsed by both the medical profession and governing authorities were assumed to be fully equipped and knowledgeable enough in their practice to make appropriate decisions about a patient's care (8). However, by this time, it was becoming increasingly apparent that care provision and the use of services was neither uniform nor based on economic prudence and health systems throughout the world began to search for more cost effective ways of delivering health care (9). At the same time research into medical innovation and care provision proliferated (8), yet with little influence on standards of care even in the most technologically advanced countries, despite the many concerted implementation efforts (9). Subsequent advances in health services research (an area of applied research characterised by its multidisciplinary and mixed methods approach to investigating health service delivery, health care policy and health care needs (10)), illuminated the wide variation in the provision of care that was inconsistent with the latest scientific knowledge (11–14).

At the turn of the 21<sup>st</sup> century, studies in the United Kingdom, the United States, the Netherlands, Canada and Australia suggested that 30% to 55% of patients were not receiving care according to current evidence-based recommendations and that about 25% of care provided was unnecessary or potentially harmful (11–13,15). This now well recognised and frequently discussed “research – practice gap” stubbornly persists, and represents a consistent finding in health services research to date (16–19). In 2001, the US Institute of Medicine concluded that a “*chasm* lies between the healthcare that we have and the healthcare that we should have”, perhaps putting the widely referred to “gap” into a much clearer perspective (20).

This persistent phenomenon prompted researchers to examine more critically the way in which new research knowledge was assumed to become embedded in routine clinical practice. Traditionally this had relied on the dissemination of information to clinicians through, for example, peer-reviewed publications, continuing medical education and conferences. It was anticipated that clinicians would subsequently absorb new evidence and duly incorporate it into their routine practice. However, while dissemination as a strategy appeared [at least at that time<sup>1</sup>] sufficient to secure more simple changes in practice (21), the effectiveness of dissemination alone in promoting the uptake of more complex innovations appeared to be limited (9,22). The need to improve the progress in uptake of new research, and the ethical imperative to remove this as a barrier to equity and access in effective healthcare, (23,24) led to increased efforts by policy makers and professionals to identify more effective implementation strategies. In his evaluation of initial implementation work, Grol (25) observed that much of this planning to introduce change often adopted a naive and opportunistic approach to the selection of implementation strategies. Many approaches to implementation that he reviewed were based on beliefs or assumptions about what people thought would work, rather than evidence about the likely effectiveness of an intervention. Furthermore, he also observed that these beliefs and assumptions varied widely depending on the professional and epistemological perspective of those developing the implementation approach. In line with other authors at that time (26–28) Grol highlighted the importance of studying the theories underlying such different implementation approaches to gain insight into how and why they have their effects.

Acknowledging that improvements were evidently possible in many areas of clinical care, Grol's analysis also highlighted the difficulty in determining which, if any, strategy was successful. The now more targeted strategies often varied in their effectiveness across studies, and determining firm conclusions about the possible source of such variation was hampered by the poor quality of the

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<sup>1</sup> Recent Cochrane review (268) suggests that when compared to no intervention, printed educational materials slightly improve process outcomes but not patient outcomes. When compared to other interventions, printed educational materials may slightly improve outcomes, but there is not enough evidence to be certain. It is not known under what circumstances and contexts printed educational materials are more effective or what specific characteristics of printed educational materials make them more effective.

studies evaluating these same strategies (25,29–33). Given the lack of direction provided by this early work, Grol concluded with a challenge to healthcare systems and researchers to make a concerted effort to develop and use a more robust evidence base to support the implementation of research evidence into routine clinical practice (25).

## **2.2 “My theory of hitting was just to watch the ball as it came in and hit it”**

*Tommy Lasorda 1980s*

A theory is defined as a “supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained”(34). Several authors subsequently re-iterated the need to understand the critical determinants of change in clinical practice, and further advocate the use of theory and conceptual models to aid this process (12,20,22,35–40). However, not all authors would agree (31,41–43). Most notably perhaps are the proponents of the “OFF Theory” (31) who suggest that rather than more theory, what is needed “is more simple logic, common sense and empiric evidence”. The single fundamental tenet of the OFF theory is that “You don’t need a theory”. In their very witty and satirical rebuff of the call for “yet more theory”, Oxman and colleagues present a number of quotations that apparently demonstrate the redundancy of theory in the presence of obvious logic and pragmatism. Lasorda’s “theory of hitting” is one such example. However, it could be argued that Lasorda’s skill in hitting the ball as effectively as he did during his career as a Dodger baseball player was based on more than his expert visual tracking of the ball’s trajectory and his champion kinetics. He will undoubtedly have had a set of implicit (or potentially explicit) assumptions about what might influence the ball’s journey towards him – perhaps the throwing technique of the pitcher or the direction of the wind - that helped him to better anticipate what he needed to do to make it more likely that the ball came into contact with his bat. His confidence in “watching the ball as it comes in”, as the crucial determinant of hitting it, was undoubtedly reinforced by his experience and success of applying his theory over and over again during his many years as a champion baseball player. But while his theory may be (or appear to be) a good fit in terms of his own performance, it is very limited in providing insight into the performance of less successful baseball players using the same technique or in its generalisation to other bat and ball sports.

Traditionally, in the healthcare setting, the application of such implicit theories to deliberate approaches to improving the delivery of patient care has been, and continues to be, a commonplace approach. Studies included in one review of strategies to improve the uptake of clinical guidelines found that less than 10% provided an explicit theoretical rationale for their intervention (44). Nonetheless this, and a number of other reviews of implementation work, have demonstrated that the majority of interventions used to improve professional practice can achieve at least moderate (or 'medium'<sup>2</sup>) change (33,44–48). Thus, as acknowledged by the Improved Clinical Effectiveness through Behavioural Research Group (ICEBerG) group (49), it is quite conceivable that clinicians who are experienced and knowledgeable in their field can produce successful intervention strategies based on their (experience informed) intuition alone. Whilst this presents a good argument for drawing on this experiential expertise, many such strategies do still fail even when they have been previously successful. Understanding this variation in effectiveness across and within strategies is a real problem. An underlying rationale would greatly enhance evidence-based generalisation of improvement approaches beyond the situation in which they are originally applied.

This is where theory can play a valuable role, by providing a means to build an understanding about what works, how it works and when it works. Several factors have been identified that determine whether or not implementation of innovation or new knowledge takes place. ((35) Chapter 2) These factors can relate to features of: the innovation itself (e.g. the strength of its evidence base or its credibility); the intended users of the innovation (e.g. the skills, attitudes and motivation of healthcare professionals); and the recipients of the innovation (e.g. the attitudes, preferences and motivation of patients). Implementation can also be influenced by features of the clinical setting (e.g. team culture and functioning); the economic and organisational context (e.g. organisational culture and financial reimbursement); and by features of the methods and strategies used to promote implementation (e.g. the type, intensity and duration of the approach).

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<sup>2</sup> Cohen (1992) proposes operationally defined effect sizes (ES) of 'small, medium or large' that are at least approximately consistent across a range of ES indexes. For the test of significance of a sample  $r$ , a medium effect size = .30. (269)



Theory can help inform understanding of these factors and their differential influences on promoting or inhibiting uptake and change in healthcare practice. The work discussed in this thesis is concentrated on the role of psychological and behaviour change theories in this respect, but it is important to recognise that not all of these factors can be addressed by one theory or model of change, or by a single disciplinary (e.g. psychological) perspective (39). A range of other prominent theoretical perspectives (e.g. political, economic, organisational) continue to be influential in the growth of implementation as a science, and underpin several current approaches to planning and studying implementation. Comprehensive overviews of these perspectives are provided elsewhere (e.g. (9,39,50,51)), but some examples are given here for illustration.

At the macro-level, political and economic theories have underpinned approaches that aim to encourage the uptake of evidence into routine practice through the use of financial and regulatory incentives, and the introduction of national standards (9). In the UK the influence of these perspectives can be seen in the introduction of monetary reimbursement systems linked to performance like the Quality & Outcomes Framework in primary care (<http://www.hscic.gov.uk/qof>), and in the increase in external accountability of healthcare organisations and professionals through the introduction of government sponsored agencies, like the Care Quality Commission (<http://www.cqc.org.uk/>). Within this broader societal context of externally imposed governance, healthcare organisations themselves also endeavour to effectively manage best-practice innovation internally (52). A commonly used approach that draws heavily on quality management theory is Total Quality Management (TQM) or Continuous Quality Improvement (CQI). TQM stresses the importance of continuous systems and organisational improvement through structural and functional reform of care processes, organisational learning, and culture change (9,50). At the more micro level, where change is required at the level of clinical teams and individual healthcare professionals, approaches to implementation have been particularly influenced by the diffusion of innovations theory (53)(54). Theories on diffusion of innovation state that the spread and adoption of new ideas and technologies is influenced by the structure and make-up of social networks (50). Adoption is proposed to progress over time

and is enhanced when interaction and communication between dissimilar groups is encouraged (between high and low performing multi-disciplinary teams for example).

As well as informing the development of interventions to improve the clinical effectiveness and the quality of the care delivered to patients, having such theoretical understanding has facilitated further learning from the study of more focused implementation studies. This is already contributing to the development of new theories and frameworks for planning and evaluating implementation. For example, Normalisation Process Theory (NPT) (55) provides a strong sociological perspective on how new technologies and ways of working become routinely embedded – or normalised – into everyday practice, as well as tools to support the application of NPT in practice. The Promoting Action on Research Implementation in Health Services (PARIHS) framework (56,57), is a conceptual framework that is grounded in the accumulated experience of healthcare workers involved in research, practice development and quality improvement (56). PARIHS proposes that successful intervention is a function of the dynamic interactions between evidence, context and facilitation. A more recent development is the Behaviour Change Wheel (BCW) (58). Firmly rooted in psychology, the BCW posits a 'behaviour system' in which capability, opportunity, and motivation interact to generate behaviour (the 'COM-B' system).

This brief overview provides an insight into the influence that a variety of theoretical perspectives has had in shaping approaches to implementation in the healthcare setting. These approaches demonstrate that theory has a very valuable role to play in improving healthcare by supporting the accumulation of knowledge and understanding, and the growth of a science of implementation.

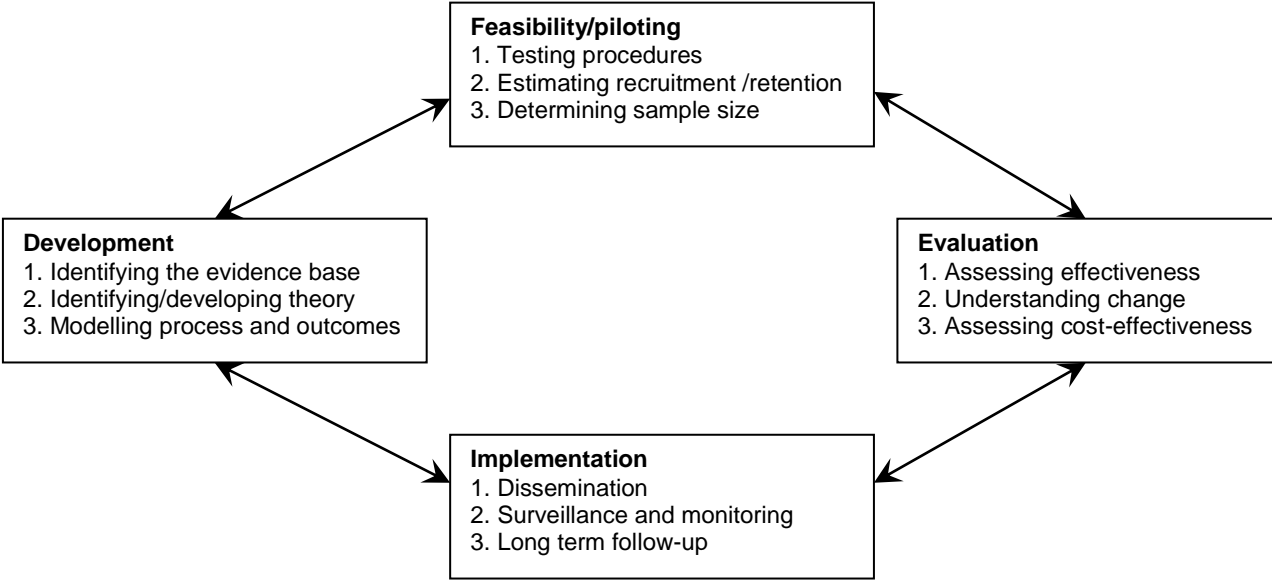
## **Chapter Three: Building a science of implementation. Using psychological theory to explain and guide change in the clinical behaviour of individual health professionals.**

### **3.1 “Knowledge of what is does not open the door directly to what should be.” *Albert Einstein (1939)***

Recognising the need to establish a more scientific basis for the choice of strategies to improve the uptake of research evidence into routine clinical practice, the UK Medical Research Council proposed a sequential framework for developing and evaluating complex interventions (59,60). The MRC framework (Figure 1) proposes a systematic approach to the development of interventions that are underpinned by the best available evidence and appropriate theory, and tested using a carefully phased approach. The MRC Framework argues for more and better theoretical and exploratory work prior to a trial as a means for improving intervention development. Though it offers little guidance about how to best do this exploratory work, the framework proposes a series of iterative phases in the development and evaluation of implementation strategies: the development of a theoretical basis for the intervention; definition of the components of the intervention; refinement of the intervention using exploratory studies; the conduct of a definitive evaluation study; and long-term implementation.

The core focus for a science of implementation (or a science of evidence-based management (16), knowledge transfer (61), or quality and safety (18)) is the timely, efficient and cost-effective transfer of research findings into routine clinical practice (62). Implementation research fundamentally involves the study of change and the maintenance of that change. According to Ferlie and Shortell (2001) this requires consideration of interventions to improve the quality of health care that operate at four different levels: the individual health professional; the healthcare teams or groups; the organisations providing healthcare; and the wider healthcare system (9). Analyses of barriers to changing practice have indeed shown that obstacles to changes in practice can arise at each of these different levels in the healthcare system (21).

**Figure 1: Key elements of the MRC Framework development and evaluation process**



Barriers identified by other studies also reflect theoretical perspectives relative to these four operational levels of the healthcare system (39,63–69). Together this body of work highlights the importance of gaining an understanding of the mechanisms underlying change within and across these levels and how theory can be a valuable means to this end.

The work presented in this thesis is an attempt to do this by using psychological theory to understand clinical behaviour at the level of the individual healthcare professional. Whilst this is not in any sense disregarding the important influences of the wider healthcare system and the broader political arena, incorporating research findings into clinical practice almost invariably necessitates a change in the clinical behaviour of individual healthcare professionals. Since they are at the “coal face” of care delivery, it could be argued that the actions and decisions of healthcare professionals can be key mediators of change, since ultimately ‘it is the individual health care professional who interprets patient preferences or decides to follow (or not) organisation protocols’ (70). This rationale is upheld by most theories of organisational change (71) and is a fundamental assumption underlying the development work described within this thesis.

Examining individual clinical behaviours, and the factors that influence their enactment, is therefore both important and warranted. This thesis describes the use of a systematic approach to the development and preliminary evaluation of interventions to change clinical practice that corresponds to each of the theoretical, modelling and experimental phases of the MRC Framework. Initially, the work focuses on the clinical behaviour of individual healthcare professionals working in a one-to-one context and then extends this to explore the application of the approach to collective, team-based, behaviours. The use of the term ‘clinical behaviour’ is used from here on in to refer to the decisions and actions that healthcare professionals make and take when delivering care to patients. A first step in the systematic process was to establish the evidence-base for the use of psychological theories within this context.

### **3.2 “Theory not only formulates what we know but also tells us what we want to know, that is, the questions to which an answer is needed.”**

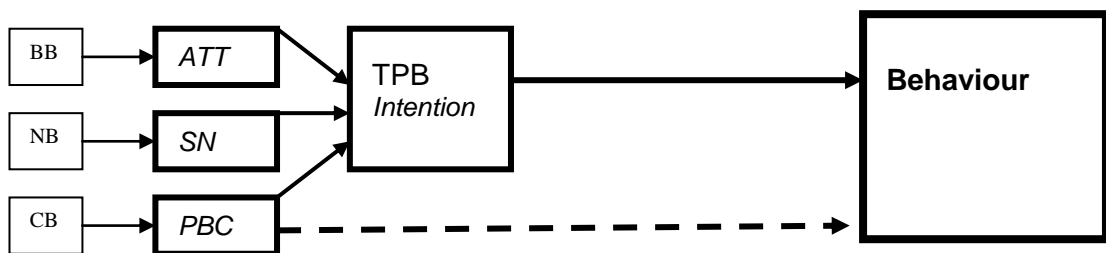
***Talcott Parsons (1937)***

The MRC Framework recommends that the first step in developing an intervention to change practice – be it individual behaviour or organisational behaviour – should be to establish the theoretical basis that suggests how the intervention will have its effect. However the framework does not provide clear guidance about how best to go about identifying appropriate theory. The work presented in this section was part of a wider programme of research funded by the European Commission Research Directorate as part of a multi-partner program: Research Based Education and Quality Improvement (ReBEQI): A framework and tools to develop effective quality improvement programs in European healthcare (Proposal No: QLRT- 2001-00657) (72). I worked on this program as part of a local (UK-based) multi-disciplinary team from 2004 to 2006. A specific aim of ReBEQI was to explore the utility of psychological models of behavior in relation to guiding change in clinical behaviour, with a view to developing methods that facilitate the transfer of research findings from one setting to another. These methods formed part of a series of outputs generated by the wider ReBEQI programme that were later made available as a suite of tools for use by clinicians and QI researchers to better facilitate research-based QI efforts (73).

Social cognitive models of behaviour have been successfully used to predict variation in the behaviour of individuals within a number of different patient and public populations and across a number of different behaviours (74,75). The models provide frameworks showing relationships between measurable psychological variables – such as beliefs, attitudes and intentions – that are postulated as predictors of a person’s behaviour and have also been used to design interventions which have been successful in changing behaviour in many different patient populations’ (74,75) One of the most commonly used social cognition models of behaviour that features intention as the proximal predictor of behaviour, is the Theory of Planned Behaviour (TPB) (76) (Figure 2). Reviews of both observational (77–79) and experimental studies Webb and Sheeran (80) have demonstrated a consistent relationship between intention

and a range of health related behaviours of patient populations, though the strength of this relationship seems to vary. For instance, intention has been shown to explain between 12% and 39% of the variance in real world behavioural outcomes in patient health behaviours (77–79) and changes in intention have been shown to lead to a corresponding change in behaviour (80).

**Figure 2: Theory of Planned Behaviour (TPB). Ajzen 1991 (76)**



*BB=Behavioural belief; NB=Normative belief; CB=control belief; ATT=Attitude; SN=Subjective norm; PBC=Perceived behavioural control.*

Previous authors have argued that, conceptually, the motivation and behaviour of clinicians are influenced by these psychological variables in the same way as the motivations and behaviour of any individual; i.e. that they are generalisable characteristics underlying all human behaviour (81). Whilst this is a convincing conceptual position, there are, arguably, some differences in the nature of patients' health-related behaviours and healthcare professionals' clinical behaviours that warrant consideration. Firstly, clinicians essentially make decisions and deliver healthcare in a similar 'advocacy' role to many other professionals – like for example, solicitors and financial advisors – and to parents and carers. This situates them in a position of 'authority' or 'power', and of having an accountable, responsibility towards someone else other than themselves. It could be argued therefore that clinical behaviour differs from patient health-related behaviour in that the consequences of any actions taken by the healthcare professional will mainly affect the recipient of care rather than the clinician themselves (notwithstanding their professional accountability).

Healthcare professionals also make decisions and deliver healthcare within the context of a large, complex and multi-layered organisation that is the National Health Service (NHS), which undoubtedly presents different or additional external mechanisms to those that influence people's general or health behaviour in their day to day personal lives. Furthermore, healthcare is often delivered within the context of a multi-disciplinary team and this may itself be complex in nature (e.g. multi-faceted) – so another consideration is whether clinical behaviours are ever truly based on the motivation, decisions and actions of just one actor? Even where healthcare is relatively uncomplicated, and requiring a “simple” action by a sole clinician (e.g. the prescription of an antibiotic), it seems unlikely that healthcare professionals' decisions to perform particular clinical behaviours are made in isolation from other influences and considerations (for example the perspectives of other players, including, that of the patient).

Whilst some studies had applied the TPB to clinical behaviour, the evidence from these had never been synthesised. Subsequently the first step in developing the evidence-base was for me and my ReBEQI colleagues to systematically examine this work. This review looked at the existing evidence for the utility of two psychological theories of behaviour in understanding and predicting the clinical behaviour of healthcare professionals; the Theory of Planned Behaviour (TPB) (76) and its predecessor, the Theory of Reasoned Action (TRA) (82). The review set out to understand the nature of the relationship between measures of intention and clinical behaviour in healthcare professionals. We were also interested in how the findings of this healthcare professional review would compare to the findings of the patient populations reviews discussed above (77–80). An important finding of these latter reviews was that when behavioural measures were self-reported, intention accounted for more of the variance in behaviour than when behavioural measures were objective or observed. This observation has implications for interpreting the value of the theoretical models as predictors of actual clinical behaviour, since interim endpoints (e.g. measures of intention) must be predictive of real world outcomes. Hence studies included in the healthcare professionals' review were



required to have used an independent, objective measure of behaviour, so that the relationship between self-reported intention as a proxy measure of clinical behaviour and actual clinical behaviour could be examined.

The systematic review included evidence from ten studies that had applied either the TPB or the TRA in the study of the clinical behaviour of healthcare professionals. Six of the ten studies examined the behaviour of nurses, three the behaviour of doctors and one of pharmacists. To estimate the strength of the relationship between intention and clinical behaviour, we were able to abstract measures of the relationship between these two constructs (correlation coefficient  $r$ , the structural coefficient or the partial correlation coefficient, as well as the model  $R^2$  summarizing the proportion of the variance explained) for all but one of the ten studies. However, the standard error for correlations was only available for three studies, ruling out a meta-analysis. Nonetheless, though the number of included studies was also small, the review did find comparable proportions of variance explained to that found by reviews of these theories as applied to patient populations and behaviours, as well as demonstrating a similar difference in the level of variance explained depending on how behaviour was measured (with  $R^2$  ranging from 0.15 to 0.4 for self-reported behaviours and from -0.42 to 0.52 (median 0.14) for observed, recorded or traceable behaviour).

While this review has several limitations – not least the small number of included studies – it was the first published attempt to quantify the intention-behaviour relationship in healthcare professionals and has therefore been an important contribution to the fields of implementation and behavioural science that has since been widely cited e.g. (83–85). Furthermore, its findings are supported by two subsequent systematic reviews that also found evidence of the utility of social cognition models of behaviour, including the TPB, for identifying important drivers of healthcare professional behaviour (83,86).

The first three papers submitted in support of this thesis build on this systematic review evidence to identify and use relevant behavioural theory to design, model and evaluate two evidence-based behaviour change interventions. As

the approach was novel and exploratory, an uncomplicated clinical condition (upper respiratory tract infection [URTI]) that is commonly managed by individual primary care general practitioners (GPs) was chosen. The target clinical behaviour had a strong empirical evidence-base so was also “uncomplicated”, in that GPs were encouraged to use only symptomatic management for URTI – i.e. to manage patients consulting with this condition without prescribing an antibiotic.

**Supporting publications:**

1. **Hrisos S**, Eccles MP, Johnston M, Francis J, Kaner EFS, Steen IN, Grimshaw J. Developing the content of two behavioural interventions. Using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics#1. *BMC Health Services Research* 2008, 8:11  
<http://www.biomedcentral.com/content/pdf/1472-6963-8-11.pdf>
2. **Hrisos S**, Eccles MP, Johnston M, Francis J, Kaner EFS, Steen IN, Grimshaw J. An intervention modelling experiment to change GPs' intentions to implement evidence-based practice: Using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics #2. *BMC Health Services Research* 2008, 8:10  
<http://www.biomedcentral.com/content/pdf/1472-6963-8-10.pdf>
3. **Hrisos S**, Eccles MP, Johnston M, Francis J, Dickinson HO, Kaner EFS, Beyer F. Are there valid proxy measures of clinical behaviour? Systematic review. *Implementation Science* 2009, 4:37  
<http://www.implementationscience.com/content/pdf/1748-5908-4-37.pdf>

**3.3 Evidence-based use of theory to inform the development of two behavioural interventions. Supporting publication #1**

In the systematic review (87) my co-authors and I argue that interventions to change behaviour may be effective for two reasons: they may contain components that are always effective in changing any behaviour, or they may contain components that overcome specific barriers encountered in relation to a particular behaviour. Two approaches are then necessary to identify the key factors – or 'active ingredients' - of complex interventions. The first is to develop an understanding of the factors underlying professional behaviour in

order to identify what sorts of processes should be targeted by interventions. This is termed “process modelling” (88). The second is to develop an understanding of how the interventions work and how they can be optimised. This is termed “intervention modelling” (89). Out with the ReBEQI program, several team colleagues and co-authors on the supporting papers discussed in this section had also carried out some proof of concept work that demonstrated the potential utility of “modelling experiment” methodology as a mechanism for modelling behaviour change interventions (89).

In a modelling experiment, key elements of an intervention are manipulated in a manner that simulates a real situation as much as possible and interim endpoints are measured rather than changes in actual professional behaviour or healthcare outcome. A typical interim endpoint in the current context would be a stated intention to behave in a particular way. Since the approach still offers experimental control, modelling experiments are a feasible platform for conducting pre-trial evaluations of proposed behaviour change interventions using replicable methods (89). The relatively lower cost and size of modelling experiments, in relation to a large, full scale RCT, is a further advantage for repeated pre-testing and refinement of interventions. Subsequent work undertaken by myself and colleagues within our multi-disciplinary team aimed to further develop an “intervention modelling process” (IMP) that corresponded to each of the theoretical, modelling and experimental phases of the original MRC Framework (59,60). The novelty of the work presented in supporting papers 1 and 2 is the application of this systematic process to inform the actual development and evaluation of two theory-driven interventions to change clinical practice.

**Supporting Paper #1:** The intervention development process reported in supporting paper #1 progressed through six key steps in the systematic development of two study interventions (Table 1). The aim of both interventions was to promote the symptomatic management of uncomplicated upper respiratory tract infection (URTI) by primary care general practitioners (GPs). This clinical condition was chosen since it is an illness that presents regularly in primary care (90), and despite there being a strong evidence-base to indicate

that antibiotics are largely ineffective in treating the condition (91–93), GPs continue to prescribe them (94,95). To help in the clear specification of our target behaviour (IMP Step 1), we followed the “TACT” principle, a systematic way of defining behaviour in terms of its Target, Action, Context and Time (82,96).

**Table 1: Steps in developing a theory based behavioural intervention<sup>1</sup>**

<b>The Implementation Modelling Process (IMP)</b>
<ol style="list-style-type: none"> <li>1. Specify target behaviour(s).</li> <li>2. Select theoretical framework (for empirical investigation at baseline and to assess process).</li> <li>3. Conduct a predictive study with a (preferably representative) sample drawn from the population of interest, to identify modifiable variables that predict the target behaviour(s) and their means/distributions. Based on the findings of this study, choose which variables to target. These variables are the proposed mediators of behaviour change.</li> <li>4. Map targeted variables onto behaviour change techniques and select techniques that (a) are likely to change the mediator variables and (b) it is feasible to operationalise.</li> <li>5. Choose appropriate method(s) of delivery of the techniques.</li> <li>6. Operationalise intervention components (techniques) in appropriate combination and order.</li> </ol>
<p>Note: As part of an iterative process, results from the intervention modelling experiment will provide information for feedback loops that address earlier points in this sequence. This feedback loop permits change, development or refinement of the intervention.</p>
<p><sup>1</sup>Table reproduced from Hrisos et al. 2008b (97)</p>

Within the context of the study aims, the key behaviour of interest for “the symptomatic management of URTI” was avoiding prescribing an antibiotic. Applying the TACT principle helped us to develop a more precise definition of what this meant in terms of the behaviour we planned to promote (or discourage) in GPs: the target of the proposed behaviour is *the patient*; the

action is managing URTI *without prescribing an antibiotic*, the context is the clinical condition (*uncomplicated URTI*), and the time is *during a primary care consultation*. From this the target behaviour was subsequently clarified for GPs as "managing patients presenting [*for a primary care consultation*] with uncomplicated URTI with-out prescribing antibiotics".

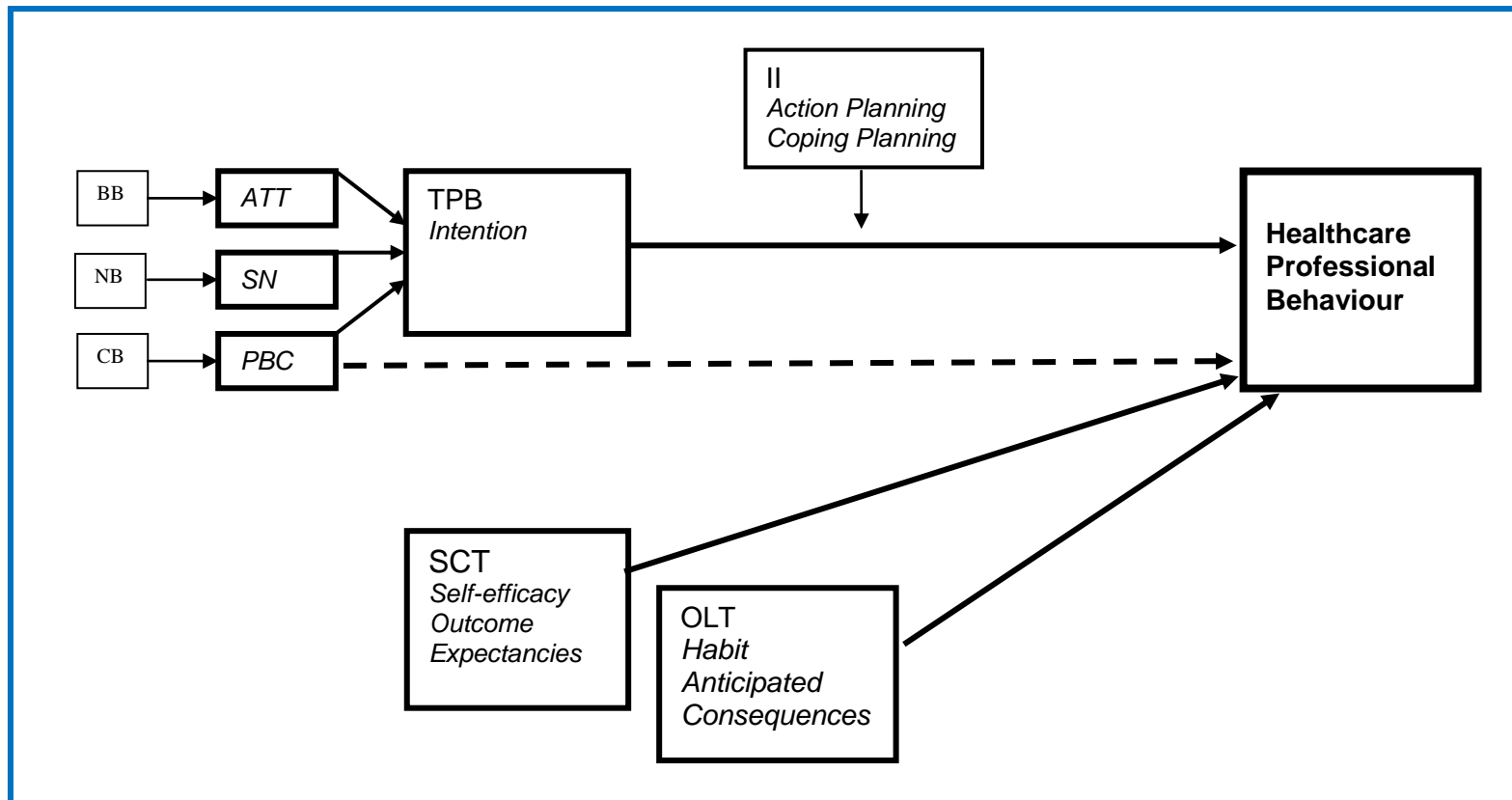
Preliminary findings from previous theory-based process work that had also examined the management of URTI by GPs<sup>3</sup> was used to identify an evidence-based theoretical framework specific to the management of URTI by GPs (IMP Step 2) (36,70) and to provide data to support the development of the study interventions. Three robust theories were suggested: the Theory of Planned Behaviour (TPB) (76), Social Cognitive Theory (SCT) (98,99) and Operant Learning Theory (OLT) (100) (Figure 3 ). These theories explain behaviour in terms of factors amenable to change (e.g. beliefs, perceived external constraints) and they include non-volitional components that acknowledge that individuals do not always have complete control over their actions. The theory-generated data from this same work further enabled empirical identification of three target psychological constructs (and their associated beliefs) that were each predictive of both GPs' self-reported simulated behaviour (as measured by their decisions to prescribe based on paper-based clinical scenarios) and their actual prescribing behaviour for URTI (based on real-world prescribing rates) (IMP Step 3; Table 1). These constructs were "**self-efficacy**" (a core construct of SCT, and closely related to the 'perceived behavioural control' construct of TPB), representing belief in one's capabilities, "**anticipated consequences**" (a core construct of OLT), and '**risk perception**' (a core construct of SCT)". Anticipated consequences and risk perception are closely related concepts and represent beliefs about the consequences of one's actions (Table 2).

To satisfy IMP Step 4, these three constructs were then mapped onto behaviour change techniques (BCT) considered by experts (101) to be effective in changing these beliefs. Systematic mapping of the techniques was facilitated by two consensus-based tools (102,103), which further supported a robust choice of candidate BCTs (Table 3).

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<sup>3</sup> This was work carried out by colleagues prior to me joining the ReBEQI team

Figure 3: Theoretical framework for understanding healthcare professional behaviour, incorporating TPB, SCT, OLT and II



**Table 2: Summary of the systematic selection of theoretical constructs to target in the development of the interventions<sup>1</sup>**

<b>Theoretical construct</b>	<b>Intention</b>		<b>Simulated Behaviour</b>		<b>Behaviour</b>	
<i><b>TPB</b></i>	<b>Predictor Y/N</b>	<b>r</b>	<b>Predictor Y/N</b>	<b>r</b>	<b>Predictor Y/N</b>	<b>r</b>
Attitude direct*	Y	<b>0.49</b>	Y	<b>0.32</b>	N	0.07
Attitude indirect**	Y	<b>0.41</b>	Y	<b>0.21</b>	N	0.02
<b><i>Intention</i></b>	-	-	Y	<b>0.44</b>	Y	<b>0.19*</b>
PBC direct	Y	<b>0.28</b>	Y	- <b>0.39</b>	N	-0.04
PBC indirect	Y	<b>0.60</b>	Y	<b>0.49</b>	N	0.17
Subjective norm	N	0.04	N	0.00 5	N	-0.10
<b>SCT</b>						
<b>Risk perception**</b>	Y	<b>0.54</b>	Y	<b>0.35</b>	Y	<b>0.17*</b>
Outcome expectancy (2 item measure)	Y	<b>0.41</b>	Y	<b>0.19</b>	N	-0.05
Outcome expectancy (7 item measure)	Y	<b>0.21</b>	Y	<b>0.21</b>	N	-0.03
<b><i>Self-efficacy</i></b>	Y	<b>0.56</b>	Y	<b>0.43</b>	Y	<b>0.14*</b>
<b>OLT</b>						
<b><i>Anticipated consequences</i></b>	Y	<b>0.54</b>	Y	<b>0.35</b>	Y	<b>0.17*</b>
Evidence of habitual behaviour	Y	<b>0.64</b>	Y	<b>0.46</b>	Y	<b>0.23*</b>

<sup>1</sup>Table reproduced from Hrisos et al 2008b (97)

\* TPB attitudes and PBC constructs can be measured "indirectly" by asking individuals to report their specific beliefs or directly by asking individuals to report at a more general level

\*\*The SCT risk perception questions were also used as a measure of OC anticipated consequences.

The final choice of BCTs (graded task and persuasive communication) was based on team discussion of how the different BCTs suggested might be feasibly operationalised, within the context of an intervention modelling experiment, using paper-based postal questionnaire methods (IMP Steps 5 & 6). The final, operationalised interventions are presented in Appendix 2 (see TRACII questionnaire, Section 3). An interactive component was included in each, both to increase GP engagement with the interventions and to provide a marker of fidelity based on the extent these were completed.

Graded Task intervention:

This intervention targeted the theoretical construct of *self-efficacy* and its aim was to increase GPs' *beliefs in their capabilities* of managing patients with URTI without prescribing antibiotics. The graded task technique does this by promoting incrementally greater levels of "mastery" by building on existing abilities, demonstrating success at each level. Two further behaviour change techniques, "rehearsal" and "action planning", were additional components of this intervention.

The "rehearsal" technique used the generation of alternative strategies as a way of rehearsing alternative actions that could be applied to the clinical situation. The "action planning" technique involved asking the participants to develop a plan of actions they intended to take when confronted by a clinical situation in which a patient presented with an URTI (Table 3). The paper-based intervention presents GPs with five situations in which they might be required to manage a patient presenting with sore throat. These situations were based on questionnaire items that had been used by Walker et al (2001) to measure GPs' self-efficacy, then ranked in order of difficulty based on their responses to these questions (104).

Starting with the easiest, GPs were to consider each of these situations in turn, and to indicate if they could confidently manage the patient without prescribing an antibiotic by ticking "Yes," "Maybe" and "No". Next they selected the situation they found the least difficult (i.e. the easiest) from those they had rated as "Maybe" or "No," and write the number of this situation in a box provided.



**Table 3: Beliefs associated with targeted theoretical constructs & mapped BCTs**

<b>Theoretical Construct (Theory)</b>	<b>Associated (discriminant) Belief<sup>1</sup></b> CB = Control Belief BB = Behavioural Belief	<b>Construct Domain</b> (102)	<b>Candidate BCT</b> (103)
<b>Self-efficacy (SCT)</b>	<ul style="list-style-type: none"> <li>• If a patient asks for an antibiotic then I will prescribe one whether it is medically indicated or not (CB)</li> <li>• I am more inclined to prescribe an antibiotic for patients of a lower social class (CB)</li> <li>• Because I don't know the cause of these patients' sore throats, I will prescribe an antibiotic so that I don't miss something (CB)</li> <li>• In most cases, the patient will finish the course of antibiotics I prescribe (CB)</li> </ul>	Belief in one's capabilities	<ul style="list-style-type: none"> <li>• Self-monitoring (incl. planning)</li> <li>• <b>Graded Task</b></li> <li>• Increasing skills</li> <li>• Coping skill</li> <li>• <i>Rehearsal</i></li> <li>• Social pressure</li> <li>• Feedback</li> <li>• Self-talk</li> <li>• Motivational interviewing</li> </ul>
<b>Anticipated consequences (OLT)</b> (Risk perception) (SCT)	<ul style="list-style-type: none"> <li>• Prescribing an antibiotic for these patients will reduce their risk of developing minor complications such as otitis media and sinusitis (BB)</li> <li>• Because I don't know the cause of these patients' sore throats, I will prescribe an antibiotic so that I don't miss something (CB)</li> <li>• In most cases, the patient will finish the course of antibiotics I prescribe (CB)</li> </ul>	Beliefs about the consequences of one's actions	<ul style="list-style-type: none"> <li>• Self-monitoring</li> <li>• <b>Persuasive communication</b></li> <li>• <i>Information regarding behaviour outcome, connection between the two</i></li> <li>• Feedback</li> </ul>

<sup>1</sup>Mapped beliefs that discriminate between GPs who do and do not intend to manage URTI without antibiotics (104)  
Table reproduced from Hrisos et al. BMC Health Services Research 2008 8:11

Space was provided for GPs to note down a 'difficult' situation of their own if none of the offered situations presented a challenge for them. Focusing on their selected situation, participants were then instructed to a) generate possible alternative management strategies for that situation and then b) to develop a plan of what they would do to manage this situation in the future.

Persuasive communication intervention:

The intervention targeted the theoretical constructs of *anticipated consequences* and *risk perception* and its aim was to encourage GPs to consider some potential consequences for themselves, their patients and society of managing patients with URTI with and without prescribing antibiotics. As before, this intervention also incorporated elements of the behaviour change technique, "provide information regarding behaviour, outcome and connection between the two" (Table 3). This intervention presents GPs with a sequence of five pictures illustrating some possible consequences of managing URTIs with or without antibiotics.

The consequence illustrated in each fictitious situation depicted was based on questionnaire items that had been used by Eccles et al (2007) (105) to ask about anticipated consequences and risk perception and the discriminant beliefs identified by Walker et al (2001) (104) as predictive of GPs who do and do not intend to manage URTI without antibiotics (Table 3). One row of pictures represents "Dr A", who manages URTI by prescribing antibiotics and the second row representing "Dr B" ((see TRACII questionnaire, Section 3, Appendix 2), who manages URTI without prescribing antibiotics. To highlight the suggested consequences, and to help recipients relate these possible consequences to each doctor's prescribing behaviour, questions were placed beneath each picture. Participants were not required to respond to these questions. The interactive component of this intervention was for GPs to indicate on a bi-polar analogue scale a) the extent to which they try to be like Dr A or Dr B (i.e. their "intended" behaviour) and b) the extent to which they are actually like Dr A or Dr B (i.e. their "actual" behaviour).

Traditionally, reporting of the process of intervention development within implementation research has been scant, resulting in a very limited understanding about what interventions contain and how they are meant to work. Such poor reporting of intervention detail prevents replication and hinders progress in the development of a cumulative science of implementation. Supporting paper #1 therefore broke with this tradition and was successfully published as a standalone paper alongside the experimental evaluation of the interventions it described (Supporting paper #2 (106)). These manuscripts were submitted as a pair and my cover letter to the journal editor explained and justified the rationale for doing this. They were sent out for review simultaneously and then published side by side as linked articles.

This was quite an achievement and one that it was hoped would encourage other authors (and journals) to do the same. Supporting paper #1 (97) was, in this respect, a “beacon” contribution to the literature and to the field of intervention development. The level of intervention description provided in this paper about the selection and operationalisation of discrete behaviour change techniques makes it possible for others to replicate their essential features in terms of both these key components of the intervention content (the proposed “active ingredients”) and the method by which the interventions were delivered (i.e. as a paper-based task). The relative effectiveness of these active ingredients is therefore open to wider exploration across other modes of delivery and across different settings. Several other authors have cited this paper in similar publications (21 citations to date) describing the development process of their interventions, hopefully as part of a trend towards greater transparency (see for example French et al. 2012 (107); McDermott 2010 (108) & Kolehmainen 2011 (109) - two of which are ‘highly accessed’ publications).

### **3.4 Theory-driven intervention evaluation within the context of a modelling experiment. *Supporting publication #2.***

Supporting paper #1 (97) describes how the first six steps (the process modelling stage) of the IMP were used to identify prime behavioural determinants to target, and to inform the content and robust development of two

targeted interventions. The process modelling work also provided the basis for the theoretical framework that would guide an additional stage in the IMP – the “intervention modelling” stage. Supporting paper #2 (106) describes how this ‘intervention modelling’ stage of the IMP approach was used to inform our understanding of how the interventions themselves worked and could therefore be optimised. In this final stage, the effect of the two interventions was experimentally evaluated within an intervention modelling experiment (IME). In particular the evaluation sought to establish:

1. Whether or not the theory-based interventions had influenced GPs' behavioural intention and/or their simulated behaviour in the management of URTI without prescribing antibiotics.
2. If the theory-based interventions influenced the targeted theoretical constructs of self-efficacy and anticipated consequences.

#### Measuring Process:

The IME was embedded within a postal questionnaire (Appendix 2) that was designed to measure psychological constructs from the three theories identified in Step 2 of the IMP (Table 1, page 19). The questionnaire items reflected the beliefs and attitudes of GPs regarding their management of URTI without antibiotics, and represent the process measures (the explanatory variables) within the IME. Since we were interested in developing replicable methods, the questionnaire items were adapted from those used in the previous study that provided data to inform the intervention development (72). The items were originally derived from semi-structured elicitation interviews with 14 GPs in Scotland which covered doctors' views and experiences relating to the management of URTI (105). Item development followed the operationalisation protocols of Ajzen (76), Bandura (98,99) and Francis et al (110). Scoring was on a 7-point scale from strongly disagree to strongly agree. Table 4 provides a summary of the adapted measures used in the study reported in Supporting Paper #2. Two additional measures were included in the final questionnaire: the extent of "prior planning" and "action planning" from the Implementation Intention model (II) (111,112). Implementation intentions are post-intentional constructs and are theorised to support the enactment of a behavioural intention through the process of planning the realisation of an intended behaviour.

**Table 4:\* Examples of questionnaire items measuring theoretical constructs**

<b>Variables</b>	<b>Example Item</b>
<b><i>Theory of Planned Behaviour (TPB) (Ajzen 1991)</i></b>	
<i>Behavioural intention</i>	I intend to manage patients with URTIs without prescribing an antibiotic (scored 1 to 7)
<i>Attitude</i>	The benefits of managing patients with URTI without prescribing antibiotics outweighs the harms
<i>Subjective Norm</i>	I feel under pressure to manage patients with an URTI without prescribing an antibiotic: from ... (e.g. my colleagues)
<i>Perceived Behavioural Control</i>	Whether I manage patients with an URTI without prescribing an antibiotic is entirely up to me
<b><i>Social Cognition Theory (SCT) (Bandura 1997)</i></b>	
<i>Risk Perception</i>	It is highly likely that patients with an URTI will be worse off if I manage them without prescribing an antibiotic.
<i>Outcome Expectancies</i>	Managing a patient with an URTI without prescribing an antibiotic would reassure them (bb) × reassuring the patient is un/important (oe)
<i>Self-Efficacy</i>	Without an antibiotic: How confident are you in your ability to manage patients with URTIs who have tried to self-medicate
<b><i>Operant Learning Theory (OLT) (Blackman 1974)</i></b>	
<i>Anticipated Consequences</i>	If I routinely manage patients with URTIs without prescribing an antibiotic then, on balance, my life as a GP will be easier in the long run
<i>Evidence of Habit</i>	When I see patients with URTIs, I automatically consider managing them without prescribing an antibiotic
<b><i>Implementation Intentions (Gollwitzer 1999)</i></b>	
<i>Prior Planning</i>	Currently, my standard method of managing patients with an URTI involves managing them without prescribing an antibiotic
<i>Action Planning</i>	I have a clear plan of <i>how; when; under what circumstances</i> (3 items) ... to manage patients with an URTI without prescribing an antibiotic
<i>*Reproduced from Hrisos et al, BMC Health Services Research 2008 8:10</i>	

### Measuring Behaviour:

An important feature of the IMP is the use of behavioural simulation as a proxy measure of actual behaviour. To evaluate GPs' simulated behaviour at baseline and post-intervention, two sets of eight patient scenarios were carefully designed to reflect the range of patients and clinical features that present in general practice. Features known to influence GPs' choice of management strategy— for example co-morbidities such as chronic obstructive pulmonary disease or asthma - were systematically allocated between the two sets of scenarios. The content of the scenarios was then validated by a small number of GPs not taking part in the main evaluation. In keeping with the need for the simulated behaviour to replicate real-life experience as closely as possible, the presentation format of the paper-based patient scenarios mimicked the way patient information is presented to a GP on their surgery computer screen (Figure 4), and also included a simulated prescription pad.

From these scenarios GPs' simulated behaviour was scored (at baseline and post-intervention) as the total number out of eight scenarios for which antibiotics were not prescribed. To help set the context within the real-life clinical situation, an instruction page was included in the questionnaire immediately prior to the section containing the series of scenarios (see TRACII questionnaire, Section 3, Appendix 2). GPs were asked to consider each scenario in the context of a routine morning surgery with eight patients waiting to be seen and two routine house calls pending. They were asked to imagine it was February (it was actually September) and that there had not been a recent flu epidemic.

A worked example scenario was also provided (Figure 4). GPs were invited to record (free text) their decisions in relation to their diagnosis and their management decision. If their management decision included the prescription of an antibiotic they were asked to write their prescription on the "script pad" included on the scenario page. Finally, a rating scale (0 = "not difficult at all" to "extremely difficult") was included on each scenario for GPs to rate how difficult it was for them to decide on their final management decision.



General Practices within 13 primary care trusts in the North East region of the UK. Completed questionnaires were returned at this point by 397 (32.4%) GPs based in 191 (66%) practices. The study interventions were incorporated into the questionnaire booklet, positioned such that they would always be completed after the process measurement and before the behavioural simulation measure. Within a 2x2 factorial design, four groups were generated: one received only the graded task intervention; one only the persuasive communication intervention; one received both interventions and finally one received no intervention (control group). The 397 GPs who responded to the baseline questionnaire were then randomised to receive the study interventions and were mailed the post-intervention survey booklet two months after the first mailing. Three hundred and forty (86%) GPs subsequently returned this post-intervention survey booklet, from 178/191 (93%) GP practices.

#### Examining the relationship between variables

The relationship between the explanatory (process) and outcome variables was examined using Pearson correlations and stepwise regression. In the first analysis, variables representing operationalised theoretical constructs were examined within their respective theoretical framework to evaluate the potential for each model to explain GPs' clinical behaviour. The TPB and SCT explained similar levels of the variance in behavioural intention, (33% & 32% respectively) and OLT explained 60%. For behavioural simulation the TPB and SCT performed slightly better than OLT (14%, 17% & 10% respectively) (Table 5). In the second analysis, all constructs from these three models were entered simultaneously into regressions on behavioural intention and behavioural simulation, and allowed to compete.

The purpose of this "cross-theory" analysis was to explore which individual constructs were contributing most to the observed variance in intention (model 1), and in behavioural simulation (model 2). Five variables were retained in model 1, each of which independently predicted a statistically significant proportion of the variance in intention. These variables were: attitude (direct), subjective norm, anticipated consequences, evidence of habitual behaviour and self-efficacy. As a group these constructs explained 63% of the observed



variance in behavioural intention, and evidence of habitual behaviour was by far the strongest predictor in this cross-theory model ( $Beta = 0.605$ ,  $p < 0.001$ ). In the cross-theory regression on behavioural simulation the two variables of prior planning and action planning from Implementation Intentions (II) were also entered into the model. Self-efficacy and prior planning were the only significant predictors of behavioural simulation. Together they explained 18% of variance, and self-efficacy was the stronger predictor ( $Beta = 0.294$ ,  $p < 0.001$ ).

**Table 5: Examining the relationship between variables**

<b>Theoretical model</b>	<b>Intention Model summary <math>R^2</math>(adj)</b>	<b>Behavioural Simulation Model summary <math>R^2</math>(adj)</b>
<b><i>Theory of Planned Behaviour</i></b>	<i>0.33</i>	<i>0.14</i>
<b><i>Social Cognitive Theory</i></b>	<i>0.32</i>	<i>0.17</i>
<b><i>Operant Learning Theory</i></b>	<i>0.60</i>	<i>0.10</i>
<b><i>Implementation Intentions</i></b>		
<i>Prior planning</i>	-	<i>0.12</i>
<i>Action planning</i>	-	<i>0.05</i>
<b><i>'Cross theory' analysis</i></b>	<i>0.63</i>	<i>0.18</i>
<i>*adapted from Hrisos et al, BMC Health Services Research 2008 8:10</i>		

Examining the effect of the theory-based interventions

*(Outcome measures: behavioural intention and simulated behaviour)*

The trial groups were compared using methods appropriate for comparing independent samples (t-tests to compare two groups, analysis of variance to compare multiple groups and analysis of covariance to compare two or more groups adjusting for differences in baseline performance). The first step in undertaking the analysis of variance and analysis of covariance was to fit a full factorial model to test for any interaction of the interventions within the trial

group receiving both study interventions. This analysis showed that there was no significant interaction effect – indicating that each intervention operated independently of the other – thus the estimate of the effect of each intervention was based on a subsequent main effects model.

Mean behavioural intention and behavioural simulation scores were compared between GPs who received the persuasive message intervention and those who did not and similarly between those who received the graded task intervention and those who did not. There was no significant effect of the graded task intervention on either behavioural intention or on behavioural simulation. On the other hand, GPs receiving the persuasive communication intervention had stronger intentions to manage URTI without prescribing antibiotics and were less likely to prescribe antibiotics than those who did not receive this intervention. These GPs had, on average, intention scores that were 0.9 (95% CI: 0.41, 1.38) units higher than controls and they also prescribed on 0.47 (95% CI: 0.19, 0.74) fewer patient scenarios, suggesting a positive effect of this latter intervention on both study outcome measures.

Targeted process measure (self-efficacy):

Although the graded task intervention did not have an effect on GPs' intention or measures of their simulated behaviour, this intervention did have a significant effect on the behavioural belief it was designed to target. In the case of GPs receiving the graded task intervention, this effect is demonstrated by their higher self-efficacy scores, as compared to controls, and reflects a greater confidence in their ability to manage uncomplicated URTI without prescribing antibiotics. This intervention also positively influenced scores on one of the TPB perceived behavioural control constructs (PBC indirect). In a similar way to the self-efficacy construct, PBC represents the extent to which the individual feels they have personal control over a given behaviour. This was a very encouraging finding since it appears that constructs relating to control were particularly sensitive to the influence of the graded task intervention – suggesting an appropriate choice of behaviour change technique – and that this intervention was having its effect as would be predicted based on the underlying rationale for its development. Furthermore, since intention is not a feature of

SCT, there is no theoretical basis to expect any enhancement of self-efficacy as a result of the intervention to have had a direct effect on this outcome measure. Additionally both the TPB and SCT propose that control cognitions (PBC and self-efficacy) can have a direct effect on behaviour, not mediated by behavioural intention, so it could be argued that the lack of effect on intention does not in this sense undermine the potential utility of these theoretical models. Another consideration is that generally GPs in both the intervention and control groups reported already having “a clear plan of how, when and under what circumstances” they would manage patients with URTI without prescribing an antibiotic. Many also reported that their “current standard method of managing patients with an URTI involves managing them without prescribing an antibiotic” (“prior planning” construct from II). This may have reduced the ‘potency’ of the graded task intervention since the intervention was not prompting GPs to do anything particularly novel in terms of planning.

Targeted process measures (anticipated consequences/ risk assessment):

As well as a significant effect of the persuasive communication intervention on both outcome measures, this intervention also demonstrated a measurable main effect on its target construct of anticipated consequences. GPs receiving this intervention reported greater anticipation of positive consequences for themselves and their patients in managing URTI without prescribing antibiotics than those not exposed to the persuasive message. As for the graded task intervention, this finding provided reassurance that the persuasive communication intervention was also having its effect as would be predicted based on its underlying theoretical rationale. Several additional non-targeted constructs were also significantly influenced by the persuasive communication: attitude (both direct and indirect measures); subjective norm; self-efficacy; evidence of habitual behaviour; and prior planning. Since there was a significant main effect of the intervention on both intention and behavioural simulation it was possible to examine these effects in greater detail. Therefore to better understand how the persuasive communication had its effect on the study outcome measures, the extent to which intervention effects were mediated by

the targeted and non-targeted behavioural beliefs was examined using the Baron and Kenny mediation methodology (113,114) and the Sobel test (115). Mediation analysis evaluates hypothesised causal relationships between three variables, whereby an independent variable causes a change in a mediator which causes a change in a dependent variable (116). The third variable provides a clearer interpretation of the relationship between the independent (intervention effect in the present example) and dependent variables (intention and behavioural simulation) by elucidating the causal process among the three variables. Causal steps were first established using the Baron and Kenny method, then the Sobel test was used to test the significance of the effect “carried” by the mediating variable. These analyses showed that the effect of the persuasive message on intention was partially mediated through its targeted construct (anticipated consequences), providing support for the predicted influence of this intervention. Partial mediation of intention also occurred through both measures of TPB attitude, the TPB measure of subjective norm and the SCT measure of self-efficacy. These latter findings provide further support that the constructs within each of the theoretical frameworks selected as being likely candidates for explaining and guiding change in professional practice were behaving as proposed by their respective theories. Likewise, partial mediation of this intervention’s effect on behavioural simulation also occurred through anticipated consequences and through the non-targeted constructs of TPB attitude (direct) and the SCT measure of self-efficacy.

Again several other authors have cited this paper (26 citations to date) and a few others have contacted me directly to request permission and advice about using both the TRACII questionnaire and the intervention materials. Both the latter tools were published alongside Supporting papers #1 and #2 as additional files. This was again to provide greater transparency and cumulative learning from wider use and testing of the theories and the IMP methodology. Recent papers that build on and cite this work include Newton et al 2010 (117); Treweek et al 2011 (118) & Milos et al 2013 (119). I have also been contacted directly by researchers from Sweden, Ireland and South America asking to use the theory-based questionnaire and intervention materials. Two requests were in relation to reducing primary care prescribing of antibiotics for upper

respiratory tract infection and one was in relation to GP adherence to national guidelines for the management of urinary tract infection.

The Swedish study applied the two study interventions within a RCT design to the 'real world' primary care setting, and compared prescribing rates of antibiotics for sore throat post-intervention between intervention and control GP practices. They also translated the theory-based questionnaire (forwards and backwards) into Swedish. This work was recently published (119); the authors found no influence of either intervention on the theoretical constructs but did find a reduction in prescribing that was restricted to children aged between 0-6 years. Though the authors conclude that theory-based interventions have limited value in changing prescribing behaviour, their findings need to be treated with caution since they did not attempt to refine or adapt the interventions to local practice or context.

Within the UK the persuasive communication intervention has been tested as part of a web-based IME, alongside a newly developed intervention (118) and using the behavioural simulation materials developed as part of the study presented in paper #2. This is an important development that allowed the comparison of the mode of delivery for the persuasive communication intervention (electronic materials by email vs paper-based materials by post) as well as its direct comparison with a new, theory based intervention targeting the same clinical behaviour. These authors found that whilst electronic delivery was significantly cheaper (approx. £3 for email delivery vs £15 for paper-based postal delivery) this neither improved nor impeded GP participation rates. Though not yet formally published, preliminary summary results of the comparison of the persuasive communication and a newly developed action planning intervention are available on-line as a slide presentation (120).

The limited data provided in this presentation suggest that the web-based version of the persuasive communication, compared to a control group, influenced GPs' simulated behaviour to a slightly greater magnitude to that achieved by the paper-based IME (0.47 (95% CI: 0.19, 0.74) fewer patient scenarios prescribed on using paper-based delivery; 0.73 (95% CI: 0.14, 1.31) fewer scenarios prescribed on using electronic delivery). The new intervention,

which was a more prescribed action plan to that included as part of the graded task intervention, targeted two 'behavioural cues' that were present in the most frequently prescribed scenarios, completed by GPs' responding to a set of pre-intervention scenarios. This intervention too appears to have influenced GPs' simulated prescribing behaviour to a similar effect size to that of the persuasive communication; (0.83 (95% CI: 0.26, 1.37)).

### **3.5 Section overview**

#### *Summary*

This initial body of work submitted in support of this thesis is an important contribution to the field in a number of ways. The Intervention Modelling Process (IMP) described in Supporting papers #1 & #2 is underpinned by an empirical foundation provided by the earlier intention-behaviour systematic review (87), as well drawing on other robust datasets. The papers have been frequently cited and the IMP approach, which provides a clear, theory-based and systematic process for the development of behaviour change interventions, has influenced thinking in relation to the design and implementation of new research evidence. The approach, and the interventions developed and described in paper #1, have also been tested by others in different settings (e.g. to explore their impact on actual prescribing (119); for different clinical conditions (e.g. urinary tract infection); and using a different mode of delivery (e.g. web-based). The modelling approach developed as a result of the work presented in the first two Supporting papers has contributed substantially to the development of a promising method for pre-trial evaluation and refinement of novel interventions – by building on previous work (70,104,121) and by providing a platform for further development work (118).

#### *Methodological and theoretical considerations*

An aim of the research approach described within this thesis is to develop a replicable methodology – an intervention modelling process - for the design, evaluation and refinement of interventions that can be used to pre-test interventions prior to conducting a definitive service level evaluation. Since the

method relies on the use of proxy measures for actual behaviour – behavioural intention & simulated behaviour - such measures need to be predictive of actual clinical behaviour. Whilst evidence has been demonstrated to suggest that behavioural intention is a reliable proxy for actual clinical behaviour, we found the evidence for the validity of patient vignettes as a robust measure of actual clinical practice to be inconclusive (122). The review reported in Supporting paper #3 (122) only found four studies that used patient vignettes, so is extremely limited. Furthermore, the style of the vignettes used in the four studies all followed a written format – i.e. a patient scenario was presented to clinicians as a block of descriptive text. This format arguably lacks very important contextual information that limits the healthcare professional's identification with the wider situational aspects of a consultation with a patient.

To address this within the modelling experiment presented in Supporting paper #2 (106), a more visual format for the study scenarios was designed that aimed to provide greater contextual and situational familiarity with the way that GPs are presented with patient information on their surgery computer screens. Thus, the lay out of the scenario page, to include a prescription pad etc., and asking GPs to note down their diagnosis and management for each fictional patient rather than give a simple "Yes/No" response to indicate their decision, may have subtly guided the GPs through a more realistic and routine decision making process. The relationship between intention and behaviour, as measured by these more context rich scenarios, was of a similar magnitude to that reported in the intention-behaviour systematic review and elsewhere for the relationship between intention and actual behaviour. As expected it appears likely that the introduction of visual elements increased saliency and engagement with the task, and in turn encouraged decisions more closely related to actual clinical practice.

Despite this, only one of the two targeted interventions (persuasive communication) realised a measurable, though albeit modest, effect on clinicians' self-reported behaviour based on this visual format. In his seminal paper, Sutton 1998 (123), outlines nine potential explanations for the lack or poor strength of the relationship commonly found between intention and behaviour:

1. Intentions may change.
2. Intentions may be provisional
3. Violations (breaches) of the principle of compatibility
4. Violation (breaches) of scale correspondence
5. Unequal number of response categories
6. Random measurement error in the measures of intention and/or behaviour
7. Restriction of range/variance in intention or behaviour
8. Marginal distributions of the measures do not match
9. Intention may not be the sufficient cause of behaviour.

Explanations 1 & 2 are related in that they reflect a potential temporal instability in intention – i.e. that the greater the “gap” in time between measuring intention and in measuring behaviour the weaker the relationship may be. This may be due to an actual duration of time between measures that allows opportunities for other influences to intervene to change intentions, or it may be that intentions stated before exposure to a particular circumstance are simply “hypothetical” and will not be fully formed until the context or nature of the decision to be made is known. In the modelling experiment reported here intention and behaviour were measured at the same point in time, excluding explanation 1. However, it is possible that some GPs’ intentions were “provisional” pending contextual knowledge. Intention to “manage patients who present with an URTI without prescribing an antibiotic” was generally high amongst the sample of GPs responding to the IME survey instrument, yet not all “intender” GPs managed their fictitious patients symptomatically. Formation of actual intention for these GPs may have happened on presentation of the more detailed and context specific scenario information. Alternatively, or additionally, they may have been influenced by positive response bias – responding in a perceived socially acceptable or desired way – since most GPs are aware that prescribing antibiotics in this context is not best practice and is not supported.

Whilst the TACT principle (described on page 19) was used to carefully define the target behaviour and guide the wording of the intention measure, there remained a degree of “mismatch” in the level of correspondence between the



measures used to capture intention and behaviour. Intention was measured at a more general level whilst the measure of behaviour consisted of several discrete situations, each presenting quite specific context-based information. This of course was deliberate, in that the selection of scenarios aimed to encompass a typical range of the clinical presentations of URTI seen within primary care consultations. However, theoretically, GPs' intentions (as well as their attitudes and subjective norms) might feasibly vary according to the individual characteristics of each presenting case. Adding to this mismatch in correspondence, the actual measurement of behaviour on the behavioural simulation scenarios was inevitably reduced to a "prescribed/did not prescribe" dichotomy for the purposes of analysis, whilst intention was measured as a categorical variable. Here we now also have apparent violations of Fishbein & Ajzens' (1975) (124); 1977 (125) & 1980 (126) "principle of compatibility" (explanation 3), of "scale correspondence" (explanation 4) and of having an "unequal number of response categories for intention and behaviour" (explanation 5). This highlights the difficulties and complexities inherent in the operationalisation of theory in its purest form.

In a similar way the issue of compatibility or correspondence may also shed some light on why the graded task intervention failed to have a significant effect on behaviour. There is an extensive literature to support the efficacy of planning to help enactment of intended behaviours (e.g. (123,127–132)). As part of this intervention, GPs were asked to choose a specific clinical context, one that they sometimes found problematic in their real clinical practice, and make a written plan of what they would do when faced with this scenario in the future. The aim of their plan was to help them end a consultation with a patient presenting with URTI without prescribing an antibiotic. The intervention had high levels of completion, suggesting good engagement with the task, but no measureable change in behaviour was found. In terms of material content, the intervention did correspond closely to the measure of behaviour in that all salient issues incorporated into the scenarios were present within the intervention materials. However, GPs' plans were subsequently "tailored" to one specific clinical context and it is likely that the behavioural scenarios did not contain sufficient clinical cases that matched specific clinical situations chosen

by GPs as the basis for their management plan. For example, 30% of GPs based their plan on the management of patients with a history of chronic obstructive pulmonary disorder (COPD), suggesting that this is a situation that they feel can be challenging and difficult not to prescribe for. This situation was represented only once within the set of eight scenarios presented to GPs post-intervention. This may have reduced the ability of the study to detect any meaningful effect of this intervention due to the infrequent occurrence of this clinical context within the scenarios. On the other hand, a more diffuse effect on non-targeted situations might have been expected, since the issues (e.g. perceived barriers) that the plan was designed to overcome were relevant to most situations. Most GPs taking part in the evaluation did, however, report already having a plan of how, when and under what circumstances they would manage URTI without prescribing an antibiotic.

Going back to Sutton's (123) potential reasons for poor prediction in relation to the intention-behaviour gap, explanations 6, 7 and 8 were less of a concern since both intention and behaviour were measured using multiple items, giving them superior reliability over single-item measures, and GPs' responses were adequately spread across both measures. However, the theoretical rationale for improving the compatibility between measures is that this will maximise predictability by more closely matching cause and effect. So could we have done anything differently to improve the predictive power of the models used in the IME? One possibility, again proposed by Sutton 1996 (133), involves varying the context component of the questions that the research participant is asked. Within the IME questionnaire this might involve extending the context component of the intention measure to include features included in the patient scenarios. For example, the current item "I intend to manage patients who present with an URTI without prescribing an antibiotic" could be re-worded as "I intend to manage patients who present with an URTI *and who have already tried to self-medicate*, without prescribing an antibiotic" and "I intend to manage patients who present with an URTI *and expect me to prescribe an antibiotic*, without prescribing an antibiotic" and so on ("*... who have a past history of COPD; ... whose symptoms are distressing them*"). Whilst this has obvious theoretical appeal in terms of improving the level of specificity between

measures, such an approach could greatly increase the length of questionnaires and/or generate non-responses due to the tedium of answering seemingly repetitive questions, again highlighting potential trade-offs in choosing one approach over another.

Sutton 1998 (123) and later Sheeran 2002 (79) argue that a more helpful way to examine the intention-behaviour relationship is to “decompose” intention-consistency into a 2 (positive intenders vs. negative intenders) x2 (performance vs. non-performance of the behaviour) matrix. They propose that dichotomising the constructs in this way makes it possible to more closely examine the sources of both consistency and discrepancy. Within the 2x 2 matrix, participants are categorised as “inclined actors” (those who both have strong intentions and performed the desired behaviour); “inclined abstainers” (those with strong intentions but who did not perform the desired behaviour); “disinclined actors” (those with low or negative intention who nonetheless performed the behaviour); and finally “disinclined abstainers” (those who neither intend to nor performed the desired behaviour).

An interesting aspect of this analysis is that it allows you to see who is responsible for the intention-behaviour gap – the two groups who do not behave according to their intentions – inclined abstainers and disinclined actors. In an application of this analysis to six published studies, Sheeran 2002 (79) demonstrated that the lack of consistency between intention and behaviour was in fact mainly due to the group categorised as “inclined abstainers”. A further secondary analysis found that mean scores for TPB variables differed significantly within each category in that scores on these variables for inclined abstainers were significantly lower than those for inclined actors.

In terms of improving the sensitivity and specificity of interventions to change behaviour this would seem a fruitful approach that could feasibly be applied within the IME context at the intervention development stage. In the first instance it could be argued that participants already behaving as intended and desired do not need to receive an intervention and could therefore be removed from any subsequent intervention study to reduce dilution of its potential effect.

Information about what drives their intention and behaviour may still inform the development of interventions to change the behaviour of inclined abstainers however. Alternatively, the analysis may reveal other more pertinent determinants to target within the two abstainer groups. Interventions that are more targeted to abstainers could then be developed, though it may be equally feasible that inclined and disinclined abstainers require differentially targeted or additional interventions, rather than a “one-size-fits-all” approach, in order to maximise effect for those with and without a (partially) formed intention.

The final reason that Sutton (123) proposes as a potential explanation for the poor prediction of behaviour is that “intention may not be the sufficient cause of behaviour”. The TPB framework allows for this possibility, however, by acknowledgement of influences on behaviour that are outside the volitional control of the actor. Examples of such influences that may have a direct effect on behaviour include lack of skills, resources and opportunities to perform the desired behaviour and also the cooperation of other people (123). Nonetheless, since the gap persists, this suggests that this model is still insufficient to explain clinical behaviour.

The work presented in this first section has explored the feasibility of using psychological models of behaviour to understand and predict the behaviour of healthcare professionals, with a view to using these models for guiding change. Primary empirical work purposely focused on a relatively simple behaviour in the context of a single, acute and relatively uncomplicated clinical condition that is typically managed by one individual healthcare professional. In the next section, a body of work will be presented that extends the application of these psychological models to the context of chronic disease management of diabetes within the primary care setting, a more challenging endeavour since there are several different clinical aspects to the management of diabetes (for example glycaemic control, weight management, foot inspection), and the behaviours involved in delivering care are usually shared and delivered by a team rather than by one individual. Different groups of healthcare professionals within a team may also have different, but shared, roles and responsibilities (e.g. prescribing may be the role of GPs; advice giving may be the role of nurses).

Alternatively, there may be a specific individual within a team or professional group whose role it is to manage a specific aspect of a patient's care (e.g. a specialist nurse or specialist GP). Thus each aspect of diabetes management may frequently involve not only the cognitions and actions of more than one healthcare professional, but also that of different types of healthcare professional.

Applying models of individual behaviour within this multiple-actor context is not without significant methodological challenges, not least relating to the identification and measurement of key cognitions and the linking of behaviours to individual actors. These issues are initially tackled in the first two methodological papers within this section (Supporting papers #4 & #5), which set the foundation for the work presented in Supporting papers #6 & #7.

Supporting paper #6 reports on work that aimed to capture a broad range of external (i.e. non-volitional) and contextual factors that are theorised to be important mediators and moderators of healthcare professionals' behaviour. Paper 7, however, brings us to the importance of the patient perspective in developing interventions to change healthcare professional practice, by demonstrating the discrepancy between what self-management care advice healthcare professionals believe they are providing to patients and what patients report they actually receive and understand.

## Chapter Four: Extending the Framework. Using theory to explain and guide change in the clinical behaviour of multiple healthcare professionals

### **Supporting papers:**

4. **Hrisos S**, Eccles MP, Francis J, Bosch M, Dijkstra R, Johnston M, Grol R, Kaner EFS, Steen IN. Using psychological theory to understand the clinical management of type 2 diabetes in Primary Care: a comparison across two European countries. *BMC Health Services Research* 2009, **9**:140 <http://www.biomedcentral.com/1472-6963/9/140>
5. Eccles MP, **Hrisos S**, Francis J, Steen IN, Bosch M, Johnson. Can the collective intentions of individual professionals within healthcare teams predict the team's performance: developing methods and theory? *Implementation Science* 2009, **4**:24. <http://www.implementationscience.com/content/4/1/24>
6. Eccles MP, **Hrisos S**, Francis J, Stamp E, Johnston M, Hawthorne G, Steen IN, Grimshaw J, Elovainio M, Pesseau J and Hunter M. Instrument development, data collection, and characteristics of practices, staff, and measures in the Improving Quality of Care in Diabetes (IQuaD) Study. *Implementation Science* 2011, **6**:61. <http://www.implementationscience.com/content/6/1/61>
7. Hawthorne G, **Hrisos S**, Stamp E, Elovainio M, Francis JJ, Grimshaw J, Hunter M, Johnston M, Pesseau, Steen N, Eccles MP. Diabetes Care Provision in UK Primary Care Practices. *PLoS ONE*. 2012. **7**(7): e41562. doi:10.1371/journal.pone.0041562. <http://t.co/hxDcMCJF>

### **4.1: Can theories of individual behaviour be applied in the context of multiple actors contributing to the same behaviour? Supporting publication #4**

Diabetes care is an ideal candidate for exploring the applicability of theories of individual behaviour to clinical contexts that involve multiple actors performing multiple care delivery behaviours in the collective management of one clinical condition. Supporting paper #5 was the initial test of how, methodologically, psychological models of individual behaviour perform in furthering the understanding of team-based behaviours. Two existing datasets were available that provided the opportunity to perform a secondary analysis exploring this question. One dataset came from a UK-based process evaluation (134) and

the other from a Netherlands-based process evaluation (135). The process evaluations ran alongside two different randomised controlled trials of interventions aiming to improve diabetes care provision through the implementation of a diabetes 'passport' – a patient held record of assessments, test results and so forth, (135,136), and had used the same process evaluation methodology (postal, self-completion questionnaire) and theory-based clinician questionnaire (that had been forward and backward translated into Dutch). The questionnaire used a standard TPB approach to explore general practitioner and practice nurse cognitions in relation to two diabetes management behaviours: foot examination and the prescription of statins. When combined, the two databases provided data on the cognitions of 105 GPs and 70 practice nurses.

Patient-reported data relating to clinicians' performance of both behaviours was also available and had been gained via a postal survey of patients who had received care at primary care practices participating in the respective trials. This dataset was used to provide a proxy measure of primary care clinicians' behaviour. I had not been involved with the staff process evaluation or the patient survey, but took the lead on obtaining copies of all datasets, combining them into one coherent body and, with the supervision of the team statistician; I conducted the subsequent cross-sectional secondary analysis. An interaction term was fitted to test for a country effect in the planned regression analyses. As both host studies were randomised controlled trials, interaction terms were also fit into a regression model to test for any respective trial effects on the outcome variables.

The first research question examined whether the TPB could predict the intentions of healthcare professionals involved in the performance of the two clinical behaviours. The analysis showed that primary care healthcare professionals' attitudes towards both the clinical behaviours investigated and their perceived social pressure to perform them accounted for a significant amount of the variance in their intention to provide the two elements of diabetes care. The second research question went on to examine the model's ability to predict clinicians' behaviour. However, despite the conclusions of the systematic reviews discussed earlier that support the utility of social cognition

models of behaviour in predicting the clinical behaviour of individuals (83,87), no relationship was found between health professionals' intention, or their perceived behavioural control, and their behaviour as measured using patient-report. Closer consideration of the measures used to test the study research questions offered some explanation of the difference observed between the results of the individual level studies reported in the reviews and the present study.

One consideration is that the patient reported questionnaire item used as our measure of clinician's prescribing behaviour was not of the same level of generality as the item measuring clinician self-reported intention. Rather than ask if they had been prescribed statins, patients were asked to list all the medication they had taken in the past four weeks. Wording the question this way changed the focus of whose behaviour was being asked about. This potentially introduced some under-reporting of statin use that reflected patient non-compliance and/or recall bias rather than a failure to prescribe on the part of the clinician. As previously outlined, a fundamental aspect of the Theory of Planned Behaviour is Fishbein's TACT principle of correspondence (76). Shifting the focus of whose behaviour was being asked about therefore changed the specificity of the Action component of TACT, thereby potentially reducing the level of correspondence between the measures.

An alternative explanation for the lack of observed relationship between intention and behaviour, again representing a potential violation of the correspondence principle, is the difference in level at which these two variables were measured. Intention was measured at the level of the individual, but behaviour was an aggregate score summarising several episodes of prescribing a statin and inspecting feet, and across several patients. So, although the relationship between healthcare professionals' cognitions and behaviour were examined as if at the individual level, only intention was clearly measured at this level. This was because the patient-reported rate of performance for each behaviour could not be linked directly to individual clinicians, hence these data could only be summarised at the level of the practice (i.e. the team) and represented the proportion of patients who responded to the survey that



reported a) they were taking a statin and/or b) that they had had a foot inspection during the past 12 (UK patients) or 15 months (ND patients). For the current, exploratory analysis, these team-level measures of behaviour were assigned to each individual clinician within the respective practice team, a strategy that assumes each healthcare professional to have an equal role in the performance of the behaviour of interest (i.e. that the behaviour is an equally shared role). This is unlikely to be a true reflection of how healthcare roles or tasks are distributed across staff in the real world workplace; however, summarising the behavioural data in this way is typical of how much routinely available quality of care data is collated, presented and understood for the purpose of assessing and gauging levels of healthcare provision (a current example of this is the summarising of patient outcome data to proportions for assessing primary care achievement of Quality and Outcomes Framework indicators (<http://www.nice.org.uk/aboutnice/qof/>)).

It is also a characteristic of data that arises from care processes that involve the collective team management of a single, but complex, condition. Furthermore, where behaviours are shared in this way, it need not necessarily result in other team members having less favourable attitudes towards the clinical behaviours investigated here. They may, however, have little or no intention to perform those behaviours because they are confident that these actions will be covered by other members of the clinical team, reducing the ability of this measure to predict behaviour. On the other hand however, having clearly delineated roles may also result in differential rather than similar cognitions towards different behaviours depending on their salience to the individual healthcare professional. This suggests that some alternative methods of aggregating the collective cognitions of the team might lead to stronger prediction of the collective behaviour, or, ideally, having a mechanism to collect or to disaggregate patient level data to individual clinicians.

#### **4.2 Can the collective intentions of individual professionals within healthcare teams predict the team's performance? *Supporting publication #5.***

Using the same dataset as the analysis presented in paper #4, this subsequent study aimed to explore the relationship between various aggregate measures of the proximal predictors of behaviour as specified by the TPB (intention and perceived behavioural control) and the aggregated, practice level measure of clinical behaviour. This analysis was purely methodological and the methods for aggregating measures were derived following group reflection of different team processes and different theoretical approaches to team-functioning. Essentially, scores for the predictor variables were aggregated over healthcare professionals to produce four hypothetical scenarios:

1. A simple mean of all primary care team members' intention scores. This approach assumes that behaviour is likely to be driven equally by the individual intentions of all the practice members, averaging intentions thus assumes equal weighting of members' views. This could feasibly suggest team decision-making based on equal and shared communications.
2. The highest intention score in the team combined with the PBC of that same individual with the highest intention. This approach assumes that it is this person's role to perform the behaviour, making it most likely that they are the key actor in this situation. In this scenario the underlying model suggests a slightly more complex team structure with more delegated decision-making.
3. The highest intention score in the team combined with the highest PBC score in the team. Whilst both scores may feasibly be from the same team member this scenario allows that they may also be from different team members. The latter scenario supposes that behaviour is driven by the intention of a key actor but is also the responsibility of another significant team member. An example situation might be where a nurse has a high intention to perform the behaviour and a doctor has a high PBC score as a consequence of knowing that the nurse intends to perform the behaviour.

4. The intention and PBC scores of the team member identified as having primary responsibility for the clinical behaviour. This scenario assumes that behaviour is most likely driven by the team member whose role it is to perform the behaviour. In a doctor/nurse team, for example, the doctor would have primary responsibility for prescribing statins and the nurse primary responsibility for inspecting feet. In teams with more than one nurse or doctor, primary responsibility was assumed by the highest intention score within the professional group (however, for behaviours performed only by one professional group – e.g. prescribing – this role analysis becomes equivalent to Scenario #2 above). As before, the highest intention score in the team was chosen as this measure potentially represented the relevant 'team cognition score', which might be seen in a team structure that has allocated roles.

#### Analysis:

Similarly, the analysis was designed as a predictive study of the theory-based cognitions and clinical behaviours using multiple regression analyses, but this time the analyses were run at the practice level. Since the dataset contained responses from single-doctor practices, and also single responses (from either one nurse or one doctor) from multi-doctor practices, this data could not be included in the summarised practice level analysis described in Scenario No.1 above. The analysis was therefore repeated to include only those practices from which more than one clinical respondent was available. The statin analysis was restricted to doctors as prescribing was assumed to be a role exclusive to doctors. There were no prescribing nurses identified in the sample of respondents. Both doctors and nurses were included in the foot examination analysis.

We also explored a country effect (to allow for both 'real' – e.g. potential cultural, functional or societal differences; and methodological – e.g. subtleties in trial processes; language; intervention delivery) and the effect of the number of responses per practice. As in Supporting paper #4, the practice level measure of behaviour was the proportion of patients per practice reporting that they were taking a statin or that they had received a foot examination. For comparisons at the level of country, overall means of practice mean intention

scores and practice proportions of patient reported outcome variables were calculated.

In total, 98 primary care practices were surveyed and healthcare professionals from 83 (85%) practices returned questionnaires (105 GPs and 70 practice nurses). Sixty-nine practices contributed at least one GP responder to the statin analysis. These practices were not significantly different in terms of size to non-responder practices (Pearson  $\chi^2 = 2.248$ , d.f. = 1,  $p = 0.13$ ). For the analysis of foot examination, the number of nurses per practice was also available. Eighty-three practices contributed at least one GP and/or nurse responder to this analysis and again were not significantly different in terms of their size (number of team members in the practice) (Pearson  $\chi^2 = 2.149$ , d.f. = 1,  $p = 0.14$ ); but they were significantly more likely to have two or more nurses (80% versus 47%, Pearson  $\chi^2 = 7.215$ , d.f. = 1,  $p = 0.007$ ).

Analysis exploring the four scenarios in the context of prescribing of statins: In UK practices, the overall mean (sd) of practice mean intention scores was 4.8 (1.5), and in Dutch practices this was 5.6 (1.3) (mean difference (95% CI) - 0.7300 (-1.4 to -0.04)  $p = 0.038$ ). Dutch doctors were therefore significantly more inclined to prescribe statins than UK doctors. Similar values for the strongest intention were observed; for the UK practices this was 5.2 (1.5) and for the Dutch practices this was 5.7 (1.3). The team scores represented by this scenario however, were not significantly different. Though the mean intention score within each practice was significantly correlated with the highest intention score within that practice (Pearson Correlation Coefficient 0.93,  $p < 0.001$ ), neither was significantly correlated with the overall practice mean percentage of patients taking a statin.

Scenario 1: Practice mean intention:

In line with the TPB framework, both mean intention and mean PBC were entered into a regression model, together with an interaction term to examine the suggested "country effect". Neither mean intention nor PBC significantly predicted behaviour, but there was a significant country effect suggesting that Dutch primary care doctors were 11% more likely than UK doctors to prescribe

statins. A similar analysis restricted to the smaller number of practices where there was more than one respondent produced a similar pattern of results, though the country effect was not significant. Removing PBC from the model did not improve the predictive ability of overall mean intention in explaining statin prescribing behaviour and there was no additional effect of the interaction term between intention and country. This analysis suggests that while Dutch GPs tended in general to have stronger intentions to prescribe statins than UK GPs, and were more likely to issue a prescription, the strength, or magnitude, of the relationship between overall mean intention and patient reported use of statins was the same in both countries.

Scenarios 2, 3 & 4: Highest team intention:

When using the highest intention score for each practice, neither of the hypothesised combinations with PBC (Scenario 2: PBC of the highest intender & scenario 3: highest PBC in the practice) predicted the prescription of statins (Scenario 4: highest intention & PBC of individual whose role it is). Again, the country effect was apparent and of the same order of magnitude and significance. When PBC was removed from the model, intention still did not predict behaviour, and there was no additional effect of an interaction term between intention and country.

Analysis exploring the four hypothesised team scenarios for foot examination: In UK practices, the overall mean (sd) of the practice mean intention score was 4.9 (1.3), and in Dutch practices this was 4.4 (1.4); these were not significantly different. Similar values for the strongest practice intention were, for the UK practices, 5.9 (1.3) and for the Dutch practices 5.1 (1.6) (Mean difference (95%CI) 0.78 (0.14 to 1.43),  $p = 0.018$ ). This suggests that UK practice teams were more inclined than Dutch practice teams to examine the feet of their patients. The mean intention score for a practice was significantly correlated with the highest intention score within that practice (Pearson Correlation Coefficient 0.78,  $p < 0.01$ ) and the highest intention score was also significantly correlated with the practice mean percentage of patients reporting a foot examination (Pearson Correlation Coefficient 0.29,  $p < 0.01$ ).

### Scenario 1: Practice mean intention:

In a regression model including both mean intention and mean PBC, neither was a significant predictor of behaviour but, as with the prescribing of statins analysis, there was a significant 'country effect'. This time however, UK practices were approximately 14% more likely to inspect the feet of their patients than their Dutch counterparts. When PBC was removed from the model, mean intention still did not predict behaviour, and there was no additional effect observed of an interaction term between intention and country. Restricting the analysis to the smaller number of practices (those with at least two respondents) again produced a similar pattern of results, though the suggested difference in foot examination behaviour between countries was no longer apparent.

### Scenarios 2 & 3: Highest team intention:

The highest intention score for foot examination in a practice belonged to 77 team members (38 nurses and 39 GPs). For 32/77 team members (24 nurses & 8 GPs) intention scores were available for both doctor and nurse respondents. For 35/77 practices the foot examination intention score was represented by practice scores where only all nurse or all GP responses were available. In the remaining six practices, the highest intention score was the same for both nurse and primary care doctor. In this situation the highest intention score used in the subsequent regression analysis was that of the team member who had both the highest intention and the highest PBC.

The highest practice team intention was a significant predictor of foot examination. As in the overall mean analysis, there was a significant country effect, with reported foot inspections being 11% fewer in ND practices than UK practices ( $p = 0.011$ ). Removing PBC, including an interaction term for a country effect and including type of healthcare professional (thus exploring professional role) did not significantly change the model.

### Summary of the analyses:

Supporting paper #6 reports an analysis of four different aggregations of individual level cognitions hypothesised as being representative of a clinical team's collective intentions and PBC. The aim of this analysis was explore the

potential for extending the use of individual level theories of behaviour to team based, or shared, practice. In particular, the analysis aimed to address the problem of relating the cognitions of individual members of a team of healthcare professionals to a shared outcome of their collective behaviours. How the individual cognitions were analysed only made a difference for foot examination and this was apparent only when using the strongest intention as representing the team score. The highest team intention was significantly associated with foot examination at the practice level. Neither PBC nor role influenced any of the observed relationships, thus none of the hypothesised scenarios were fully supported in this analysis.

#### **4.3 The role of organisational culture and context in shaping healthcare professional behaviour. *Supporting publication #6***

However exploratory and imperfect the work presented in papers #4 and #5, the issues addressed and raised are of enduring importance, both methodologically and theoretically. In studies wishing to understand the behaviours of healthcare professionals within clinical teams, the need for some sort of representative team measure, aggregated from individual team members is indicated. Since much routinely available patient outcome data is commonly aggregated to team or practice level, a team cognition measure would provide greater confidence in the use of this data as a reflection of clinical practice and processes. An alternative measure might be one that asks team members to agree an aggregate score as a group using some kind of open consensus agreement process (137). Examining this further is necessary for the advancement of both the theoretical and practical understanding of the processes that lead to implementation of clinical behaviours within healthcare teams, as well as providing the methodological means to capture and represent team based processes.

Supporting paper #6 describes a multi-centre, national study that not only built on the exploratory work presented in papers #4 & #5, but also set out to address many of the shortcomings identified by that work. The 'Improving

Quality of Care in Diabetes (IQuaD)' Study (138,139) was designed as a predictive study (over 12 months) ambitiously aiming to investigate multi-level factors - organisational, team, and individual - that determine a range of behaviours needed to manage type 2 diabetes in the primary care setting. Data collection was by theory-based questionnaires and postal survey methods in line with the methods developed across the work discussed in previous sections of this thesis. As well as measures examining individual motivation, beliefs and behaviour, the IQuaD questionnaire also incorporated a series of validated measures of team and organisational functioning and behaviour. Several sources of outcome data were also utilised to provide triangulation of differing degrees of external validation for healthcare professional self-reported behavioural data.

Supporting paper #6 provides an extensive overview of the IQuaD study design and conduct, and the development process for three study questionnaires (one each for practice administration staff and healthcare professionals, and one for patients). The paper also documents the characteristics of the participating practices and primary care teams, and extensive descriptive analyses of the data collected. Detail is provided about the structure and functioning of participating practices in relation to their provision of care for patients with type 2 diabetes, providing a unique overview of this service provision within the UK. A key aim of the IQuaD study, however, was to collect multi-level data from a large number of complete primary care practice teams (i.e. including both clinical and non-clinical staff) in order to advance the work discussed in the previous section of this thesis. The rationale for sampling complete practice teams was to ensure that all key actors were represented within subsequent analyses, therefore providing the data and opportunity to address the limitations identified in the exploratory work undertaken in papers #4 & #5.

Though I was not involved in the original funding application for this work (since I moved to support another diabetes related project at the end of the ReBEQI funding period (140)), I had, as discussed in previous sections, made a substantial contribution to the conceptual and exploratory work underpinning its rationale. I was therefore well placed to pick up this national, multi-centre



IQuaD project as a key research team member. As the sole research associate on the study, I was responsible for its set up (which initially included the recruitment and induction of 100 GP practices, and obtaining ethical and governance approvals across what was then 36 different PCTs within four devolved nations), coordination and subsequent conduct in line with the published protocol (139). I was therefore heavily involved in the planning and execution of the study; in the development and identification of relevant measures to include in the battery of data collection instruments; and in the a priori planning of core analyses and study publications.

Coordination of this study was complex, since all communication was done remotely, using regular mail, email and telephone. To facilitate this, I asked each practice to nominate a study lead, who would be my key contact, but I also familiarised other team members with myself and the study (particularly reception staff, as they would usually be the first line of contact for telephone calls). To support practice staff in working to the study protocol, I prepared a carefully structured, study manual that also included photographs of all team members and direct contact numbers for me, the study PI and the project secretary.

Achieving maximum response rates amongst primary care teams was a fundamental aim of the IQuaD study, in order to support the planned analyses derived from the complex conceptual work that defines this work. Research active primary care practices were therefore: recruited through the MRC General Practice Framework (MRC GPRF); offered full reimbursement for staff time and administration costs arising from study participation; asked to formally agree to this reimbursement as conditional upon minimum practice level response rates; and were required to sign contractual service agreements with the MRC GPRF, documenting study related workload and the level of remuneration that the practice would receive, before being formally recruited to the study. Every best effort was also made to engage all staff within recruited practices, for example: by asking that practices discuss and agree participation as a team prior to making a decision to take part in the study; by minimising study related work burden; by preparing practices in advance for completion of

the study questionnaires at each data collection time point; and by sending out regular newsletters and Christmas cards from the research team. Despite this the study still only achieved 100% coverage of staff for 40/100 recruited practices. Of course, it might not be methodologically necessary to have complete datasets – it may be sufficient to have only the cognitions of a few, key healthcare staff for example. The rationale for aiming for full practice participation was to provide the means to derive the most parsimonious model for theorising about and studying team behaviours from a comprehensive dataset. Whilst this methodological modelling is still possible (since we achieved >80% coverage of staff in 67/100 practices), this experience has real implications for what might be realistically achievable when attempting to study team behaviours in the real world setting.

Nonetheless, IQuaD makes an extremely valuable and unique contribution to the field of implementation science because it is one of the largest and most comprehensive datasets of its type. Following the completion of all planned analyses and publications, the dataset will also be made available to other researchers for secondary data analysis, therefore maximising its impact on improving care for patients with type 2 diabetes. Supporting paper #6 (138) was the first IQuaD publication, and is a core repository document detailing the dataset, the research process and the development of the study data collection instruments. It is therefore a rich, transparent and robust resource that underpins all subsequent planned IQuAD analyses and publications.

#### *Building the IQuaD dataset: Step 1. Identifying the target behaviours*

The IQuaD study set out to establish the first three steps in the IMP process (Table 1, page 19): 1. Identify the target behaviour(s), 2. Identify and select a relevant theoretical framework, and 3. Conduct a predictive study to identify potential mediators of change.

#### Identifying Target behaviours

Policy support for diabetes care is provided by the National Service Framework (<http://www.nhs.uk/nhsengland/nsf/Pages/Nationalserviceframeworks.aspx>), National Institute for Health and Clinical Excellence (NICE) guidelines

(<http://www.nice.org.uk/>) and the implementation of the Quality and Outcomes Framework (QOF); (<http://www.ic.nhs.uk/statistics-and-data-collections/audits-and-performance/the-quality-and-outcomes-framework>), which provides incentives for practice performance. Six clinical behaviours were identified that are performed in the management of patients with type 2 diabetes (Table 6). The behaviours were chosen to: cover a range of clinical activities (prescribing, non-prescribing); reflect decisions that were not necessarily straight forward (controlling BP that was above target despite other drug treatment); and reflect recommended best practice as described by national guidelines (<http://guidance.nice.org.uk/CG15>). The behaviours were precisely specified (according to the 'TACT' principle described earlier (76) in terms of "Who does what, where and when". The aim of this was twofold; firstly, to provide clarity to the study respondents about the behaviours being asked about and, secondly, to provide consistency of measurement across practices.

**Table 6: Six target clinical behaviours for improving type 2 diabetes**

<b>1. Giving advice about weight management</b> to patients with type 2 diabetes whose BMI is above a target of 30kg/m <sup>2</sup> , even following previous management.
<b>2. Prescribing additional antihypertensive drugs</b> for patients with type 2 diabetes whose blood pressure (BP) is above a target of 140 mm Hg for Systolic BP or 80 mm Hg for Diastolic BP, even following previous management.
<b>3. Examining foot circulation and sensation</b> in the feet of patients with type 2 diabetes, registered with your practice.
<b>4. Providing advice about self-management</b> to patients with type 2 diabetes, registered with your practice.
<b>5. Prescribing additional therapy for the management of glycaemic control</b> (HbA1c) for the management of HbA1c in patients whose HbA1c is higher than 8.0%, despite maximum dosage of two oral hypoglycaemic drugs.
<b>6. Providing general education about diabetes</b> for patients with type 2 diabetes, registered with your practice.
<i>Table replicated from (138) Implementation Science</i>

Behavioural data and measures of healthcare professional behaviour:

Complementary measures of the performance of the six study behaviours were collected using clinician self-report; individual patient biochemical, physiological, and drug data; routinely available practice performance data; and patient-report of clinicians' behaviour. Two clinician self-report measures provided behavioural data at the level of the individual clinician, while the clinical outcome data - the practice performance data and the patient-report measure - generated behavioural data aggregated to the practice level.

Clinician self-report:

At baseline, a summary measure of clinicians' 'simulated behaviour' was derived from four clinical scenarios devised for the study. The scenarios were embedded within a questionnaire survey booklet (similar to the URTI study) (See Appendix 3, IQuaD Clinician Q1) and designed to simulate the behaviour that an individual clinician would perform during a diabetes review appointment, and were delivered in a format to simulate the computer screen available during consultations (Figure 5). Primary care doctors and nurses were asked to consider a series of diabetes-related factors and then to indicate which they would prioritise to address within that consultation (by ticking the 'would do' response option) or would aim to address given sufficient time (by ticking the 'would do if time' response option). Space was provided for respondents to provide written explanation for their management decisions. The attributes of each scenario were varied, but given the small number of scenarios (n=4) it was not possible to systematically vary every combination of every variable. These limitations aside, the four scenarios provide rich contextualised data from which it is possible to explore complex decision making processes in the management of type 2 diabetes in the primary care setting.

At 12 months, a self-reported behaviour postal questionnaire asked individual clinicians about their performance of each of the six clinical behaviours over the previous year (Appendix 3, IQuaD Clinician Q2). The items used in this very brief questionnaire (one item for each of the six clinical behaviours) were worded: 'Over the past 12 months, given 10 patients with diabetes < *attributes of patients*>, for how many did you < *behaviour*>? (scored 0 to 10)'.

Figure 5: Example of IQuAD Clinical Scenario

**WORKED EXAMPLE**

No. 000      Mrs Melody Dent, 2 Burnside Mews, Othertown      Age 75 years

**Clinical Records** ← **1. Consider the information presented in the clinical records for this patient**

---

**A Add**      **X All non-values**      **C Consultations**      **P Problems**      **J IOS Claims**  
**V Values**      **I Immunisations**      **M Medications**      **N Investigations**      **L Patient notes**  
**H Health**      **T Templates**      **F Forms & Admin**      **B Allergies**      **Q More**

**Active Problems:** Type 2 DM 1992  
 Osteoarthritis  
 Hypertension

**Smoker:** Ex-smoker      **Employment:** Retired

**Current medication:** Co-codamol 2QDS PRN; Metformin 500mg TDS; Ramipril 10mg OD; Aspirin 75mg OD; Atenolol 100 mg OD; Adipine MR 40mg BD; ipratropium 2 puffs QDS; Simvastatin 40 mg QD

**Significant past:** Cancer of colon 1998  
 COPD 1983  
 Fall, 2001, 2004, 2006

**Allergies:**

**History:** Reluctant to take additional drugs

**2. Consider the clinical information presented in the table below relating to past reviews for this patient.**

	14/08/04	28/07/05	04/09/06	18/08/07	10/09/08	Would do	If time allows	What would you do?
HbA1c	8.3	8.0	7.3	7.7	8.4			
Cholesterol	5.4	3.9	4.2	4.1	4.3			
Systolic BP					145			
Diastolic BP					80			
Albumin:Cre ratio (normal)					1.0			
Foot inspect								
BMI	35	35	35	34	34			
Patient education	√							
Weight management								
Self-management								
Notes								

**3. Tick the aspects of care that you consider to be the most important for this patient and that you would prioritise to do during this consultation.**

**4. Tick the aspects of care that you also consider to be important for this patient and that you would do if time allows during this consultation.**

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#### Clinical outcome data:

Anonymised individual patient biochemical, physiological, and drug data were extracted from practice computer systems for all patients with a diagnosis of type 2 diabetes registered with the practice. Data were extracted for a 24-month period (i.e. 12 months prior to and 12 months after the month within which the baseline survey was undertaken). Data extraction was performed by the practice managers using a study specific query devised for their clinical operating system by a data performance manager based within the North East Primary Care Trust (PCT) sponsoring the research. Engaging the support of the PCT-based performance manager in this huge endeavour was essential to the success of this aspect of data collection. I had worked with a local PCT performance management team on a previous diabetes study, so used this established working relationship to negotiate the central collation of these data by a skilled performance manager. This involved me working closely with the nominated PCT performance manager to establish what data we could extract from the various database systems that the different primary care practices were using at that time, and how comparable these data would be across those systems. It also involved me liaising with the 100 practices to ensure their timely completion of this data collection process.

#### Routinely collected performance data:

The study further made use of performance data specific to the management of type 2 diabetes that is routinely collected by primary care practices, and that is publicly available via the QOF national database (<http://qof.hscic.gov.uk/>).

#### Patient report of clinician behaviour:

Having reviewed the type of data that these previous measures could provide, it was apparent that data relating to advice giving and education behaviours would be limited and potentially erratically recorded. For example, codes that were available to interrogate practice database systems could, at best, only suggest that information had been provided to patients or not.

This has significant limitations in that it is not possible to determine what that advice or information might have comprised, which was particularly important

since the IQuaD study was particularly interested in understanding what it is that healthcare professionals actually *do*. An additional limitation is that these measures are all based on clinician self-report of providing diabetes-related advice to patients. To address these limitations, a submission for additional funds was made to Diabetes UK to support an add-on patient survey that would ask patients about the care they had received over the previous year in more detail. Not only would this provide a more informative outcome measure, but it would also provide some external validation of the clinician reported measures. I was co-applicant on this additional funding request, drafting and submitting the initial correspondence to Diabetes UK that provided the scientific justification for this extension to the project, and I was actively involved in securing the additional £70,000 award through direct negotiations with Diabetes UK. I then took the lead in engaging the 100 practices already participating in the study, with 86 agreeing to take part in this add-on patient survey. These practices were again fully supported in the identification of a random selection of 100 patients from their database of registered patients with a diagnosis of type 2 diabetes and provided with pre-prepared questionnaire packs ready to be posted out to their patients on behalf of the Newcastle based research team. Questionnaire packs contained a reply paid envelope for return of (anonymous) questionnaires directly to the research team at Newcastle. No reminders were sent. A response rate of 25% was aimed for (to provide a final sample size of 25 respondents per practice).

This sample size was based on a conservative estimate of 50% patients currently receiving advice, with a standard error of 10% from a sample of 25 patients per practice (25% response rate). Patient reported outcome data were subsequently collected at 12 months by postal questionnaire for the three advice-giving behaviours (Appendix 3. IQuaD Patient Q), using a single relevant question about each advice-giving behaviour adapted from the 2006/07 Healthcare Commission patient survey instrument (Table 7) (<http://www.nhssurveys.org/>). A single item for foot examination was included to triangulate other sources of data reporting performance of this outcome of interest. Questionnaires were returned by 3595/8600 (41.8%) patients with a mean age of 67.0 years.

**Table 7: Single item patient-report measures of healthcare professional behaviour**

<i>Thinking about the last 12 months, when you received care for your diabetes from a doctor or nurse... (common item stem)</i>	
Providing weight management advice. ‘...were you given advice about how to manage your weight?’	<i>Response: Yes/No/Don’t Know</i>
Providing self-management advice. ‘...were you given advice about how YOU should manage YOUR diabetes?’	<i>Response: Yes/No/Don’t Know</i>
Providing general education. ‘...were you provided with general information about diabetes?’	<i>Response: Yes/No/Don’t Know</i>
Examining feet. ‘...have you had your bare feet examined?’	<i>Response: Yes/No/Don’t Know</i>

Since the items listed in Table 7 still retain a high degree of generality, additional items were included in the IQuaD patient questionnaire that asked about more specific aspects of the targeted advice giving behaviours. Examples of these additional items are provided in Table 8. The aim of including these additional items was to increase the specificity of each of the single item measures by including detail on what the clinician did. Having multiple items also allowed for the development of a second, composite score for each of the three advice-giving behaviours.

*Building the IQuaD dataset: Step 2. Identifying theory and a broader explanatory framework*

Whilst a crucial aim of the study was to identify avenues for improvement in diabetes care provision within the UK primary care setting, a parallel focus of the IQuaD work was methodological. This included theory-building and testing to extend understanding of clinical behaviour, as well as the further development of applied research methods. The IQuaD study further aimed to



extend the theoretical and empirical basis for understanding diabetes care provision beyond individual factors, by including and capturing as broad a range of additional organisational factors as possible (Table 7). This involved drawing on theory and conceptual frameworks from other disciplines and fields of investigation to identify team, organisational and structural factors relevant to diabetes care provision in the UK.

**Table 8: Additional patient-report items measures of healthcare professional behaviour**

<b><i>Thinking about the last 12 months, when you received care for your diabetes from a doctor or nurse... (common item stem)</i></b>	
<i>Providing weight management advice. ‘...were you given advice about eating less to manage your weight?’</i>	<i>Response: Yes/No/Don’t Know</i>
<i>Providing self-management advice. ‘...did you agree a plan to manage your diabetes over the next 12 months?’</i>	<i>Response: Yes/No/Don’t Know</i>
<i>Providing general education. ‘...were you given personal advice about the kinds of food to eat?’</i>	<i>Response: Yes/No/Don’t Know</i>

Practice structure and functioning:

The findings of two UK studies available at the time of the IQuaD study planning suggested that structural factors, e.g. appointment booking interval and practice list-size, and psychosocial factors, e.g. practice team climate, may be associated with diabetes management (13,141). I therefore collected extensive descriptive data via telephone interviews with key practice informants, using a structured interview schedule asking about the structure and functioning of the practice, both generally and in relation to diabetes care provision. This included information about practice-size (list size and staffing levels) and appointment intervals; clinical skill mix; the frequency and types of meetings held; staff sickness and turn-over; the availability and accessibility of services in the practice, the local community and in secondary care; and detailed

information about how diabetes care was organised and managed within each individual practice. This interview also identified lead clinicians for diabetes, all other staff members with similar key roles and the level of diabetes-specific training each had undergone.

Team level psychosocial factors:

Structural characteristics, such as those captured during the telephone interviews, have also been associated with organizational justice perceptions or clinical outcomes in previous studies (142). Organizational justice (OJ) refers to the extent to which people believe that their viewpoint is considered, that information is shared concerning decision-making, and whether their organisation or manager treats them fairly and in a truthful manner (143). Perceptions relating to team functioning and practice organisational behaviour reflect the theoretical constructs of Exchange Theory (144), which proposes that fair organisations produce well-functioning teams and good health outcomes for patients. Within this framework, team level factors were measured using a number of existing validated scales: Organizational Justice Evaluation Scale (142), a shortened version of the Team Climate Inventory (TCI) (145) and the Organisational Citizenship Behaviour (OCB) scale (146). In addition, a diabetes specific version of the shortened Team Climate Inventory was developed for the IQuaD study, in order to explore if this was a better predictor of the behaviours of interest than their generic counterparts (Appendix 3, Clinician Q1: Section 1).

Individual level factors relating to the team and work place:

Studies from other fields have also repeatedly shown that work-related OJ and other psychosocial factors, such as stress, time pressure, job control and team functioning, explain variability in work-related behaviour (147). Stress was therefore measured using a 12-item measure based on the General Health Questionnaire (GHQ-12) (148).

Individual level behavioural theory:

Informed by our previous work, several psychological models were again used to measure individual level factors. Measured constructs included motivational factors (individual perceptions about personally performing the six clinical behaviours and their intentions to perform the behaviours) from the Theory of

Planned Behaviour (76) and Social Cognitive Theory (98); and action factors (including habits, rewards, action plans, coping plans) from the Self-Reported Habit Index (100,149) and Action Planning/Coping Planning (128,129).

Analytical framework:

A key aspect of the IQuaD study development work was the iterative construction of an a priori analytical framework (Figure 6), Main analysis framework), supported by available evidence, to guide a series of planned analyses. The subsequent model places the theories and conceptual models listed above within a single over-arching framework that then attempts to integrate the different influences that converge to shape the behaviour of clinicians and their subsequent management choices for patients with type 2 diabetes. Assembling the models within the framework not only provides a graphical representation of hypothesised pathways between variables, but also facilitates the extension of theory by inspiring the conceptual representation and positioning of hypothesised moderator and mediator variables within the mix.

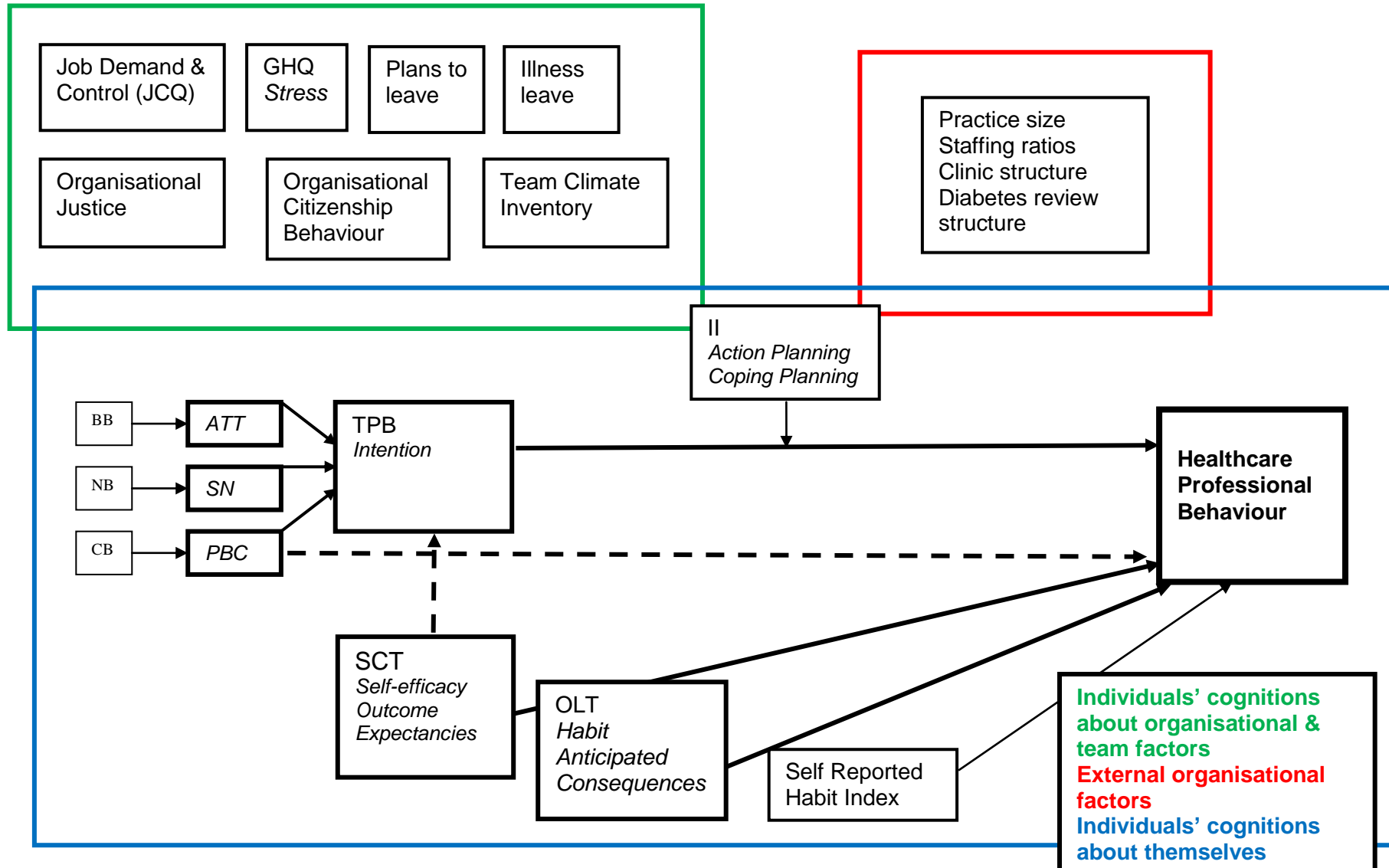
These variables can then be measured, and the hypothesised relationships and pathways tested, using multiple regression and structured equation modelling (SEM). Since leaving the IQuaD project to take up a more senior research post on a different research programme, my contribution to the final iterations of this framework has been focused on providing comments on the progress of its development. Since the framework itself is not yet in the public domain, the figure presented in Figure 6 is purely for illustrative purposes. Hypothesised links proposed by the IQuaD study team are not presented within this diagram, since this analysis is on-going and has yet to be published.

*Building the IQuaD dataset. Step 3: Conduct a predictive study to identify potential mediators of change.*

Data collection:

All measures were incorporated into a single questionnaire booklet comprising three sections (see Appendix 3, Clinician Q1). The first section measured individuals' perceptions relating to team functioning and practice organisational

Figure 6: Outline Analytical Framework illustrating individual, team & organisational measures included in the IQaD study



behaviour in the context of the practice. All members of the practice, including administrative staff, were invited to complete this section.

Section one also included questions about demographic descriptors, the respondent's self-perceived role, who they identified as being involved in delivering care for patients with diabetes in the practice, and two questions covering sickness absence and plans to leave their current job. The second section covered cognitions about performing the six different clinical behaviours and the third section contained the four clinical scenarios relating to patients with type 2 diabetes. Only clinical members of the practice who considered the management of patients with type 2 diabetes to be part of their professional role were invited to complete sections two and three of the questionnaire.

The staff questionnaire was extensively piloted with both clinical and non-clinical practice staff. All piloting work was undertaken by me, including the identification of two non-study GP practices and the recruitment of individual staff members. The aim of the pilot study was primarily to establish face and content validity of the six target behaviours and the clinical scenarios; clarity and understanding of the questionnaire items; the effectiveness of the navigation skips to guide respondents to appropriate items; the length of time taken to completion; and, importantly, points at which question fatigue began to manifest.

Based on this pilot work, quite substantial adjustments needed to be made to the questionnaire to improve clarity and to minimise repetition in the wording of the items. Two behavioural scenarios were removed (the original questionnaire had six scenarios, reduced to four in the final version). This highlights an ever present tension between attaining purity in operationalising theory and devising a valid instrument that will facilitate the collection of useable and informative data. However, these changes were essential as respondent tedium and fatigue were identified as significant factors that could have seriously influenced completion rates. To reduce repetition it was necessary to remove some of the TACT wording from the stem of each question and to place this as a header within each questionnaire section as an alternative (Table 9).

**Table 9: Measures of team, organisational and structural factors**

Measure	Description
<b><i>Practice level measures</i></b>	
<i>Practice structure &amp; functioning</i>	Structured telephone interview with lead informant at each practice
<b><i>Team level measures</i></b>	
<i>Organisational Justice (OJ)</i>	Measures perceived organisational justice and fairness. Two dimensions: Procedural Justice; Relational Justice.
<i>Team Climate Inventory (TCI) [shortened version]</i>	Measures perceptions of openness to innovation in teams. Four dimensions: Participation; Support for Innovation; Vision; Task Orientation.
<i>Organisational Citizenship Behaviour (OCB)</i>	Measures 'extra role behaviours' within the team
<b><i>Individual level measures</i></b>	
<i>Job Content Questionnaire (JCQ) [Karasek job demand-control model]</i>	Measures psychological job characteristics Two dimensions: Decision Latitude and Job Demands. Decision Latitude is composed of two underlying dimensions: <i>Skill discretion and Decision Authority</i> .
<i>Stress measure from General Health Questionnaire (GHQ-12)</i>	Negatively-worded items Positively-worded items
<i>Self-reported sickness/illness absence</i>	Free text item
<i>Intention to leave</i>	Free text item

\*also included as a diabetes specific version

From a theoretical point of view, this trade-off to maintain respondent engagement arguably distanced the behaviour from the detailed, specified context, therefore weakening the influence of the TACT principle.

Removing two of the six scenarios further limited the quality of the behavioural simulation data and the degree of between-scenario variation that could be achieved in clinicians' responses.

Even with these compromises the final, three-section, shortened questionnaire (Appendix 3, Clinician Q1) still took on average two hours to complete for clinicians who perceived the provision of diabetes care as part of their role. The amended questionnaire was then re-piloted using postal methods, with two original think aloud participants, two additional primary care physicians and two practice nurses. No further amendments were suggested as a result of the re-piloting.

### *Conducting the study*

The predictive study began in March 2008 and closed in December 2009 (Table 10). Baseline data were collected for:

1. The structural and functional characteristics of participating practices using structured telephone interviews.
2. Individuals' theory-based, self-reported cognitions about team functioning and practice organisational behaviour in their primary care practice (all staff).
3. Individuals theory-based self-reported cognitions about performing the six clinical behaviours (clinicians only).
4. Simulated behaviour data using four clinical scenarios (clinicians only).

At 12 months data were collected for:

1. Self-reported performance of the six clinical behaviours (clinicians only).
2. Physiological, biochemical, and drug data and clinician diabetes management behaviours from practice computer systems on all patients with diabetes managed within the participating primary care practices.

3. Patient report of clinician behaviour from a sample of patients with diabetes managed within the participating primary care practices.
4. Quality and Outcome Framework data for the participating primary care practices.

**Table 10: Example of questionnaire item modification following piloting work**

<b><i>Original pilot version with all TACT principles included</i></b>
Within the next 12 months ( <b>T</b> ime), given 10 patients ( <b>T</b> arget) whose systolic BP is higher than 140 or whose diastolic BP is higher than 80, even following previous management ( <b>C</b> ontext), for how many of these patients would you intend to prescribe an additional BP lowering drug ( <b>A</b> ction)?
<b>Post-pilot version with Context principle removed</b>
Over the next 12 months ( <b>T</b> ime), given 10 patients ( <b>T</b> arget) whose BP is 5 mm Hg above target, for how many do you intend to prescribe an additional antihypertensive drug ( <b>A</b> ction)?

Creating an impact:

At the close of the predictive study data collection, I secured a more senior research post on a programme of research that focused more on patient involvement in the their healthcare and healthcare safety

(<http://www.ncl.ac.uk/ih/research/project/4025>; (150)). This move has allowed me to explore my personal interests in relation to the patient/professional interaction within the context of facilitating both patient and professional behaviour change. I did, however, continue to play a lead role on the analysis and writing up of two key papers arising from the IQuaD work (paper #6 described above, and paper #7 (151) discussed below), though my move did mean compromising on previously planned lead authorship for these papers due to new commitments. Nonetheless, I take great pride that the work presented in Supporting paper #6 (138) has provided a robust foundation for several additional planned complex analyses and a suite of papers (six publications to date: Supporting papers #6 & #7 (138,151); *'Is organizational*



*justice associated with clinical performance in the care for patients with diabetes in primary care? Evidence from the improving Quality of care in Diabetes study.*' (152); 'Theory-based predictors of multiple clinician behaviours in the management of diabetes.' (153); 'Reflective and automatic processes in healthcare professional behaviour: an application of a dual process model' (154); *Environmental and individual correlates of distress: Testing Karasek's Demand-Control*' (155)). These publications have each made a valuable and novel contribution to the literature on implementation and professional behaviour change. The work has also supported the development of an intervention aiming to improve the provision of diabetes care in the primary care setting that is currently being piloted in a service level exploratory trial (<http://www.ncl.ac.uk/ih/research/project/4385>).

#### **4.4 Considering the broader context: What about the patient? Supporting paper #7**

Exploring the patient perspective in parallel to that of their healthcare providers is something that I feel to be an essential factor for understanding healthcare professional behaviour that is currently missing from the work presented over the Supporting papers #1 to #6. Whilst the primary aim of the IQuAD add-on patient survey was to provide outcome data for the three advice-giving behaviours in Table 4 (see also "*Patient Report*", page 61), the survey also offered a valuable opportunity to explore patient experience more broadly, in particular an opportunity to examine how this experience compared to that of the healthcare professionals providing their care. It was not feasible to look at patient cognitions using the same detailed theoretical framework as used for investigating professionals' cognitions, as this would have created a very lengthy questionnaire, with implications for jeopardising response rates for the main study outcome measures. Theory-based questions for patients were therefore restricted to asking about their confidence and self-efficacy in relation to their self-management of their diabetes, since it is believed that improving patient self-efficacy is a critical pathway to improved self-management in patients (156–160). Supporting paper #7 presents these wider findings of the patient survey.

As well as being co-applicant on the funding application supporting the patient survey, I played a lead role in the design, set-up, conduct, analysis and write up of this additional study. I also led on the development of the questionnaire, including identifying questions from the Healthcare Commission 2006/07 patient survey that best matched the study advice-giving behaviours, constructing additional theory-based questions and then discussing this content during piloting sessions with groups of patients from local Diabetes UK Voluntary groups. Piloting did not result in any major changes, possibly because the layout and some of the content was based on the Health Commission 2006/07 patient survey (so was already tried and tested), but one interesting finding from this work was how patients perceived the provision of education. Patients taking part in a group think aloud pilot session commented that education was something that they received when first diagnosed, anything beyond that was updating their knowledge and seen more in the context of being provided with information. This prompted a change in wording of one item asking about the provision of *education* 'over the past 12months' to ask about the provision of *general information* over the past 12months (Appendix 3, Patient Q, Q9, item I).

Quite uniquely, the patient survey publication presents experience on the provision and receipt of care for patients with diabetes from the perspective of both patients and healthcare professionals, from the same GP practices. As well as having this dual perspective, the survey also aimed to assess the extent to which these two viewpoints converge: is the care that primary care clinicians report providing associated with the care that people with Type 2 diabetes report receiving? The analysis presented in Supporting paper #7 (151) found a lack of correspondence across a range of advice giving dimensions between what clinicians report delivering and what patients report receiving. This may suggest that there is some lack of provision of the three advice giving behaviours investigated by IQuaD that would benefit from targeted intervention to improve diabetes care, though it may also reflect poor recall of advice provision on the part of the patients. Importantly, the analysis highlights in some detail which important aspects of advice giving could be improved upon.

Practices participating in IQuaD were research active and therefore might be atypical in terms of the care they offer, or may offer better care than that delivered in practices that are not in research networks. This would suggest that even higher proportions of patients may be receiving care of a lower standard than that reported in Supporting paper #7. A further important finding was that a large minority of patients lacked confidence in their ability to manage some aspects of their diabetes, despite healthcare professionals consistently reporting high rates of discussing these areas with them. If healthcare professionals are indeed providing advice, this finding may reflect issues of how or what advice is being communicated to patients. This finding also warrants further investigation since patient low self-confidence in managing their diabetes has previously been linked to poorer physician communication (161–163)

From a clinical management perspective, these findings are undoubtedly important since they illuminate quite particular areas of care provision that require swift attention and intervention. However, the analysis is also important from a methodological perspective, because it clearly signals not only the importance of understanding the broader context in which diabetes care is delivered (i.e. the structure and functioning of care services), but also how care delivery is experienced by both patients and healthcare providers. The IQuaD work is pioneering in its attempts to measure and model a range of contextual factors and their potential influence on the behaviour of primary care clinicians. Yet the patient perspective does not feature in the IQuaD explanatory framework (Figure 6, page 67): beyond providing an indirect measure of clinicians' behaviour, or as being a modifiable factor within the professional's environment. The patient as an entity, with motivations, beliefs, values and preferences, is currently omitted from this framework. The findings of the patient survey suggest that including this missing perspective more formally may help explain the intention-behaviour gap demonstrated in the analysis of individual theories discussed earlier.

## 4.5 Section overview

### *Summary*

The four papers considered in this section aimed to extend an evolving theoretical framework for understanding healthcare professional behaviour. The team management of type 2 diabetes in primary care is used as the clinical context. Papers #4 and #5 describe the empirical testing of a theory-driven approach to the application of current models of individual behaviour to behaviours that are performed as part of a clinical team. Papers #6 and #7 (138,151) build on this methodological work through the theoretical modelling of a range of contextual factors known to influence the behaviour of individual healthcare professionals when working as part of a team. Then, within the parameters of an extended, a priori theoretical framework, the application of this theorising is empirically tested. Collectively, the work presented in this section makes a unique and valuable contribution to the field of implementation research. It also contributes uniquely to current understanding of how the management of diabetes is organised within UK primary care, and also identifies specific aspects of care that require swift intervention.

### *Methodological and theoretical considerations*

Many aspects of healthcare involve repeated contacts with the same patient in the management of the same, long-term condition, and management of these conditions often involves the work of a number of different healthcare professionals. This presents a very complex array of factors, with a multitude of possible configurations, that will shape and constrain what healthcare professionals do and how patient care is delivered.

The secondary data analysis presented in Supporting paper #4 (comparison across two European countries) (164) was a first attempt at exploring the utility of applying theories of individual behaviour to clinical contexts in which patient care is delivered by a team of healthcare professionals. This is an increasingly common scenario within primary healthcare provision for chronic conditions but, as this analysis illustrated, it is one that doesn't easily lend itself to the application of theoretical models of behaviour in their current form.

The analysis did show that the variables specified by the TPB are important predictors of primary care clinicians' intentions to perform two aspects of diabetes care. This in itself did not add anything to what was already known, but the purpose of the secondary analysis was primarily methodological, to test out new ideas with a view to challenging and extending current theory. It was in this sense that the findings of this analysis make a useful and novel contribution to the field in several ways. Though its impact in terms of citations has been somewhat more modest than Supporting papers #1 - #3, (with only seven citations) a number of these have been cited by other quite prominent international research teams with similar methodological interests (e.g. Netherlands (165); Canada (166) & Greece (167)).

This study was also helpful in that it did highlight some important methodological challenges that need to be addressed for a theory-based approach to understanding team behaviours to be advanced. In particular is the issue relating to the correspondence between measures of intention and behaviour, within the context of team behaviours. One fruitful area for exploration arising from this secondary data analysis was that of seeking alternative methods of measuring or aggregating *cognitions* about the clinical behaviour. The study thus provided a platform to guide a more systematic exploration of how best to measure and represent both team-level cognitions and behaviour, and formed the basis for the analysis presented in Supporting paper #5. Furthermore, the combined UK/Netherlands dataset also allowed a direct comparison of the behavioural determinants of two clinical behaviours, across two countries, providing novel evidence for the generalisability of the models to similar clinical populations outside UK Primary Care.

Supporting papers #4 and #5 shared the same dataset and thus a number of additional limitations that also warrant consideration:

1. Under representation of team members' cognitions:

Firstly, the dataset did not include representation of all practice team members, as only a minority of team members of individual practices in both countries responded to the staff questionnaires. Team scores used in the analyses did not therefore include scores from those disinclined to complete

questionnaires and potentially omitted scores belonging to key team members whose role it was to perform the target behaviours. In addition, 20% of patients sampled had their care shared between primary and secondary care services. Together these factors may have reduced the power of the exploratory studies to detect difference across the different analyses and may have contributed to an underestimation of the effects explored.

## 2. Application of individual level theoretical frameworks to team level behaviours

The theoretical framework used models of behaviour devised to understand behaviour at the level of the individual. Aggregating the cognitions of multiple individuals thus represents a misrepresentation of the existing TPB model. Importantly, however, the analyses presented in Supporting papers #4 and #5 address a significant limitation in the application of existing models to a common scenario of team based care provision within the healthcare setting. Hence the proposed extension to the use of the TPB explored within these two studies could potentially facilitate the use of such theories in predicting and modelling the collective behaviour of clinical teams.

## 3. Mismatch between measures of intention and behaviour

In addition to low response rates for both the healthcare professional and patient surveys, there was also the possibility that a mismatch occurred between how the prescribing behaviour was defined for the two groups. GPs were asked about their intentions to prescribe statins to their patients with type 2 diabetes but patients were asked to report what medications they were taking. Though the patient reported rates of statins use could be substantiated to some degree for the UK cohort, it is possible that the patient reported data used was somewhat biased by patient compliance, understanding of their medications and / or recall.

Despite these limitations, there are other potential explanations for why the proposed intention combinations did not show an effect. Since this was an

opportunistic, secondary analysis of an existing dataset, it was restricted to the inclusion of only those factors measured for the purpose of the original studies. It is feasible that additional unmeasured factors contributed to the lack of observed effect. As discussed earlier, there are a number of known post-intentional factors that can intervene to contribute to the intention-behaviour gap (129,131). There is growing awareness, for example, that the nature of the behaviour being investigated may be a significant factor – if the behaviour is novel or infrequent for example or if it is habitual or routine (58,102).

Probably the most obvious shortcoming of the work presented in Supporting paper #6 (and by association the analysis presented in Supporting paper #7) is that the practices contributing to the IQuaD dataset were self-selected and part of a primary care network of research active practices. This places significant limitations on the generalisability of the data collected to wider primary care. This was, however, a deliberate compromise as a core of the work was to maximise the likelihood of achieving complete practice datasets. That the study still failed to fully achieve this, despite enrolling motivated practices and reimbursing them for their participation, suggests that it is unlikely that this level of coverage could ever be achieved outside of this very favourable scenario.

This latter concern has since been echoed by the authors of a primary care study that attempted to do a theory-based survey of primary care healthcare professionals as part of their development phase for an implementation study (168). The authors planned to analyse the data using multi-level modelling, but were unable to do so due to a very low response rate. This was despite the authors employing a number of evidence-based strategies aiming to maximise healthcare professional engagement and participation (168). This has significant implications for the application of the methods developed across this thesis to the real world setting.

Also, as the same authors further reflect, achieving the level of professional participation in surveys that was achieved by IQuaD is likely to be far more difficult to achieve where the novel innovation to be implemented can at best have a moderate impact and is based on moderate evidence. Again, this

suggests a further limitation of the generalisability of the IQuaD study outside of clinical contexts - such as the management of type 2 diabetes - where the targeted behaviours have an established, strong evidence base for their implementation. A related point that these authors raise that also merits consideration is that of local context. It is suggested by these authors that the approach used by IQuaD is more suited to large scale studies across multiple sites, rather than collaborative implementation studies between single organisations and academic institutions. They argue that this does not allow for the development of an understanding of local contextual factors that can influence innovation adoption and suggest adopting a case study approach instead.

Whilst this is an interesting proposition, particularly in the light of difficulties in attaining adequate survey response rates, a case study approach at the point of implementation will also have significant limitations in terms of generalisability of learning beyond the setting in which it is undertaken. What is probably more pertinent is the issue of local contextual factors. IQuaD did attempt to capture the influences of local context in terms of how diabetes care was structured, how each primary care team functioned and how team members related to each other and their workplace. However, the target behaviours were based on national guidelines and may therefore have overlooked any important local adaptations that were in place across any one of the 36 PCTs involved in the study. Such local adaptation of recommendations may have been a hidden influence on how healthcare staff responded to the survey as well as their performance on the clinical scenarios.

In Supporting paper #7 a mismatch between healthcare professional and patient reports of care provision was observed. Again there are possible methodological issues that could have contributed to this mismatch. Firstly, though the wording of questionnaire items generally appears to convey similar meaning with regards to the same aspect of care, for some items there was potential for ambiguity in interpretation. For example the clinician item "*Giving advice that takes account of individual circumstances*" may prompt reflections on wider salient situational factors, whilst the corresponding patient item asks



specifically about making a plan. In future studies examining clinician and patient perspectives of the same behaviour or initiative, careful exploration of understanding of questionnaire items should be made during the piloting stage to minimise ambiguity. A second consideration with respect to the findings of this study is that clinicians were reporting their behaviour in relation to care delivery across a number of patients with diverse needs whilst patients were reporting on their own individual experience over (possibly) a number of consultations. In the present study, however, the selection of a random sample of patients helped to minimise any potential bias arising from this latter consideration.

Other limitations to this study that prompt caution in interpreting patients' responses to the IQuaD patient survey include the low response rate (that was below 50%) and the fact that the patient survey was anonymous, so it was impossible to establish how representative sampled patients were to the rest of the patients in the practices from which they were sampled.

## **Chapter Five: Conceptualising the role of the patient in shaping health care delivery behaviour.**

### **5.1 ‘It’s far more important to know what person the disease has than what disease the person has.’ *Hippocrates 357 BC***

#### *Extending theory: incorporating the patient into a co-determined model of healthcare delivery behaviour*

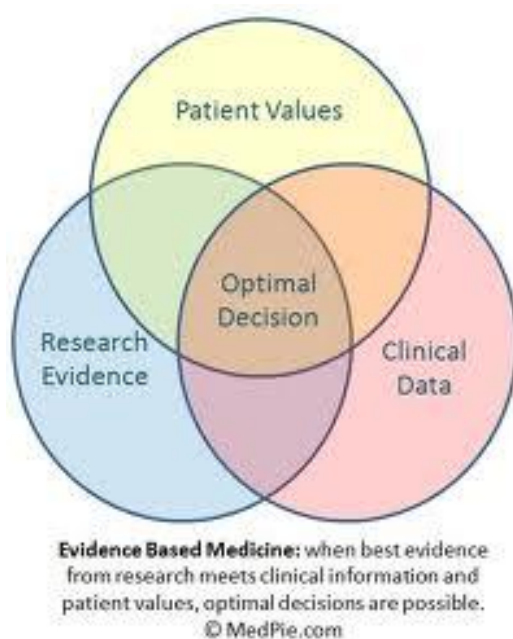
Behaviour change interventions have substantial promise as conduits for improved healthcare delivery by supporting the uptake of research evidence into routine clinical practice. The work presented in this thesis demonstrates the value of using behavioural theory in promoting clinician’s motivation in relation to their use of robust research evidence and as a way to more systematically identify relevant behaviour change techniques. The approach developed, however, has been less consistent in demonstrating behaviour change, even in the presence of strong motivation, and particularly so for the more complex behaviours examined. This suggests that further theorising is required beyond the point of intention in order to populate and bridge the intention-behaviour gap.

I believe that a fruitful avenue to pursue in this respect would be to turn attention to the point at which healthcare is delivered – the clinical encounter. The focus of the present work has been only on the behaviour of healthcare professionals, on the basis that they are, ultimately, the person or persons delivering healthcare (88). Technically this is true, since there are medicines and services that are only accessible to patients via their healthcare providers. But taking this viewpoint suggests that healthcare is something that healthcare professionals *do* to patients and that patients are simply passive recipients of care. It also assumes a one-sided source or ownership of information, knowledge and expertise that lies firmly within the domain of the healthcare professional (See (169–175) for comparisons of ‘traditional’ and ‘collaborative’ characterisations of patient/professional interactions). This is neither representative of how healthcare is (or should be) practiced or experienced, nor

is it compatible with the fast changing landscape of collaborative care driven by healthcare policy and widespread public access to healthcare information.

Whilst it can be argued that all behaviour is social, there is a uniqueness to the social context of healthcare delivery that cannot be adequately captured in a uni-dimensional model of healthcare professional behaviour. A fundamental uniqueness is that there will always be at least two people who are contributing to decisions made in relation to a patient's healthcare; two separate perspectives, each influenced by the owner's respective knowledge, understanding and experience of themselves, their wider social relationships and of the illness or health issue in question. Inextricably linked, it is the interaction of these perspectives that will inform and influence decision making in relation to an individual patient and their prevailing situation. Recognition of this dynamic is entirely in keeping with a true ethos of evidence based medicine (EBM) (176,177) (<http://tinyurl.com/nw2pt4v>), where research evidence, clinical judgement and patient experience each has a contributory role to play in the determination of an optimal healthcare decision (Figure 7). Indeed the findings from both the TRACII and IQuAD studies suggest that this is exactly how many of the GP participants are behaving when confronted with scenarios introducing patients into the context.

**Figure 7: The EBM Triad**



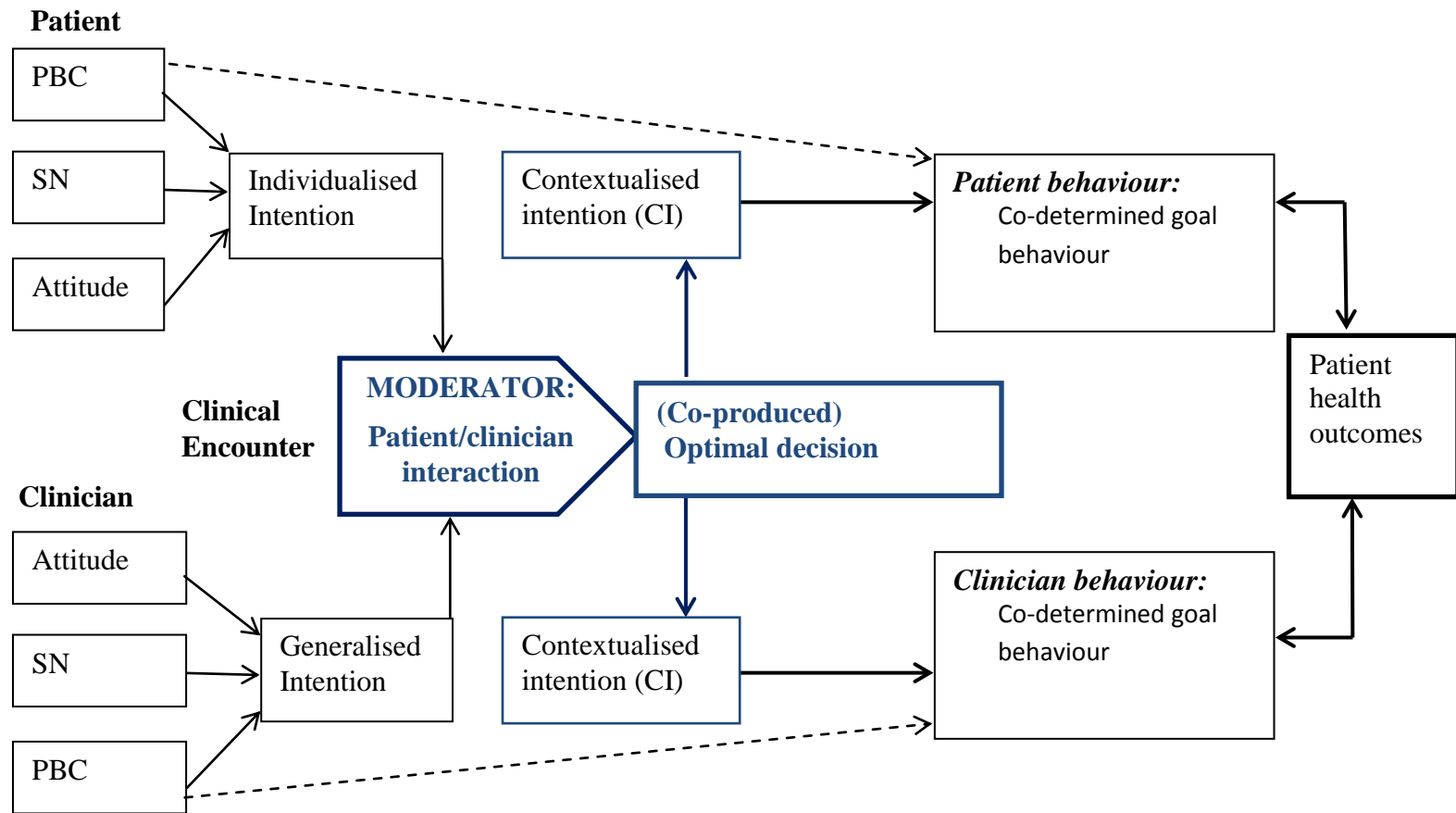
### *Adapting the model to accommodate dual perspectives*

As well as an explicit representation of the patient, the patient/clinician interaction has not been considered or captured within the theoretical model developed within the work presented in this thesis. It is my contention that these are both significant factors contributing to the inability of this model to adequately explain clinical behaviour. Given the consistent finding that patient and clinician perspectives can differ substantially, understanding the motivations of both in relation to the same novel recommendation is an essential first step in planning its implementation. This will identify where intervention is needed to create or improve positive and aligned intentions towards adoption of that innovation. Subsequently, I propose an extension to the exemplar model used so far (TPB); a dual perspective model of healthcare behaviour in which there are now two actors, the clinician and the patient, each with their own corresponding behavioural determinants (Figure 8). There also remains scope within this model to accommodate multiple perspectives during the same encounter (for example that of a patient's relative or other advocate), and possibly for modelling the influence of multiple encounters with different healthcare professionals contributing to a patient's team-based care (during the patients journey through a diabetes clinic for example).

#### Individualised and generalised intention:

The work presented in this thesis has aimed to capture clinicians' commonly held beliefs about barriers and facilitators to the uptake of evidence into practice, including patient-related factors that operate in the clinician's environment, and to theorise how such factors might influence clinicians' intention and subsequent behaviour. Salient patient features were also included in the scenarios used as a proxy measure for clinical behaviour to try to mimic as close as possible the clinical context. By presenting a series of patient scenarios, the aim here was also to use measures of intention and behaviour that were of similar levels of generality. Despite this, a relationship between these two measures was still not demonstrated, even in the presence of strong motivation. What I feel this suggests is that clinicians initially form *generalised*, in-principle, intentions towards novel (and perhaps also longstanding) recommendations, based on evidence derived at a population level,

**Figure 8: A dual perspective model for evidence-based healthcare (EBH):** The patient/clinician interaction as moderator of intention at the point of the clinical encounter.



which are then calibrated in the presence of an individual patient during the clinical encounter. For patients, pre-encounter intention is represented in Figure 8 as more *individualised* since they will form an intention relative to their own individual experience and how the evidence fits with this (if they are aware of the evidence).

Co-produced optimal decision and contextualised intention:

As well as now including a visual representation of the patient, the dual perspective model also formally incorporates the clinical encounter. The patient's individualised intention and the clinician's generalised intention are moderated by the patient /clinician interaction that takes place within this encounter. It is theorised that the outcome of this interaction is a co-produced decision about how best to optimally manage the patient's healthcare issue. Intention for both patient and clinician then becomes contextualised as a result of this optimal decision. Contextualised intention may remain unchanged and therefore be equal to the original intentions of patient and clinician, or it may be modified depending on salient factors identified at the time of the clinical encounter.

Co-determined goal behaviour:

Likewise, the subsequent goal behaviours of both patient and clinician are dependent on the co-produced optimal decision, and are, as such, co-determined.

The theorised pathways presented in the extended model provide several hypothesised routes from (original) intention through to co-determined goal behaviour that can be measured and tested empirically. The model also provides scope for developing better theoretical and empirical understanding of the relationship between the patient / healthcare professional interaction and the formation of optimal decisions, and how different features of that dynamic process may mediate this relationship.

*Using the dual perspective model to generate new thinking around 'evidence-based healthcare'*

As well as incorporating the clinical encounter within a broader visual representation of healthcare delivery behaviour, the inclusion of the patient perspective into the model is more in keeping with a true holistic EBM approach in that it implicitly incorporates all three fundamental tenets of evidence-based medicine (Figure 8). The apparent omission of the patient perspective in efforts to establish evidence-based healthcare has long been a concern within the health services research literature. In my early days of puzzling over this missing link and how, if at all, it could be addressed within a more comprehensive psychological model of healthcare delivery behaviour, I came across a paper by Bensing (2000) that resonated with the struggle I was having, but from a different disciplinary perspective (178). In this paper, the author was also lamenting how patient-centred care and evidence-based medicine were seen and mostly studied as separate paradigms. For me this publication encapsulated the need to bridge a seemingly counterproductive disciplinary and epistemological divide between two, historically polarised, fields of thought, since both are clearly needed to fully understand and realise true evidence-based healthcare (179–181).

Sackett et al (1996) (176) define EBM as the '... use of current best evidence in making decisions about the care of individual patients'. Ironically, the true concept of EBM within this definition actually attempts to draw these two camps together, but instead an apparent disciplinary turf war for ownership of what represents best evidence has ensued (182–187). Nonetheless, evidence-based medicine (or practice or healthcare as it is variably called) still attracts and retains considerable support from practitioners from all fields of healthcare, despite the fact that many also feel that conceptualisations of EBM have come to favour reductionist research evidence as the *best evidence* over all other forms of evidence. Experiential evidence (including both patient experience *and* clinical judgement) is felt to have become somewhat marginalised (188), with some authors going so far as to claim that EBM 'has failed to demonstrate its own effectiveness according to its own criteria' (e.g. (189); (190)).

The proposed dual perspective model is therefore also an attempt to address this divide by re-directing how we think about and understand not just healthcare professional behaviour, but how the behaviour of both clinicians and that of their patients is co-constructed by the dynamics of their inevitable interaction. Within this paradigm, focusing on only one side of an inter-dependent relationship seems nonsensical. Recognition of the need for more inclusive and cross-disciplinary models can be seen by the emergence of a number of multi-level frameworks in recent years that aim to encapsulate all possible influences on healthcare delivery throughout different layers of society and organisations (9,55,56,58,191–193). Yet none currently give explicit acknowledgement to the patient beyond being a rather passive recipient of care or as a factor to address within the clinician’s environment. Encouragingly, the importance of context and of service-users as a dynamic force within that is now also being realised across theoretical perspectives and epistemological traditions (191,194,195). The dual perspective model proposed within Figure 8 complements these broad conceptual models since it attempts to drill down even further to elaborate on, and guide change in, mechanisms underlying patient and clinician behaviour at the very fundamental point of care delivery.

## **5.2 ‘One of the most sincere forms of respect is actually listening to what another has to say.’ *Bryant H. McGill 2012***

*Developing theory: integrating theoretical and conceptual perspectives to understand and promote co-determined healthcare behaviour.*

Within the work undertaken within this thesis, the behaviour that we have aimed to change or promote (and understand), has been defined by the research evidence that we are attempting to implement into practice (e.g. symptomatic management of URTI, prescribing a statin for patients whose BMI is ...). This is entirely appropriate as an *aspired* optimum management behaviour to promote in healthcare professionals since it represents best available (clinical) evidence. However measuring only optimum practice of that behaviour as a reflection of its adoption into clinical practice will always be problematic, since it is unlikely to be the optimum management option (or choice) for all patients.



Firstly, research evidence is a tool to help *guide* and support appropriate healthcare decisions. Since clinical judgement and patient values will [should] play a role in evidence-based decision making, some variation in practice might still be expected, even in the face of strong research evidence. According to true EBM principles, this would be an acceptable state of affairs (provided those principles have been adhered to). Drawing on thinking from the field of health services research, the statement below illustrates these issues, describing why some variation in practice is ‘warranted’ since it reflects good patient-centred care.

*“If all variation were bad, solutions would be easy. The difficulty is in reducing the bad variation, which reflects the limits of professional knowledge and failures in its application, while preserving the good variation that makes care patient centred. When we fail, we provide services to patients who don’t need or wouldn’t choose them while we withhold the same services from people who do or would, generally making far more costly errors of overuse than of underuse.” Al Mulley 2010 (196)*

Secondly, if within the evidence-based paradigm we can still expect some legitimate variation, but then fail to acknowledge it as such, do we then risk stifling good practice as well as skewing estimations of bad practice?

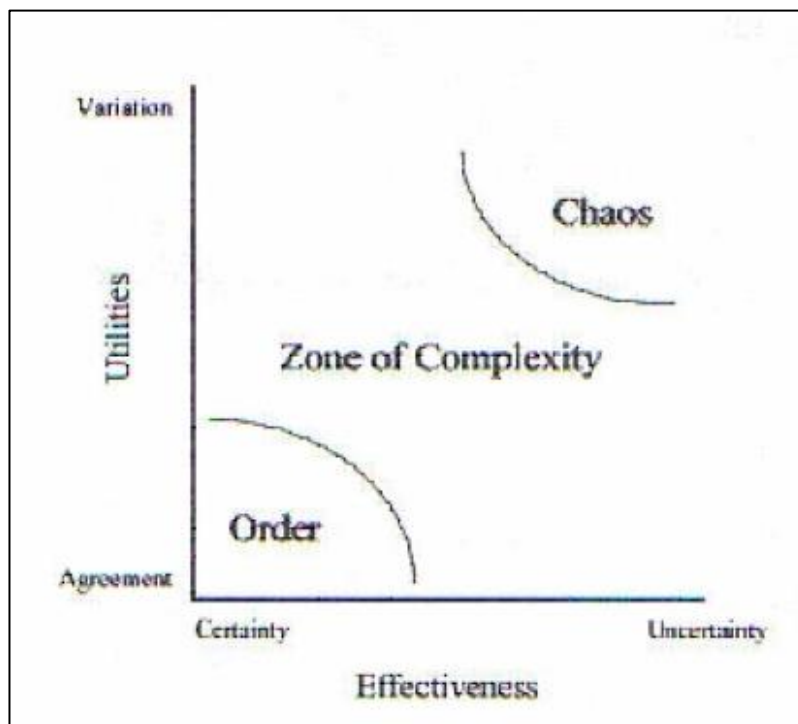
#### *Distinguishing ‘the good from the bad’ in healthcare decision making*

The issue then arises about how we identify and distinguish good (warranted) from bad (unwarranted) variation. In practice distinguishing between warranted and unwarranted variation is likely to be easiest (and more pertinent) where the research evidence is unequivocal and where there is also strong clinical and patient agreement that gains to be made far outweigh the risks. In this scenario of high certainty and clarity we could confidently expect there to be very little, if any, justifiable variation (197,198). However, this is an ideal, optimum scenario within which most of healthcare decision making does not readily fit. As certainty and clarity decreases on any or all three EBM dimensions, the scope for variation in practice increases and assessing what is good variation

becomes more subjective, since the context for decision making will be much more idiosyncratic.

The Stacey Diagram (Figure 9) (reproduced from Bohmer et al 2005 (199)) is helpful in illustrating this dilemma; deviations from expected practice falling within the 'Order' segment (where there is high clinical certainty and high patient agreement) are easier to identify. As uncertainty and agreement begin to diverge 'complexity' increases, until there is 'chaos'. There are many situations in healthcare where such uncertainties exist (198) and most of healthcare falls within Stacey's 'zone of uncertainty' (200);(Mulley 2011: TEDxDartmouth <http://www.youtube.com/watch?v=hnEIMhwM-OY>). A situation may exist for example where there is clarity in the evidence but, as suggested earlier, uncertainty in a clinician about its applicability to an individual patient in a particular circumstance; or there may clarity in the evidence, certainty in the clinician but uncertainty in the patient based on their personal experience or preference (198). In these scenarios distinguishing warranted from unwarranted variation is much more complex, since what is an optimal and valid) decision will be relative to the prevailing context in which it was made.

**Figure 9: The Stacey Diagram** (reproduced from: (199))



<http://www.youtube.com/watch?v=hnEIMhwM-OY>

### *Revisiting an old paradigm:*

In Mulley's statement above, it is suggested that warranted variation arises from good, patient-centred care. Since the counter argument to this is that unwarranted variation arises from an absence of, or poor, patient-centred care, a more fruitful approach to reducing only unwarranted variation might be to focus on improving the practice of good patient-centred care (201).

This in itself would not be a new endeavour, since the concept of patient-centred healthcare is one that arose in the health services research literature many decades ago in an attempt to improve the patient experience of healthcare by making it less disease and system focused. Fundamentally, patient-centred care is completely compatible with an evidence-based approach to healthcare. Yet despite considerable effort and relentless advocacy by international organisations - like, for example, The Picker Institute (202); the World Health Organisation (203), and the USA based Institute of Medicine (204) - change has been (familarly) slow (205). Whilst the essence of the concept remains unchanged, patient centred-care has, over almost 30 years, been variously defined (206), enacted (traditionally in terms of clinical communication skills) (207,208) and measured (e.g. (209,210), and these inconsistencies have contributed to the difficulties in its practical and effective application (178,206,211).

Nonetheless, evidence from the health services research literature provides some evidence for a positive effect of patient involvement in their care for improved quality and health outcomes (160,212–214). Given that the importance of patient-centeredness has also emerged as the central (and currently lacking) factor for improving the quality and safety of patient care in recent reviews of the NHS (215–217), it would appear imperative to revisit this old paradigm and its potential for enhancing the implementation of research evidence into routine practice.

### *Integrating learning and evidence from other approaches:*

In terms of developing the utility of the extended dual perspective model, I sought to explore what can be learned from other approaches that focus on the

interaction between patient and professional by building on the principles of EBM and patient-centred care. Here I discuss the merits of two approaches that feature quite prominently in current UK and international policy; shared decision making and behavioural goal setting, in terms of their value for facilitating the development of co-produced optimal decisions and goal behaviours.

Shared decision making (SDM):

SDM is an approach where clinicians and patients make decisions together using the best available evidence (137). It is a key method to facilitating patient centred care that has grown alongside this and a continually rising demand for healthcare due to changes in population demographics, technological advances in healthcare, as well as political and social drivers (218–222). SDM promotes greater patient involvement and co-creation of treatment decisions by actively including patients in discussions and decisions made about their care, aligning healthcare options with patient values and preferences (200). As well as being underpinned by an ethical rationale for more patient centred care, a function of SDM is to reduce unwarranted variation and more effective use of healthcare resources (218,219,223). Generally, SDM has focused on decision making within the patient-professional interaction but the approach now also recognises and encompasses the influence of their wider social environment (200,224). SDM has gained much momentum in recent years (225–227) and holds significant prominence in both UK NHS and USA health care policy (228–230).

Systematic review evidence supports SDM as a process to improve decision quality by enhancing knowledge, patient satisfaction with the decision making process, and realistic expectations, as well as by decreasing fears and decisional conflict (231). This latter finding is reinforced by other studies of SDM (222,232,233) and from the small, but growing, patient experience literature (211,234–242) that suggests where patient and clinician viewpoints become more closely aligned, patients experience more optimal care and improved clinical outcomes.

### *Current limitations of this approach*

Whilst drawing on the SDM paradigm for developing the utility of the dual perspective model appears to be a promising way forward, the approach is not without its own difficulties in implementation. Variation in conceptualisation, definition and application of the approach (243), and a subsequent lack of clear guidance about how best to accomplish SDM in the clinical encounter have contributed to this (200,211). However, efforts are in play aiming to remedy this, including calls for clarity of definition (244), and a recent focus on developing more pragmatic support for both patients and clinicians in the form of decision support tools (245,246); 'how to do it' style guides (200); and improved measurement techniques, that, encouragingly, include a recent interest in developing dyadic approaches to capture interactional behaviours (211,247–251).

### Goal setting:

Goal setting is a behaviour change technique for developing distal (general target outcomes) and proximal behavioural goals (specific intermediate action plans to support achievement of the target outcomes) (172). The technique is a key feature in many patient collaborative care educational programmes and strategies designed to support patient self-management of long-term and chronic illness (157). Such programmes are again deeply embedded in UK and international health policy for people with one or more long-term conditions (252). As an important feature of patient centred care, the focus of goal setting in this context is on patients and healthcare professionals working together, collaboratively, to reach agreement on shared goals for management, (172,253). It is widely considered to be a valuable tool for improving patients' self-management skills across a range of chronic conditions (e.g. diabetes (254,255), asthma (253), dementia (256), and neurological rehabilitation (257), and its use in the context of chronic illness is supported by a body of research on health-related behaviours suggesting that when patients participate in decisions, they are more likely to adopt the behaviours decided upon (162,172,258). A growing evidence-base also suggests that involving patients in their care through shared goal setting can be associated with improved clinical outcomes (159,169,259,260).

### *Current limitations of this approach*

As with SDM, and more general applications of patient-centred care, clear definition is lacking and understanding and use of goal setting as a strategy to support self-management of chronic illness varies (172,253). In the absence of detailed guidance about how to implement goal setting, Bodenheimer & Handley (2009) (172) reviewed approaches used in USA primary care and summarise this as a way of providing learning and pragmatic advice to healthcare professionals about how they might devise their own approaches. They also found that the perception that goal setting would be time consuming was commonly cited as a major barrier to its use by healthcare professionals. Similar conceptual variation and issues inhibiting implementation have also been noted in a small UK-based study (253). Importantly the latter study also explored and compared the (asthma) goals of patients and professionals in order to identify barriers and facilitators to achieving shared goals and patient-centred care. These authors found that whilst both patients and professionals identified similar categories (or types) of goal – for example work, personal, or illness related – patients were twice more likely to emphasise the importance of lifestyle related goals. Professionals on the other hand tended to focus on illness related goals and, in particular (for asthma at least), on medication management (253)

These authors also found that patients' goals were often tacit, not easily elicited, context dependent and transient, and link this to reluctance on the part of the patient to step outside traditional role perceptions and behavioural expectations. They concluded that to achieve shared goals, both patients and professionals will require a change in attitudes, including a clearer understanding of their own and each other's (new) roles and expertise in the management of their healthcare. These findings and conclusions resonate closely with those of recent work I have completed looking at patient involvement in improving patient safety (150). Williams et al (2011) (253) go on to suggest that professionals may benefit from training on how to elicit, and value, patients' more distal, lifestyle goals, and how to distinguish these from their proximal, transient goals. They cite Bradley (1999) (256) in support of their finding that goal setting within the clinical encounter may be inhibited or facilitated by factors such as patient participation, control and trust in the process.

## Summary of transferable learning & support:

Taken together, the evidence from these two key approaches provides rich and valuable learning to inform further development of the dual perspective model. It also lends considerable support to the propositions that the model makes:

- Firstly, the importance of targeting disparities between patient and clinician perspectives leading up to and during the clinical encounter is strengthened. This relates not only to beliefs and attitudes towards the target management of a given health complaint but also to role perceptions that inhibit or facilitate the way that patients and healthcare professionals interact.
- Secondly, the proposition of potential benefit from drawing on and integrating learning from different disciplinary perspectives is upheld. Since the reasons for the disparities may differ at two key time points (e.g. inhibiting role beliefs or poor understanding of recommendations prior to the encounter; poor or dominant representation of one perspective during the encounter) remedial action would therefore require a combination of intervention approaches (198); a behaviour change approach to promote positive cognitions and behaviour, and a decision support approach to facilitate a patient centred interaction and collaborative co-production of an optimal decision.
- Thirdly, the notion of an important role for factors that influence the nature of the patient / professional interaction (e.g. misaligned perceptions and/or the level of patient-centeredness or patient involvement; role uncertainty) as amenable mediators of relationships between constructs along the subsequent pathways from the clinical encounter to co-produced optimal decisions, contextualised intention and co-determined goal behaviours is supported.

Moving forward:

As well as valuable learning, review of the patient-centred approaches above has highlighted how they share common and familiar challenges with other approaches similarly hoping to realise timely and consistent implementation of innovation into routine practice. My critical sense of what may be contributing to this phenomenon within the work submitted in support of this thesis has hinged on its unilateral focus on healthcare professional behaviour. More generally I have struggled, not necessarily with the separate study of patients and professionals, but with the tendency to study them as if the behaviour of one (in terms of the delivery of healthcare) happens in isolation of the other. In looking to other approaches that focus on the interaction between the two perspectives for insight, I am inspired that combining methods and integrating philosophies for promoting and supporting mutual behaviour change has substantial promise as a way forward. Before this can happen however there needs to be careful work to address the ambiguities in current understanding and interpretations of 'patient-centred' and 'shared care'. This will provide a firm foundation, with clarity of definition and purpose, on which to build and develop both behaviour change interventions and interventions to support collaborative interactions between patients and their healthcare providers.

However, whilst this presents a step in the right direction, it would be naïve to think that achieving a consensus definition could ever be as straightforward as it looks on this page of a PhD thesis. The concept has been hotly debated for decades (see for example (261) & (262)). Furthermore, anyone who has studied implementation and / or worked in or with the NHS will know it would be equally naïve to underestimate the challenges to changing behaviour and culture that are implicit in the analysis above. The interface of healthcare delivery is only one layer in a very complex, dynamic and constantly changing organisation. Nonetheless everything that happens within and across those layers does so with a common purpose – to deliver safe, high quality and appropriate healthcare to its patients, that is underpinned by a robust evidence base. The interaction that takes places between patient and professional within the clinical encounter is the lynchpin of that endeavour.



### 5.3 Thinking ahead: Taking the ‘patient’ out of the centre of healthcare: *Supporting paper #8*

#### ***Supporting paper:***

8. **Hrisos S**, Thomson, RG. More required on the patient role and standardization *American Journal of Bioethics* 2013, **13**:8: 62-65  
<http://www.tandfonline.com/doi/abs/10.1080/15265161.2013.807184?journalCode=uajb20#.UspwYLRptfw>

Recently, the concept of patient-centred care has been discussed within the context of capabilities theory in a potentially ground breaking publication (206). I had the opportunity to co-author an invited peer commentary on this publication, which is the final paper submitted in support of this thesis (263). In their paper, Entwistle & Watt (2013) (206) suggest that it is the way that people (and especially health care staff) think about patient-centred care and health care quality more generally that has hindered the ability of health services to consistently deliver the kinds of experiences for patients that proponents of patient-centred care aspire to. These authors provide a very timely and thought provoking analysis of the situation that may well pave ‘The Road Ahead’ advocated by the Picker Institute (205). Entwistle & Watt argue convincingly for a re-definition of the concept of *patient*-centred care to one of ‘*person*-centred care’, making novel use of insights from the capabilities approach to characterise person-centred care as “*care that recognises and cultivates the capabilities associated with the concept of persons*”.

Within that definition, *person*-centred care becomes applicable to a “diverse range of patients and situations”. The emphasis is on “treating the patient as a person”, and thus as an “ethically significant” being, encouraging a fresh way of thinking that prevents the exclusion of the person when considering how healthcare is or should be delivered. Capabilities thinking has roots in philosophy and has been used as a way of thinking about how advantaged or disadvantaged people are, or how the quality of human lives can be assessed, and it is now well established in work on international human development and social justice (264–266).

The capabilities approach has two main concepts:

- **“Functionings”**: which are the things that people do - “ways of being” or “doings” – such as preparing meals for one’s family, working as a nurse, being malaria free, being literate.
- **“Capabilities”**: which are the real freedoms, genuine opportunities and powers that people have to achieve particular functionings. The capability to prepare meals for one’s family, for example, depends on having relevant resources (food and tools for cooking it), knowledge and skills, interpersonal proximity, and a position within the family from which sociocultural norms allow one to take on food preparation responsibility (206).

The basic idea of the capabilities approach is that ‘what makes for good lives’ is having capabilities for *valued* functionings. Entwistle & Watt suggest that this can encourage us to think, when we are considering the quality of people’s lives, about the extent to which they are genuinely free and able to be and do what it matters to them that they are able to be and do. In treating the patient as a person this might mean that healthcare professionals (and healthcare organisations) should:

- Focus on what is important to patients – by aiming to achieve as an outcome what the patient values as their “good life”, or by aiming not to disrupt or undermine that good life by imposing their (healthcare’s) aspired, or desired, outcomes on the patient.
- Be “responsive to, recognise, and cultivate” person-engagement – by fostering person engagement and involvement in their care and decisions about their care. Entwistle & Watt (2013) place the onus for recognising and cultivating patients’ ‘person-al’ capabilities squarely with the healthcare professional, based on their perception of what capabilities a person (the patient) has (or doesn’t have), or potentially has (or doesn’t have), to enable that person to achieve their (the patient’s) valued functionings, according to their good life.

On the face of it this might not sound so radically different from the conclusions or recommendations of other conceptualisations of patient-centred care – e.g. that healthcare should shift the focus away from thinking “how do I cure this disease or illness” to “how do I restore/maintain this person’s good life?” Neither are entirely new concepts. What I feel is radically different; however, is the notion that healthcare should “... *treat others as persons*”. This simple semantic change from “patient” to “person” could be, I believe, a potentially powerful change maker in its own right, since to treat people as ‘*persons*’ has quite different connotations to treating people as ‘*patients*’. The latter has a very distinct historical and powerful meaning of its own. Perhaps it is time to take the ‘patient’ out of the centre of care.

### *Cultivating capabilities*

Entwistle & Watt (206) propose that person-centred care can be understood in terms of their single guiding idea that it involves (healthcare professionals) recognising and cultivating (patients’) ‘person-al’ capabilities. Person-al capabilities are (loosely) defined as ‘a subset of capabilities (and/or their corresponding functionings) that is particularly associated with the concepts of being ‘persons’ and of being treated as ‘persons’, and that are, almost by definition, valued human capabilities’. Examples of personal capabilities might be to reason, to feel and respond to emotion, to intend and initiate action, to be self-aware and self-directing, and to be able to participate socially in a group or community of beings that recognises each other as having significant ethical privileges. An important tenet of the capabilities approach is the recognition that capabilities are “dynamically shaped by interactions between individuals and their environments, including their social relationships”. As Entwistle & Watt point out, there are many important senses in which the ways people treat each other enable them (or not) to feel and/or to be seen as “ethically significant beings.”

In preparing our commentary, Entwistle & Watt’s conceptualisation of cultivating capabilities prompted my co-author and me to reflect on our respective experiences of our research on patient involvement in two currently topical aspects of their healthcare (SDM and improving patient safety) (263).

Whilst we can both see huge potential for the application of the approach for understanding and moving forward person-centred care, we were somewhat perplexed at the rather marginal role assigned to the patient in the co-production of person-centred care. This was further confounded by the proposition that it should be the burden of healthcare professionals to recognise and cultivate the personal capabilities of patients. This immediately felt counter-intuitive, given Entwistle and Watt's argument for 'equality-mutuality' in the person / professional relationship, and unusual in the sense that there is a tacit assumption that healthcare professionals themselves possess both the necessary personal and *inter-personal* capabilities to recognise and foster the same in patients.

*Inter-personal capabilities for 'inter-person centred care'*

Within the context of enabling person-centred care, it is widely recognized that health care professionals hold a prime position in permitting (or denying) patient involvement in health care (267). Our recent work demonstrates the significance of this (150) and has led to the development of an approach to supporting patient involvement in improving their own safety that focuses on facilitating the patient / professional interaction. A key component of this is a responsibility for healthcare professionals to actively foster engagement and enquiring behaviours in patients. What this work further demonstrated, however, is that professionals also need support in doing this – since they too have insecurities relating to their interactions with patients in the context of involving them in their care (150).

The apparent lack of emphasis Entwistle and Watt (206) place on the potential for the patient to shape the behaviour of the healthcare professional is further surprising given that the expression of capabilities is framed within a relational context. In the commentary paper, I argued that patients (e.g. those who self-manage long term conditions) may often be in a position to both recognise and cultivate healthcare professionals' capabilities. This led us to propose a notion of 'inter-person centred care' and reciprocal inter-personal capabilities for both

patients and professionals in promoting and inhibiting the development or expression of mutual capabilities (263).

This latter proposition can be illustrated in relation to the findings of the study looking at goal setting discussed above (253). The traditional role perceptions and expectations identified as barriers to patient involvement in goal setting might be seen to be operating dynamically to frame and constrain the way both patients and professionals behave within this context. Williams et al's findings that patients place greater emphasis on lifestyle goals (their valued functionings) outside of the consultation than they express within that setting, and that professionals simultaneously place greater emphasis on illness focused goals, might be a reflection on the implicit but mutual understanding that conversations within this (time limited) context are limited to all things medical, including health as the *implicit* valued functioning. If the pursuit of non-health goals is not felt to be conducive to this environment then it is not affording patients genuine opportunities to realise *their* valued functionings and it is not affording healthcare professionals genuine opportunities to realise their valued functioning to provide truly patient (person) centred care.

#### Further possibilities for a capabilities approach

Though the application of a capabilities approach to healthcare is still in its early infancy, it shows exciting potential for engendering novel thinking around how we currently view healthcare, and the roles and behaviours of all those involved in its delivery and receipt. There are many other ways in which capabilities thinking can provide a novel lens through which to examine aspects of the dynamics within the patient / professional interaction that act to facilitate or inhibit patients' and professionals' capabilities for achieving person-centred care. Examples include the power imbalance within this relationship; the related tension between knowledge and values; understandings of professionalism and personhood within a context of person-centred healthcare; and perhaps the negative or unwanted consequences of constraining the expression of capabilities (e.g. preventing patients from achieving non-elicited but valued life goals; undermining or denigrating the role of the professional). Better understanding of these dynamics is essential to the advancement of

person-centred care, and the development and utility of a dual perspectives model for the implementation of evidence-based healthcare.

Better understanding of the range of personal and inter-personal capabilities that exist, and what separate and shared capabilities patients and healthcare professionals need for achieving person-centred care, as well as how healthcare professionals and patients might recognise these in each other, would inform the development of new or existing intervention approaches aiming to support and engender collaborative patient / professional interactions.

#### **5.4 Closing Summary**

This thesis provides a critical overview of a substantial programme of work that has resulted in the development and testing of an innovative approach to the development of interventions to promote change in clinical practice. The work described in supporting publications #1 - #6 has made an unequivocally important and influential contribution to the science of implementation. As well as providing methods for identifying and applying behavioural theory, the work has also set standards for transparency in intervention development processes. This precedent provides the basis for building a stronger, cumulative understanding of the processes underlying change and the adoption of new research technology, healthcare therapies and practice into routine healthcare delivery. Transparency also lends to more confident and consistent replication that will further support robust comparison across intervention studies and the synthesis of cross-study data. This can only serve to hasten growth in the field of implementation science that unrelentingly strives to bridge the chasm between research evidence and practice.

Whilst this work has shown that behaviour change interventions have substantial promise for improving healthcare delivery, it has also demonstrated the limitations of current models of individual behaviour in this endeavour. Psychological theories of behaviour do have an important function for understanding what drives, motivates and changes healthcare professional behaviour. However I have argued that the utility of their application to improvement and change in healthcare delivery is weakened by their inability to account for context and, in particular, the dynamic, rather than passive,

influence of the patient. That is not say that psychological theory does not have an important, if not essential, role to play in moving the implementation of innovation forward. Structured models do indeed provide valuable frameworks that help to organise evidence and ideas, and to use this to guide critical thinking and the generation and testing of new hypotheses. It is just to say that psychological theory cannot do this in isolation, it cannot provide the proverbial, and infamously elusive, silver bullet. Implementation of research evidence into practice not only requires multi-faceted, complex intervention, it also requires a multi-disciplinary, multi-level, holistic perspective.

In the final section of this submission, I present an extended dual perspective model of healthcare delivery that aims to illustrate the interdependency of professional and patient behaviour in determining healthcare decision making and patient outcomes. The framework functions at the very core of healthcare delivery, at the level of the clinical encounter. I have provided a strong evidential and theoretical rationale for the need to focus on better understanding of the interactional and relational processes that are generated during this encounter as an essential step forward for both implementation and improvement science.

My future work will now focus on illuminating these processes with a view to informing the development of interventions that encompass all three dimensions of the EBM paradigm and that provide support to both professionals and patients. Recent public scrutiny of UK healthcare organisations has emphasised the need for a more patient focussed approach to healthcare provision and delivery. Research evidence further underpins, and justifies, *person-centred* care as not only an ethical imperative but also as a mechanism for the delivery of safe and effective healthcare, that is grounded in best evidence. Revisiting this paradigm from a capabilities perspective provides exciting promise for a new direction in thinking about how patients and their healthcare providers might each be enabled to interact in a way that exemplifies this cornerstone concept. This will be the essence of my future research endeavours.

## References

1. Anonymous: Cognitive function and dementia in six areas of England and Wales: the distribution of MMSE and prevalence of GMS organicity level in the MRC CFA Study. The Medical Research Council Cognitive Function and Ageing Study (MRC CFAS). *Psychol. Med.* 1998;28(2):319–35.
2. Clarke MP, Wright CM, Hrisos S, Anderson JD, Henderson J, Richardson SR. Randomised controlled trial of treatment of unilateral visual impairment detected at preschool vision screening. *BMJ.* 2003;327(7426):1251.
3. Hrisos. S, Clarke M, Wright C. The emotional impact of amblyopia treatment in preschool children: randomised controlled trial. *Ophthalmology.* 2004;111(8):1550–6.
4. Hrisos. S, Clarke M, Kelly T, Henderson J, Wright C. Unilateral visual impairment and neurodevelopmental performance in preschool children. *Br. J. Ophthalmol.* 2006;90(7):836–8.
5. Haggerty H, Richardson S, Hrisos. S, Strong N, Clarke M. The Newcastle Control Score: a new method of grading the severity of intermittent distance exotropia. *Br. J. Ophthalmol.* 2004;88(2):233–5.
6. Buck D, Hatt S, Haggerty H, Hrisos. S, Strong N, Clarke M. The use of the Newcastle Control Score in the management of intermittent distance exotropia. *Br. J. Ophthalmol.* 2007;91(2):215–8.
7. Buck D, Clarke M, Haggerty H, Hrisos. S, Powell C, Sloper J, et al. Grading the severity of intermittent distance exotropia: the revised Newcastle Control Score. *Br. J. Ophthalmol.* 2008;92(4):577.
8. Weisz G, Cambrosio A, Keating P, Knaapen L, Schlich T, Tournay VJ. The emergence of clinical practice guidelines. *Milbank Q.* [Internet]. 2007 Dec;85(4):691–727. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18712285>
9. Ferlie EB, Shortell SM. Improving the quality of health care in the United Kingdom and the United States: a framework for change. *Milbank Q.* [Internet]. 2001 Jan;79(2):281–315. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2751188&tool=pmcentrez&rendertype=abstract>
10. Bowling A. *Research methods in health. Investigating health and health services.* 2nd ed. Open University Press; 2002.
11. Ketley D, Woods K. Impact of clinical trials on clinical practice: example of thrombolysis for acute myocardial infarction. *Lancet.* 1993;342(891-894).



12. Grol R. Successes and failures in the implementation of evidence-based guidelines for clinical practice. *Med. Care.* 2001;39(8 (suppl 2)):1146–54.
13. Schuster M a, McGlynn E a, Brook RH. How good is the quality of health care in the United States? 1998. *Milbank Q.* [Internet]. 2005 Jan;83(4):843–95. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2690270&tool=pmcentrez&rendertype=abstract>
14. Wennberg JE. Unwarranted variations in healthcare delivery: implications for academic medical centres. *BMJ.* 2002;(325.7370):961.
15. McGlynn E. The Quality of Health Care Delivered to Adults in the United States. *N Engl J Med.* 2003;348:2635–45.
16. Shortell S, Rundall T, Hsu J. Improving Patient Care by Linking Evidence-Based Medicine and Evidence-Based Management. *JAMA.* 2007;298(9):673–6.
17. Woolf S. The Meaning of Translational Research and Why It Matters. *JAMA.* 2008;299(2):211–3.
18. Grol R, Berwick DM, Wensing M. On the trail of quality and safety in health care. *BMJ* [Internet]. 2008 Jan 12;336(7635):74–6. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2190232&tool=pmcentrez&rendertype=abstract>
19. Chaudoir SR, Dugan AG, Barr CHI. Measuring factors affecting implementation of health innovations: a systematic review of structural, organizational, provider, patient, and innovation level measures. *Implement. Sci.* [Internet]. 2013 Jan;8:22. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3598720&tool=pmcentrez&rendertype=abstract>
20. National Academies Press. Institute of Medicine (US). Committee on Quality of Health Care in America. Crossing the quality chasm: A new health system for the 21st century. 2001.
21. Grol R, Grimshaw J. Research into practice. From best evidence to best practice : effective implementation of change in patients ' care. *Lancet.* 2003;362:1225–30.
22. Grimshaw JM, Eccles MP. Is evidence-based implementation of evidence-based care possible? *Med. J. Aust.* [Internet]. 2004 Mar 15;180(6 Suppl):S50–1. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15012580>
23. Aubry WM. The “ Tipping Point ” and Health Care Innovations : Advancing the Adoption of Beneficial Technologies. 2003;
24. Eccles MP, Armstrong D, Baker R, Cleary K, Davies H, Davies S, et al. An implementation research agenda. *Implement. Sci.* [Internet]. 2009 Jan

[cited 2013 Dec 14];4:18. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2671479&tool=pmcentrez&rendertype=abstract>

25. Grol R. Education and debate. *BMJ*. 1997;315(August):418–25.
26. Robertson N, Baker R, Hearnshaw H. Viewpoint Changing the clinical behaviour of doctors : psychological framework. 1996;(September 1995):51–4.
27. Kanouse D, Kallich J, Kahan J. Dissemination of effectiveness and outcomes research. *Health Policy (New York)*. 1995;34:167–92.
28. Davis D, Thomas M, Oxman A, Haynes R. Evidence for the effectiveness of CME. A review of 50 randomised controlled trials. *JAMA*. 1992;268:1111–7.
29. Baker R, Gillies C, Ej S, Cheater F, Flottorp S, Robertson N. Tailored interventions to overcome identified barriers to change : effects on professional practice and health care outcomes ( Review ). *Cochrane Collab*. 2010;(3).
30. Shojania K, Grimshaw J. “Still no magic bullets: pursuing more rigorous research in quality improvement.” *Am. J. Med*. 2004;116(11):778–80.
31. Oxman A, Fretheim A, Flottorp S. . “It is a capital mistake to theorize before one has data: a response to Eccle’s criticism of the OFF theory of research utilization.” *J. Clin. Epidemiol*. 2005;58(2):119–20.
32. Eccles MP, Grimshaw JM. Selecting, presenting and delivering clinical guidelines: are there any “magic bullets”? *Med. J. Aust*. [Internet]. 2004 Mar 15;180(6 Suppl):S52–4. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/15012581>
33. Oxman AD, Thomson MA, Pt B, Davis DA, Haynes RB. No Magic Bullets : A Systematic Review Of 102 Trials Of Interventions To Improve Professional Practice. 1995;153(10).
34. Oxford: Clarendon Press. *The Oxford english dictionary*. Vol. 2. 1989.
35. Grol R, Wensing M. What drives change? Barriers to and incentives for achieving evidence-based practice. *Med. J. Aust*. [Internet]. 2004 Mar 15;180(6 Suppl):S57–60. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/15012583>
36. Eccles M, Grimshaw J, Walker A, Johnston M, Pitts N. Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. *J. Clin. Epidemiol*. [Internet]. 2005 Feb [cited 2013 Dec 13];58(2):107–12. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/15680740>

37. Eccles M, Grimshaw J, Walker A, Johnston M, Pitts N. "Response to "the OFF theory of research utilization"." *J. Clin. Epidemiol.* 2005;58.2:117–8.
38. Foy R, Eccles M, Grimshaw J. Why does primary care need more implementation research? *Fam. Pract.* [Internet]. 2001 Aug;18(4):353–5. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/11477039>
39. Grol RPTM, Bosch MC, Hulscher MEJL, Eccles MP, Wensing M. Planning and studying improvement in patient care: the use of theoretical perspectives. *Milbank Q.* [Internet]. 2007 Jan;85(1):93–138. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2690312&tool=pmcentrez&rendertype=abstract>
40. Graham ID, Tetroe J. Some theoretical underpinnings of knowledge translation. *Acad. Emerg. Med.* [Internet]. 2007 Nov [cited 2013 Dec 13];14(11):936–41. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17967955>
41. Chalmers I. "If evidence-informed policy works in practice, does it matter if it doesn't work in theory?." *Evid. Policy A J. Res. Debate Pract.* 2005;1.2:227–42.
42. Oxman A, Sackett D, Chalmers I, Prescott T. "A surrealistic mega-analysis of reorganization theories." *J. R. Soc. Med.* 2005;98(12):563–8.
43. Bhattacharyya O, Reeves S, Garfinkel S, Zwarenstein M. Designing theoretically-informed implementation interventions: fine in theory, but evidence of effectiveness in practice is needed. *Implement. Sci.* [Internet]. 2006 Jan [cited 2013 Dec 12];1:5. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1436014&tool=pmcentrez&rendertype=abstract>
44. Grimshaw J, Thomas R, MacLennan G, Fraser C, Ramsay C, Vale L, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol. Assess. (Rockv).* 2004;8(6).
45. Freemantle N, Grilli R, Grimshaw J, Oxman A. Cochrane Collaboration on Effective Practice Implementing findings of medical research : the Cochrane Collaboration on Effective Professional Practice. 1995;45–7.
46. Wensing M, van der Weijden T, Grol R. Implementing guidelines and innovations in general practice: which interventions are effective? *Br. J. Gen. Pract.* [Internet]. 1998 Feb;48(427):991–7. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1409988&tool=pmcentrez&rendertype=abstract>
47. Bero L, Grilli R, Grimshaw J, Harvey E, Oxman A, Thomson M. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote implementation of research findings by healthcare professionals. *BMJ.* 1998;317(465-468).

48. Grimshaw J, Shirran L, Tride E, Mowatt G, Fraser C, Bero L. Changing provider behaviour: an overview of systematic reviews of interventions. *Med. Care.* 2001;39(suppl 2):11–2–11–45.
49. The Improved Clinical Effectiveness through Behavioural Research Group (ICEBeRG): Designing theoretically-informed implementation interventions. *Implement. Sci.* [Internet]. 2006 Jan [cited 2013 Dec 14];1:4. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1436012&tool=pmcentrez&rendertype=abstract>
50. Grol R, Wensing M, Eccles M, Davis D, editors. *Improving patient care: the implementation of change in health care.* John Wiley & Sons.; 2013.
51. Wensing M, Bosch M, Grol R. Developing and selecting interventions for translating knowledge to action. *Can. Med. Assoc. J.* 2010;
52. French B, Thomas LH, Baker P, Burton CR, Pennington L, Roddam H. What can management theories offer evidence-based practice? A comparative analysis of measurement tools for organisational context. *Implement. Sci.* [Internet]. 2009 Jan [cited 2014 Jul 11];4:28. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2694144&tool=pmcentrez&rendertype=abstract>
53. Rogers E. *Diffusion of Innovations.* New York: Free Press; 1995.
54. Greenhalgh T, Robert G, Macfarlane F, Bate P, Kyriakidou O. Diffusion of Innovations in Service Organizations: Systematic Review and Recommendations. *Milbank Q.* 2004;82:581–629.
55. May CR, Mair F, Finch T, MacFarlane A, Dowrick C, Treweek S, et al. Development of a theory of implementation and integration: Normalization Process Theory. *Implement. Sci.* [Internet]. 2009 Jan [cited 2013 Dec 17];4:29. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2693517&tool=pmcentrez&rendertype=abstract>
56. Rycroft-malone J. The PARIHS Framework — A Framework for Guiding the Implementation of Evidence-based Practice. *J. Nurs. Care Qual.* 2004;19(4):297–304.
57. Kitson A, Harvey G, McCormack B. Enabling the implementation of evidence based practice: a conceptual framework. *Qual. Health Care* [Internet]. 1998 Sep;7(3):149–58. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2483604&tool=pmcentrez&rendertype=abstract>
58. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement. Sci.* [Internet]. BioMed Central Ltd; 2011 Jan [cited 2013 Dec 11];6(1):42. Available from:

<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3096582&tool=pmcentrez&rendertype=abstract>

59. Campbell M, Fitzpatrick R, Haines A, Kinmonth AL, Sandercock P, Spiegelhalter D, et al. Framework for design and evaluation of complex interventions to improve health. *BMJ*. 2000;321(September).
60. Craig F, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ*. 2008;337 :a1655.
61. Woolf SH, Grol R, Hutchinson a, Eccles M, Grimshaw J. Clinical guidelines: potential benefits, limitations, and harms of clinical guidelines. *BMJ* [Internet]. 1999 Feb 20;318(7182):527–30. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1114973&tool=pmcentrez&rendertype=abstract>
62. The Clinical Effectiveness Research Agenda Group (CERAG). An Implementation Research Agenda A report prepared for the High Level Group on Clinical. 2009.
63. Cabana M, Rand C, Powe N, Wu A, Wilson M, Abboud P, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA*. 1999;282(15):1458–65.
64. Oxman A, Flottorp S. An overview of strategies to promote implementation of evidence-based practice in primary care. In: Silagy C, Haines A, editors. *Evidence-based Pract. Prim. care*. 2nd ed. London: BMJ Books; 2001.
65. Huggonet S, Pittet D. Hand hygiene-beliefs or science? *Clin. Microbiol. Infect.* [Internet]. 2000 Jul;6(7):350–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/11168150>
66. Pittet D. Improving compliance with hand hygiene in hospitals. *Infect. Control Hosp. Epidemiol.* [Internet]. 2000 Jun;21(6):381–6. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23221203>
67. O'Boyle C, Henly S, Larson E. Understanding adherence to hand hygiene in hospitals. *Am. J. Infect. Control*. 2001;29(6):352–60.
68. Solomon DH, Hashimoto H, Daltroy L, Liang MH. Techniques to improve physicians' use of diagnostic tests: a new conceptual framework. *JAMA* [Internet]. 1998 Dec 16;280(23):2020–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/9863854>
69. Dijkstra R, Braspenning J, Uiters E, Ballegooie E van, Grol R. Perceived barriers to the implementation of diabetes guidelines in hospitals in the Netherlands. *Neth. J. Med*. 2000;56(3):80–8.

70. Bonetti D, Pitts N, Eccles M, Grimshaw J, Johnston M, Steen N, et al. Applying psychological theory to evidence-based clinical practice: Identifying factors predictive of taking intra-oral radiograph. 2006;63(7).
71. Iles V, Sutherland K. Organisational change: a review for health care managers and professionals and researchers. London; 2001.
72. Eccles MP, Johnston M, Hrisos S, Francis J, Grimshaw J, Steen N, et al. Translating clinicians' beliefs into implementation interventions (TRACII): a protocol for an intervention modeling experiment to change clinicians' intentions to implement evidence-based practice. *Implement. Sci.* [Internet]. 2007 Jan [cited 2013 Dec 14];2:27. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1988805&tool=pmcentrez&rendertype=abstract>
73. Akl E a, Treweek S, Foy R, Francis J, Oxman AD. NorthStar, a support tool for the design and evaluation of quality improvement interventions in healthcare. *Implement. Sci.* [Internet]. 2007 Jan [cited 2013 Dec 14];2:19. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1913538&tool=pmcentrez&rendertype=abstract>
74. Conner M, Norman P, editors. *Predicting health behavior: Research and practice with social cognition models*. Buckingham: The Open University Press; 1996.
75. Rutter D, Quine L, editors. *Changing Health Behaviour*. Buckingham: Open University Press; 2002.
76. Ajzen I. The theory of planned behaviour. *Organ. Behav. Hum. Decis. Process.* 1991;50:179–211.
77. Godin G, Kok R. The Theory of Planned Behaviour: A Review of Its Applications to Health-related Behaviours. *Am. J. Heal. Promot.* 1996;11:87–98.
78. Armitage CJ, Conner M. Efficacy of the theory of planned behaviour: a meta-analytic review. *Br. J. Soc. Psychol.* [Internet]. 2001 Dec;40(Pt 4):472–99. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/11795063>
79. Sheeran P. Intention-behavior relations: A conceptual and empirical review. In: Stroebe W, Hewstone M, editors. *Eur. Rev. Soc. Psychol.* John Wiley & Sons Ltd; 2002. p. 1–36.
80. Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychol. Bull.* [Internet]. 2006 Mar [cited 2013 Dec 12];132(2):249–68. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/16536643>
81. Marteau T, Johnston M. Health professionals: A source of variance in health outcomes. *Psychol. Health.* 1991;5(1):47–58.

82. Fishbein M, Yzer M. Using Theory to Design Effective Health Behavior Interventions. *Commun. Theory*. 2003;2:164–83.
83. Godin G, Bélanger-Gravel A, Eccles M, Grimshaw J. Healthcare professionals' intentions and behaviours: a systematic review of studies based on social cognitive theories. *Implement. Sci.* [Internet]. 2008 Jan [cited 2013 Dec 12];3:36. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2507717&tool=pmcentrez&rendertype=abstract>
84. Légaré F, Graham I., O'Connor A, Aubin M, Baillargeon L, Leduc Y, et al. Prediction of health professionals' intention to screen for decisional conflict in clinical practice. *Heal. Expect.* 2007;10:364–79.
85. Bigham BL, Dainty KN, Scales DC, Morrison LJ, Brooks SC. Predictors of adopting therapeutic hypothermia for post-cardiac arrest patients among Canadian emergency and critical care physicians. *Resuscitation* [Internet]. 2010 Jan [cited 2013 Dec 14];81(1):20–4. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19913981>
86. Perkins MB, Jensen PS, Jaccard J, Gollwitzer P, Oettingen G, Pappadopulos E, et al. Applying theory-driven approaches to understanding and modifying clinicians' behavior: what do we know? *Psychiatr. Serv.* [Internet]. 2007 Mar;58(3):342–8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17325107>
87. Eccles MP, Hrisos S, Francis J, Kaner EF, Dickinson HO, Beyer F, et al. Do self-reported intentions predict clinicians' behaviour: a systematic review. *Implement. Sci.* [Internet]. 2006 Jan [cited 2013 Dec 14];1:28. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1664582&tool=pmcentrez&rendertype=abstract>
88. Walker AE, Grimshaw J, Johnston M, Pitts N, Steen N, Eccles M. PRIME-PRocess modelling in ImpleMEntation research: selecting a theoretical basis for interventions to change clinical practice. *BMC Health Serv. Res.* [Internet]. 2003 Dec 19;3(1):22. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=317340&tool=pmcentrez&rendertype=abstract>
89. Bonetti D, Eccles M, Johnston M, Steen N, Jeremy G, Baker R, et al. 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.* 2005;60(9):2135–47.
90. Butler CC, Hood K, Kinnersley P, Robling M, Prout H, Houston H. Predicting the clinical course of suspected acute viral upper respiratory tract infection in children. *Fam. Pract.* [Internet]. 2005 Feb [cited 2013 Dec 14];22(1):92–5. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15640294>
91. Mar C Del, Spinks AB. Antibiotics for sore throat ( Review ). 2006;

92. Spurling G, Del Mar C, Dooley L, Foxlee R, Farley R. Delayed antibiotics for respiratory infections ( Review ). 2013;(4).
93. Arroll B, Kenealy T, Kerse N. Do delayed prescriptions reduce antibiotic use in respiratory tract infections? A systematic review. *Br. J. Gen. Pract.* [Internet]. 2003 Nov;53(496):871–7. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1314731&tool=pmcentrez&rendertype=abstract>
94. Ashworth M, Latinovic R, Charlton J, Cox K, Rowlands G, Gulliford M. Why has antibiotic prescribing for respiratory illness declined in primary care? A longitudinal study using the General Practice Research Database. *J. Public Health (Oxf)*. [Internet]. 2004 Sep [cited 2013 Dec 14];26(3):268–74. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15454595>
95. Ashforth M, Charlton J, Ballard K, Latinovic R, Guildford M. Variations in antibiotic prescribing and consultation rates for acute respiratory infection in UK general practices 1995–2000. *Br. J. Gen. Pract.* 2005;55(603-606).
96. Fishbein M. Attitude and the prediction of behaviour. In: Fishbein M, editor. *Readings attitude theory Meas.* New York Wiley; 1967. p. 477–492 (TACT).
97. Hrisos S, Eccles M, Johnston M, Francis J, Kaner EFS, Steen N, et al. Developing the content of two behavioural interventions: using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics #1. *BMC Health Serv. Res.* [Internet]. 2008 Jan [cited 2013 Dec 14];8:11. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2267186&tool=pmcentrez&rendertype=abstract>
98. Bandura A. Health promotion from the perspective of social cognitive theory. In: Norman P, Abraham C, editors. *Underst. Chang. Heal. Behav. from beliefs to self-regulation.* Amsterdam: Harwood; 2000.
99. Bandura A. *Self-efficacy: the exercise of control.* New York: Freeman; 1997.
100. Blackman D. *Operant conditioning: an experimental analysis of behaviour.* Blackman D, editor. London: Methuen; 1974.
101. Abraham C, Michie S. A taxonomy of behavior change techniques used in interventions. *Health Psychol.* [Internet]. 2008 May [cited 2013 Dec 12];27(3):379–87. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18624603>
102. Michie S, Johnston M, Abraham C, Lawton R, Parker D, Walker a. Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual. Saf. Health Care* [Internet]. 2005 Feb [cited 2013 Dec 11];14(1):26–33. Available from:



<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1743963&tool=pmcentrez&rendertype=abstract>

103. Michie S, Johnston M, Francis J, Hardeman W, Eccles M. From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Appl. Psychol.* [Internet]. 2008 Oct [cited 2013 Dec 13];57(4):660–80. Available from:  
<http://doi.wiley.com/10.1111/j.1464-0597.2008.00341.x>
104. Walker A, Grimshaw J, Armstrong E. Salient beliefs and intentions to prescribe antibiotics for patients with sore throat. *Br. J. Health Psychol.* 2001;6:347–60.
105. Eccles MP, Grimshaw JM, Johnston M, Steen N, Pitts NB, Thomas R, et al. Applying psychological theories to evidence-based clinical practice: identifying factors predictive of managing upper respiratory tract infections without antibiotics. *Implement. Sci.* [Internet]. 2007 Jan [cited 2013 Dec 14];2:26. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2042498&tool=pmcentrez&rendertype=abstract>
106. Hrisos S, Eccles M, Johnston M, Francis J, Kaner EFS, Steen N, et al. An intervention modelling experiment to change GPs' intentions to implement evidence-based practice: using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics #2. *BMC Health Serv. Res.* [Internet]. 2008 Jan [cited 2013 Dec 14];8:10. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2262061&tool=pmcentrez&rendertype=abstract>
107. French SD, Green SE, O'Connor D a, McKenzie JE, Francis JJ, Michie S, et al. Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework. *Implement. Sci.* [Internet]. ???; 2012 Jan [cited 2013 Dec 12];7(1):38. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3443064&tool=pmcentrez&rendertype=abstract>
108. McDermott L, Yardley L, Little P, Ashworth M, Gulliford M. Developing a computer delivered, theory based intervention for guideline implementation in general practice. *BMC Fam. Pract.* [Internet]. 2010 Jan [cited 2013 Dec 15];11(1):90. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2995485&tool=pmcentrez&rendertype=abstract>
109. Kolehmainen N, Francis JJ. Specifying content and mechanisms of change in interventions to change professionals' practice: an illustration from the Good Goals study in occupational therapy. *Implement. Sci.* [Internet]. *Implementation Science*; 2012 Jan [cited 2013 Dec 15];7(1):100. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3502268&tool=pmcentrez&rendertype=abstract>

110. Francis AJJ, Eccles MP, Johnston M, Walker A, Grimshaw J, Foy R, et al. Constructing questionnaires based on the theory of planned behaviour a manual for health services researchers. 2004.
111. Gollwitzer P. Implementation intentions: Strong effects of simple plans. *Am. Psychol.* Vol. 1999;54(7):493–503.
112. Gollwitzer P, Sheeran P. Implementation intentions and goal achievement: a meta-analysis of effects and processes. *Adv. Exp. Soc. Psychol.* 2006;38:69–119.
113. Baron RM, Kenny D a. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* [Internet]. 1986 Dec;51(6):1173–82. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/3806354>
114. Hayes AF. Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. *Commun. Monogr.* [Internet]. 2009 Dec [cited 2013 Dec 12];76(4):408–20. Available from: <http://www.tandfonline.com/doi/abs/10.1080/03637750903310360>
115. Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav. Res. Methods. Instrum. Comput.* [Internet]. 2004 Nov;36(4):717–31. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15641418>
116. Analysis M, Kenny D. Mediation analysis. [Internet]. Website. [cited 2013 Dec 15]. Available from: <http://www.davidakenny.net/cm/mediate.htm>
117. Newton AS, Zou B, Hamm MP, Curran J, Gupta S, Dumonceaux C, et al. Improving child protection in the emergency department: a systematic review of professional interventions for health care providers. *Acad. Emerg. Med.* [Internet]. 2010 Feb [cited 2013 Dec 15];17(2):117–25. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3023813&tool=pmcentrez&rendertype=abstract>
118. Treweek S, Ricketts IW, Francis J, Eccles M, Bonetti D, Pitts NB, et al. Developing and evaluating interventions to reduce inappropriate prescribing by general practitioners of antibiotics for upper respiratory tract infections: a randomised controlled trial to compare paper-based and web-based modelling experiments. *Implement. Sci.* [Internet]. BioMed Central Ltd; 2011 Jan [cited 2013 Dec 12];6(1):16. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3058065&tool=pmcentrez&rendertype=abstract>
119. Milos V, Jakobsson U, Westerlund T, Melander E, Mölsted S, Midlöv P. Theory-based interventions to reduce prescription of antibiotics—a randomized controlled trial in Sweden. *Fam. Pract.* [Internet]. 2013 Aug 19;30(6):634–40. Available from: <http://fampra.oxfordjournals.org/content/early/2013/08/19/fampra.cmt043.abstract>

120. Treweek S, Jones C. A web-based intervention modelling experiment (WIME) using LifeGuide [Internet]. 2013. Available from: [www.lifeguideonline.org/file/download/wime2012](http://www.lifeguideonline.org/file/download/wime2012)
121. Bonetti D, Johnston M, Pitts N, Deery C, Ricketts I, Bahrami M, et al. Can psychological can psychological models bridge the gap between clinical guidelines and clinicians' behaviour? A randomised controlled trial of an intervention to influence dentists' intention to implement evidence-based practice. *Soc. Sci. Med.* 2005;60(9):2135–47.
122. Hrisos S, Eccles MP, Francis JJ, Dickinson HO, Kaner EFS, Beyer F, et al. Are there valid proxy measures of clinical behaviour? A systematic review. *Implement. Sci.* [Internet]. 2009 Jan [cited 2013 Dec 12];4:37. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2713194&tool=pmcentrez&rendertype=abstract>
123. Sutton S. Predicting and Explaining Intentions and Behavior: How Well Are We Doing?. *J. Appl. Soc. Psychol.* 1998;28:1317–38.
124. Fishbein M, Ajzen I. *Belief, attitude, intention and behavior: An introduction to theory and research.* 1975.
125. Ajzen I, Fishbein M. Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychol. Bull.* [Internet]. 1977;84(5):888–918. Available from: <http://content.apa.org/journals/bul/84/5/888>
126. Ajzen I, Fishbein M. *Understanding attitudes and predicting social behaviour.* null, editor. 1980. p. null.
127. Cooke R, Sheeran P. Moderation of cognition-intention and cognition-behaviour relations: A meta-analysis of properties of variables from the theory of planned behaviour. *British Journal of Social Psychology*, 43: 159–186. doi: *Br. J. Soc. Psychol.* 2004;43:159–86.
128. Sniehotta FF, Schwarzer R, Scholz U, Schüz B. Action planning and coping planning for long-term lifestyle change: theory and assessment. *Eur. J. Soc. Psychol.* 2005;35:565576.
129. Sniehotta FF, Scholz U, Schwarzer R. Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychol. Health.* 2007;20(2):143–60.
130. Van Hooft E, Born M, Taris T, van der Flier H, Blonk J. Bridging the gap between intentions and behavior: Implementation intentions, action control, and procrastination. *J. Vocat. Behav.* 2005;66(2):238–56.
131. Sniehotta FF. Towards a theory of intentional behaviour change: Plans, planning, and self-regulation. *British Journal of Health Psychology*, 14: 261–273. doi: *Br. J. Health Psychol.* 2009;14:261–73.

132. Sutton S. How does the Health Action Process Approach (HAPA) Bridge the Intention–Behavior Gap? An Examination of the Model’s Causal Structure. *Appl. Psychol.* [Internet]. 2008 Jan [cited 2013 Dec 17];57(1):66–74. Available from: <http://doi.wiley.com/10.1111/j.1464-0597.2007.00326.x>
133. Sutton S. Some suggestions for studying situational factors within the framework of attitude-behaviour models. *Psychol. Health* [Internet]. Routledge; 1996 Jul 1;11(5):635–9. Available from: <http://dx.doi.org/10.1080/08870449608404993>
134. Francis JJ, Eccles MP, Johnston M, Whitty P, Grimshaw JM, Kaner EFS, et al. Explaining the effects of an intervention designed to promote evidence-based diabetes care: a theory-based process evaluation of a pragmatic cluster randomised controlled trial. *Implement. Sci.* [Internet]. 2008 Jan [cited 2013 Dec 17];3:50. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2603022&tool=pmcentrez&rendertype=abstract>
135. Dijkstra R, Braspenning J, Grol R. Implementing diabetes passports to focus practice reorganization on improving diabetes care. *Int. J. Qual. Health Care* [Internet]. 2008 Feb;20(1):72–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18024508>
136. Eccles MP, Whitty PM, Speed C, Steen IN, Vanoli A, Hawthorne GC, et al. A pragmatic cluster randomised controlled trial of a Diabetes REcall And Management system: the DREAM trial. *Implement. Sci.* [Internet]. 2007 Jan [cited 2013 Dec 17];2:6. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1804280&tool=pmcentrez&rendertype=abstract>
137. Elwyn G, Bekkers M-J, Tapp L, Edwards A, Newcombe R, Eriksson T, et al. Facilitating organisational development using a group-based formative assessment and benchmarking method: design and implementation of the International Family Practice Maturity Matrix. *Qual. Saf. Health Care* [Internet]. 2010 Dec 1 [cited 2013 Dec 17];19(6):e48. Available from: <http://qualitysafety.bmj.com/content/19/6/1.53.abstract>
138. Eccles MP, Hrisos S, Francis JJ, Stamp E, Johnston M, Hawthorne G, et al. Instrument development, data collection, and characteristics of practices, staff, and measures in the Improving Quality of Care in Diabetes (iQuaD) Study. *Implement. Sci.* [Internet]. BioMed Central Ltd; 2011 Jan [cited 2013 Dec 17];6(1):61. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3130687&tool=pmcentrez&rendertype=abstract>
139. Eccles MP, Hawthorne G, Johnston M, Hunter M, Steen N, Francis J, et al. Improving the delivery of care for patients with diabetes through understanding optimised team work and organisation in primary care. *Implement. Sci.* [Internet]. 2009 Jan [cited 2013 Dec 17];4:22. Available from:

<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2680803&tool=pmcentrez&rendertype=abstract>

140. Foy R, Hawthorne G, Gibb I, Eccles MP, Steen N, Hrisos S, et al. A cluster randomised controlled trial of educational prompts in diabetes care: study protocol. *Implement. Sci.* [Internet]. 2007 Jan [cited 2013 Dec 17];2:22. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1973073&tool=pmcentrez&rendertype=abstract>
141. Davies HT, Nutley SM, Mannion R. Organisational culture and quality of health care. *Qual. Health Care* [Internet]. 2000 Jun;9(2):111–9. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1743521&tool=pmcentrez&rendertype=abstract>
142. Elovainio M, Kivimäki M, Vahtera J. Organisational justice: evidence of a new psychosocial predictor of health. *Am. J. Public Health.* 2002;92(1):105–10.
143. Blau P. *Exchange and power in social life.* New York: Wiley; 1964.
144. Homans G. Social Behavior as Exchange. *Am. J. Sociol.* 1991;76(6):845–55.
145. Kivimäki M, Elovainio M. A short version of the Team Climate Inventory: Development and psychometric properties. *J. Occup. Organ. Psychol.* 1999;72(2):241–6.
146. Moorman R. Relationship between organizational justice and organizational citizenship behaviors: Do fairness perceptions influence employee citizenship?
147. Karasek R. *Job content questionnaire and user's guide.* 1985.
148. Goldberg D, Hillier V. A scaled version of the General Health Questionnaire. *Psychol. Med.* 1979;9:139–45.
149. Verplanken B, Orbell S. Reflections on past behavior: a self-report index of habit strength. *J. Appl. Soc. Psychol.* 2003;33:1313–30.
150. Hrisos S, Thomson R. Seeing It from Both Sides: Do Approaches to Involving Patients in Improving Their Safety Risk Damaging the Trust between Patients and Healthcare Professionals? An Interview Study. *PLoS One* [Internet]. 2013 Jan [cited 2013 Dec 17];8(11):e80759. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3819291&tool=pmcentrez&rendertype=abstract>
151. Hawthorne G, Hrisos S, Stamp E, Elovainio M, Francis JJ, Grimshaw JM, et al. Diabetes care provision in UK primary care practices. *PLoS One* [Internet]. 2012 Jan [cited 2013 Dec 17];7(7):e41562. Available from:

<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3408463&tool=pmcentrez&rendertype=abstract>

152. Elovainio M, Steen N, Presseau J, Francis J, Hrisos S, Hawthorne G, et al. Is organizational justice associated with clinical performance in the care for patients with diabetes in primary care? Evidence from the improving Quality of care in Diabetes study. *Fam. Pract.* [Internet]. 2013 Feb [cited 2013 Dec 17];30(1):31–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22936716>
153. Presseau J, Johnston M, Francis JJ, Hrisos S, Stamp E, Steen N, et al. Theory-based predictors of multiple clinician behaviors in the management of diabetes. *J. Behav. Med.* [Internet]. 2013 May 14 [cited 2013 Dec 12]; Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23670643>
154. Presseau J, Johnston M, Eccles MP, Francis JJ, Steen N, Elovainio M, et al. Reflective and automatic processes in healthcare professional behaviour: an application of a dual process model. *Psychol. Health.* 2013;27:105–6.
155. Presseau J, Johnston M, Johnston DW, Elovainio M, Hrisos S, Steen N, et al. Environmental and individual correlates of distress: Testing Karasek's Demand-Control model in 99 primary care clinical environments. *Br. J. Health Psychol.* 2013;
156. Krichbaum K, Asrestad V, Bueth M. Exploring the Connection Between Self-Efficacy and Effective Diabetes Self-f Management. *Diabetes Educ.* 2003;29(4):653–62.
157. Coleman MT, Newton KS. Supporting self-management in patients with chronic illness. *Am. Fam. Physician* [Internet]. 2005 Oct 15;72(8):1503–10. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/16273817>
158. Tahmasebi R, Noroozi A, Tavaflan S. Determinants of Self-Management Among Diabetic Patients A Path Analysis. *Asia-Pacific J. Public Heal.* 2013;
159. Heisler M, Smith DM, Hayward R a, Krein SL, Kerr E a. How well do patients' assessments of their diabetes self-management correlate with actual glycemic control and receipt of recommended diabetes services? *Diabetes Care* [Internet]. 2003 Mar;26(3):738–43. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/12610031>
160. Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Aff. (Millwood).* [Internet]. 2013 Feb [cited 2013 Dec 11];32(2):207–14. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23381511>
161. Heisler M, Cole I, Weir D, Kerr E, Hayward R. Does Physician Communication Influence Older Patients' Diabetes Self-Management and

Glycemic Control? Results From the Health and Retirement Study (HRS) 1435-1442. *J Gerontol A Biol Sci Med Sci.* 2007;62(12):1435–42.

162. Heisler M, Vijan S, Anderson RM, Ubel P a, Bernstein SJ, Hofer TP. When do patients and their physicians agree on diabetes treatment goals and strategies, and what difference does it make? *J. Gen. Intern. Med.* [Internet]. 2003 Nov;18(11):893–902. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1494939&tool=pmcentrez&rendertype=abstract>
163. Aikens J, Bingham R, Piette J. Patient-Provider Communication and Self-care Behavior Among Type 2 Diabetes Patients. *Diabetes Educ.* 2005;31(5):681–90.
164. Hrisos S, Eccles MP, Francis JJ, Bosch M, Dijkstra R, Johnston M, et al. Using psychological theory to understand the clinical management of type 2 diabetes in Primary Care: a comparison across two European countries. *BMC Health Serv. Res.* [Internet]. 2009 Jan [cited 2013 Dec 14];9:140. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2729744&tool=pmcentrez&rendertype=abstract>
165. Sassen B, Kok G, Vanhees L. Predictors of healthcare professionals' intention and behaviour to encourage physical activity in patients with cardiovascular risk factors. *BMC Public Health* [Internet]. BioMed Central Ltd; 2011 Jan [cited 2013 Dec 17];11(1):246. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3104375&tool=pmcentrez&rendertype=abstract>
166. Ly B, Gagnon M, Rousseau M. Prévalence et facteurs associés aux données manquantes des registres de consultations médicales des médecins des centres de santé communautaires de bamako. 2012.
167. Tsiantou V, Shea S, Martinez L, Agius D, Basak O, Faresjö T, et al. Eliciting general practitioners' salient beliefs towards prescribing: A qualitative study based on the Theory of Planned Behaviour in Greece. *J. Clin. Pharm. Ther.* 2013;38:109–14.
168. Hanbury A, Farley K, Thompson C, Wilson P, Chambers D. Challenges in identifying barriers to adoption in a theory-based implementation study: lessons for future implementation studies. *BMC Health Serv. Res.* [Internet]. BMC Health Services Research; 2012 Jan [cited 2013 Dec 12];12(1):422. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3537535&tool=pmcentrez&rendertype=abstract>
169. The Health Foundation. Co-creating health : building partnerships [Internet]. 2008. Available from: [www.health.org.uk](http://www.health.org.uk)
170. The Health Foundation. Snapshot: Overcoming challenges to improving quality. 2011.

171. Bodenheimer T. Patient Self-management of Chronic Disease in Primary Care. *Jama* [Internet]. 2002 Nov 20 [cited 2013 Dec 12];288(19):2469. Available from:  
<http://jama.jamanetwork.com/article.aspx?doi=10.1001/jama.288.19.2469>
172. Bodenheimer T, Handley MA. Goal-setting for behavior change in primary care : An exploration and status report. *Patient Educ. Couns.* 2009;76:174–80.
173. The Health Foundation . Implementing shared decision making. 2013.
174. Holman H, Lorig K. Patients as partners in managing chronic disease. *BMJ.* 2000;320(7234):526–7.
175. Lorig K, Ritter PL, Plant K. A disease-specific self-help program compared with a generalized chronic disease self-help program for arthritis patients. *Arthritis Rheum.* [Internet]. 2005 Dec 15 [cited 2013 Dec 17];53(6):950–7. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/16342084>
176. Sackett D, Rosenberg W, Gray J, Haynes R, Richardson W. Evidence based medicine: what it is and what it isn't. *BMJ.* 1996;312:71.
177. Sackett DL. Evidence-based medicine. *Spine (Phila. Pa. 1976).* [Internet]. 1998 May 15;23(10):1085–6. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/17340682>
178. Bensing J. Bridging the gap. The separate worlds of evidence-based medicine and patient-centered medicine. *Patient Educ. Couns.* [Internet]. 2000 Jan;39(1):17–25. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/11013544>
179. Davidoff F. Heterogeneity Is Not Always Noise. Lessons From Improvement. *JAMA.* 2009;302(23):2580–6.
180. Øvretveit J. Understanding the conditions for improvement: research to discover which context influences affect improvement success. *BMJ Qual. Saf.* [Internet]. 2011 Apr [cited 2014 Jan 7];20 Suppl 1(Suppl 1):i18–23. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3066695&tool=pmcentrez&rendertype=abstract>
181. Glasziou P, Ogrinc G, Goodman S. Can evidence-based medicine and clinical quality improvement learn from each other? *BMJ Qual. Saf.* [Internet]. 2011 Apr [cited 2013 Dec 12];20 Suppl 1(Suppl 1):i13–17. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3066698&tool=pmcentrez&rendertype=abstract>
182. Porter S, O'Halloran P. The postmodernist war on evidence-based practice. *Int. J. Nurs. Stud.* [Internet]. 2009 May [cited 2013 Dec



17];46(5):740–8. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/19117568>

183. Ogilvie D, Craig P, Griffin S, Macintyre S, Wareham NJ. A translational framework for public health research. *BMC Public Health* [Internet]. 2009 Jan [cited 2013 Dec 12];9:116. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2681470&tool=pmcentrez&rendertype=abstract>
184. Holmes D, Murray SJ, Perron A. “Insufficient” but still “necessary”? EBPM’s dangerous leap of faith: commentary on Porter and O’Halloran (2009). *Int. J. Nurs. Stud.* [Internet]. 2009 May [cited 2014 Jan 5];46(5):749–50. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/19217106>
185. Porter S, O’Halloran P. Postmodernism and evidence-based practice: a reply to Holmes et al. (2009). *Int. J. Nurs. Stud.* [Internet]. 2010 Apr [cited 2014 Jan 5];47(4):529–30. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/19836747>
186. Bonell C, Fletcher A, Morton M, Lorenc T, Moore L. Realist randomised controlled trials: a new approach to evaluating complex public health interventions. *Soc. Sci. Med.* [Internet]. Elsevier Ltd; 2012 Dec [cited 2014 Jan 5];75(12):2299–306. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/22989491>
187. Marchal B, Westhorp G, Wong G, Van Belle S, Greenhalgh T, Kegels G, et al. Realist RCTs of complex interventions - an oxymoron. *Soc. Sci. Med.* [Internet]. Elsevier Ltd; 2013 Oct [cited 2014 Jan 5];94:124–8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23850482>
188. Rycroft-Malone J, Seers K, Titchen A, Harvey G, Kitson A, McCormack B. What counts as evidence in evidence-based practice? *J. Adv. Nurs.* [Internet]. 2004 Jul;47(1):81–90. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/21733101>
189. Freshwater D, Rolfe G. *Deconstructing evidence-based practice.* Psychol. Press. 2004;
190. Tonelli M. Integrating evidence into clinical practice : an alternative to evidence-based approaches. *J. Eval. Clin. Pract.* 2006;12(3):248–56.
191. Wensing M, Oxman A, Baker R, Godycki-Cwirko M, Flottorp S, Szecsenyi J, et al. Tailored Implementation For Chronic Diseases (TICD): a project protocol. *Implement. Sci.* [Internet]. BioMed Central Ltd; 2011 Jan [cited 2013 Dec 12];6(1):103. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3179734&tool=pmcentrez&rendertype=abstract>
192. Murray E, Treweek S, Pope C, MacFarlane A, Ballini L, Dowrick C, et al. Normalisation process theory: a framework for developing, evaluating and implementing complex interventions. *BMC Med.* [Internet]. BioMed

Central Ltd; 2010 Jan [cited 2013 Dec 12];8(1):63. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2978112&tool=pmcentrez&rendertype=abstract>

193. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander J a, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement. Sci.* [Internet]. 2009 Jan [cited 2013 Dec 12];4:50. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2736161&tool=pmcentrez&rendertype=abstract>
194. Rycroft-Malone J, Seers K, Chandler J, Hawkes C a, Crichton N, Allen C, et al. The role of evidence, context, and facilitation in an implementation trial: implications for the development of the PARIHS framework. *Implement. Sci.* [Internet]. 2013 Jan;8:28. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3636004&tool=pmcentrez&rendertype=abstract>
195. May C. Towards a general theory of implementation. *Implement. Sci.* [Internet]. *Implementation Science*; 2013 Jan [cited 2013 Dec 17];8(1):18. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3602092&tool=pmcentrez&rendertype=abstract>
196. Mulley A. Improving productivity in the NHS. Reducing practice variation through better decision making is key. *BMJ.* 2010;341(c3965).
197. Falit BP. Twisting the truth: tinkering with patient decision aids to reduce health care expenditures. *Yale J. Biol. Med.* [Internet]. 2008 Mar;81(1):43–7. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2442725&tool=pmcentrez&rendertype=abstract>
198. Elwyn G, Frosch D, Rollnick S. Dual equipoise shared decision making: definitions for decision and behaviour support interventions. *Implement. Sci.* [Internet]. 2009 Jan [cited 2013 Dec 12];4:75. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2784743&tool=pmcentrez&rendertype=abstract>
199. Bohmer R, Sepucha J, Feldman L. “Shared Decision Making.” *Harvard Bus. Sch.* 2005. p. 604–001.
200. Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J. Gen. Intern. Med.* [Internet]. 2012 Oct [cited 2013 Dec 12];27(10):1361–7. Available from:  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3445676&tool=pmcentrez&rendertype=abstract>
201. Mulley A, Trimble C, Elwyn G. PATIENTS ’ PREFERENCES MATTER Stop the silent misdiagnosis. 2012.

202. Picker. The Picker Institute [Internet]. Improv. Healthc. through eyes patients. 2013 [cited 2013 Oct 8]. Available from: <http://pickerinstitute.org/>
203. WHO. WHO South-East Asia and Western Pacific Bi-regional Publication [Internet]. People Cent. Heal. care Harmon. mind body, people Syst. 2013 [cited 2013 Oct 8]. Available from: [http://www.wpro.who.int/publications/PUB\\_139789290613169/en/index.html](http://www.wpro.who.int/publications/PUB_139789290613169/en/index.html)
204. Institute of Medicine. Crossing The Quality Chasm: A New Health System For The 21st Century. 2001.
205. The Picker Institute. Patient-Centered Care : The Road Ahead [Internet]. 2013 p. 16. Available from: <http://pickerinstitute.org/wp-content/uploads/2013/03/Patient-Centered-Care-The-Road-Ahead.pdf>
206. Entwistle VA, Watt IS. Treating Patients as Persons : A Capabilities Approach to Support Delivery of Person-Centered Care Treating Patients as Persons : A Capabilities Approach to Support Delivery of Person-Centered Care. *Am. J. Bioeth.* [Internet]. 2013 Jan [cited 2013 Dec 12];13(8):29–39. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3746461&tool=pmcentrez&rendertype=abstract>
207. Levinson W, Lesser C, Epstein R. Developing physician communication skills for patient-centered care. *Heal. Aff. (Project Hope)*. 2010;29(7):1310–8.
208. Silverman J, Kurtz S, Draper J, Al. E. Skills for communicating with patients. Abingdon: Radcliffe Medical Press. 1998.
209. Roter D, Larson S. The Roter interaction analysis system (RIAS): utility and flexibility for analysis of medical interactions. *Patient Educ Couns.* 2002;46(4):243–51.
210. Epstein R, Franks P, Fiscella K, Shields C, Meldrum S, Kravitz R, et al. Measuring patient-centered communication in Patient–Physician consultations: Theoretical and practical issues. *Soc. Sci. Med.* 2005;61(7):1516–28.
211. Sanders ARJ, van Weeghel I, Vogelaar M, Verheul W, Pieters RHM, de Wit NJ, et al. Effects of improved patient participation in primary care on health-related outcomes: a systematic review. *Fam. Pract.* [Internet]. 2013 Aug [cited 2013 Dec 12];30(4):365–78. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23629738>
212. Greene J, Hibbard J. Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. *J. Gen. Intern. Med.* 2012;27:520–526.
213. Hibbard JH, Greene J, Overton V. Patients with lower activation associated with higher costs; delivery systems should know their patients'

- “scores”. *Health Aff. (Millwood)*. [Internet]. 2013 Feb [cited 2013 Dec 11];32(2):216–22. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23381513>
214. Hibbard JH, Cunningham PJ. How engaged are consumers in their health and health care, and why does it matter? *Res. Brief* [Internet]. 2008 Oct;(8):1–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18946947>
  215. Francis R. Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry Executive summary Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry [Internet]. 2013. Available from: <http://www.midstaffpublicinquiry.com/report>
  216. Keogh BS. Review into the quality of care and treatment provided by 14 hospital trusts in England : overview report [Internet]. 2013. Available from: <http://www.nhs.uk/NHSEngland/bruce-keogh-review/Documents/outcomes/keogh-review-final-report.pdf>
  217. National Advisory Group. A promise to learn – a commitment to act Improving the Safety of Patients in England [Internet]. 2013. Available from: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/226703/Berwick\\_Report.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226703/Berwick_Report.pdf)
  218. Stiggelbout AM, Wit MPT De, Frosch D, Montori VM, Trevena L, Elwyn G. Shared decision making : really putting patients at the centre of healthcare. 2012;256(January):1–6.
  219. Edwards A, Elwyn G. Shared decision-making in health care: achieving evidence-based patient choice. 2nd ed. Edwards A, Elwyn G, editors. Oxford: Oxford University Press; 2009.
  220. Coulter A. Engaging patients in healthcare,. Maidenhead: McGraw- Hill; 2011.
  221. Mol A. The logic of care: health and the problem of patient choice. Abingdon: Routledge; 2008.
  222. Kasper J, Heesen C, Köpke S, Fulcher G, Geiger F. Patients' and observers' perceptions of involvement differ. Validation study on inter-relating measures for shared decision making. *PLoS One* [Internet]. 2011 Jan [cited 2014 Jan 5];6(10):e26255. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3197148&tool=pmcentrez&rendertype=abstract>
  223. Braddock CH. Supporting Shared Decision Making When Clinical Evidence Is Low. *Med. Care Res. Rev.* 2013;70(1, no.1 suppl):129S–140S.
  224. Rapley T. Distributed decision making: the anatomy of decisions-in-action. *Sociol. Health Illn.* [Internet]. 2008 Apr [cited 2014 Jan

5];30(3):429–44. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/18194358>

225. O'Connor AM, Wennberg JE, Legare F, Llewellyn-Thomas H a, Moulton BW, Sepucha KR, et al. Toward the “tipping point”: decision aids and informed patient choice. *Health Aff. (Millwood)*. [Internet]. 2007 [cited 2014 Jan 5];26(3):716–25. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/17485749>
226. Elwyn G, Laitner S, Coulter A, Walker E, Watson P, Thomson R. Implementing shared decision making in the NHS and patients should be the first step in giving patients choice. *BMJ*. 2010;341(November):971–5.
227. Barry MJ, Edgman-Levitan S. Shared decision making--pinnacle of patient-centered care. *N. Engl. J. Med.* [Internet]. 2012 Mar 1;366(9):780–1. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22375967>
228. Department of Health. *Equity and excellence: Liberating the NHS*. London: HMS Stationery Office. Crown Copyright; 2010.
229. Department of Health. *Patient experience in adult NHS services: improving the experience of care for people using adult NHS services. Patient experience in generic terms Clinical Guidance Methods, evidence and recommendations*. London: National Clinical Guideline Centre; 2012.
230. Senate and House of Representatives. *Patient Protection and Affordable Care Act*. [Internet]. Washington: One Hundred Eleventh Congress of the United States of America; 2010. Available from:  
<http://www.gpo.gov/fdsys/pkg/BILLS-111hr3590enr/pdf/BILLS-111hr3590enr.pdf>
231. Stacey D, Bennett C, Barry M, Col N, Eden K, Holmes-Rovner M, et al. Decision aids for people facing health treatment or screening decisions (Review). *Cochrane Collab*. 2011;(10).
232. Légaré F, O'Connor AM, Graham ID, Wells GA, Tremblay S. Impact of the Ottawa Decision Support Framework on the Agreement and the Difference between Patients' and Physicians' Decisional Conflict. *Med Decis Mak*. 2006;26(4):373–90.
233. Joosten E a G, DeFuentes-Merillas L, de Weert GH, Sensky T, van der Staak CPF, de Jong C a J. Systematic review of the effects of shared decision-making on patient satisfaction, treatment adherence and health status. *Psychother. Psychosom*. [Internet]. 2008 Jan [cited 2014 Jan 5];77(4):219–26. Available from:  
<http://www.ncbi.nlm.nih.gov/pubmed/18418028>
234. Hertwig R, Buchan H, Davis DA, Gaissmaier W, Härter M, Kolpatzik K, et al. How Will Health Care Professionals and Patients Work Together in 2020 ? A Manifesto for Change. In: Gigerenzer G, Gray JAM, editors. *Better Dr. Better Patients, Better Decis. Envisioning Heal. Care 2020*. Strungmann. Cambridge, MA: MIT Press; 2011. p. 317–37.

235. Entwistle VA, Quick O. Trust in the context of patient safety problems. *J. Health Organ. Manag.* 2006;20(5):397–416.
236. Doherty C, Stavropoulou C. Patients' willingness and ability to participate actively in the reduction of clinical errors: A systematic literature review. *Soc. Sci. Med.* 2012;75(2):257–63.
237. Ziebland S. Why listening to health care users really matters. *J. Health Serv. Res. Policy* [Internet]. 2012 Apr [cited 2014 Jan 5];17(2):68–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22535900>
238. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open* [Internet]. 2013 Jan [cited 2013 Dec 16];3(1). Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3549241&tool=pmcentrez&rendertype=abstract>
239. Hor S-y, Godbold N, Collier A IR. Finding the patient in patient safety. *Health (Irvine. Calif.)*. 2013;17:567–83.
240. Ovretveit J. The contribution of new social science research to patient safety. *Soc. Sci. Med.* 2009;69(12):1780–3.
241. Entwistle V, Firnigl D, Ryan M, Francis J, Kinghorn P. Which experiences of health care delivery matter to service users and why? A critical interpretive synthesis and conceptual map. *J. Health Serv. Res. Policy* [Internet]. 2012 Apr [cited 2014 Jan 5];17(2):70–8. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3336938&tool=pmcentrez&rendertype=abstract>
242. Joosten EAG, De Weert-Van Oene GH, Sensky T, Van Der Staak CPF, De Jong CA. Treatment Goals in Addiction Healthcare: the Perspectives of Patients and Clinicians. *Int J Soc Psychiatry.* 2011;57:263–76.
243. Makoul G CM. An Integrative Model of Shared Decision Making in Medical Encounters. *Patient Educ Couns.* 2006;60(301-12).
244. Clayman M, Makoul G. Conceptual variation and iteration in shared decision-making: the need for clarity. In: Edwards A, Elwyn G, editors. *Shar. Decis. Heal. Care Achiev. Evidence-based Patient Choice.* 2009. p. 109–414.
245. Brief decision aids. Available at: <http://www.patient.co.uk/brief-decision-aids> [Internet]. 2013 [cited 2014 Jan 4]. Available from: [uk/brief-decision-aids](http://www.patient.co.uk/brief-decision-aids)
246. Elwyn G, Lloyd A, Joseph-Williams N, Cording E, Thomson R, Durand MA, et al. Option Grids: Shared decision making made easier. *Patient Educ. Couns.* 2012;90:207–12.
247. Elwyn G, Barr PJ, Grande SW, Thompson R, Thom Walsh C, Ozanne EM. Developing CollaboRATE: A fast and frugal patient-reported measure

of shared decision making in clinical encounters. *Patient Educ. Couns.* 2013;93(1):102–7.

248. Kasper J, Hoffmann F, Heesen C, Köpke S, Geiger F. MAPPIN'SDM--the multifocal approach to sharing in shared decision making. *PLoS One* [Internet]. 2012 Jan [cited 2014 Jan 5];7(4):e34849. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3325952&tool=pmcentrez&rendertype=abstract>
249. Kasper J, Hoffmann F, Heesen C, Köpke S, Geiger F. Completing the third person's perspective on patients' involvement in medical decision-making: approaching the full picture. *Z. Evid. Fortbild. Qual. Gesundheitswes.* [Internet]. 2012 Jan;106(4):275–83. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22749075>
250. Légaré F, LeBlanc A, Robitaille H, Turcotte S. The decisional conflict scale: moving from the individual to the dyad level. *Z. Evid. Fortbild. Qual. Gesundheitswes.* 2012;106 247–25(4):247–52.
251. Elwyn G, Tsulukidze M, Edwards A, Légaré F, Newcombe R. Using a “talk” model of shared decision making to propose an observation-based measure: Observer OPTION 5 Item. *Patient Educ. Couns.* 2013;93(2):265–71.
252. Entwistle VA, Cribb A. *Enabling people to live well.* Heal. Found. London: The Health Foundation; 2013. p. 52.
253. Williams B, Steven K, Sullivan FM. Tacit and transitional: An exploration of patients' and primary care health professionals' goals in relation to asthma. *Soc. Sci. Med.* 2011;72(8):1359–66.
254. Langford AT, Sawyer DR, Gioimo S, Brownson CA, O'Toole ML. Patient-Centered Goal Setting as a Tool to Improve Diabetes Self-Management. *Diabetes Educ.* 2007;33(6):139S–144S.
255. Lafata JE, Morris HL, Dobie E, Heisler M, Werner RM, Dumenci L. Patient-reported use of collaborative goal setting and glycemic control among patients with diabetes. *Patient Educ. Couns.* 2013;92(1):94–9.
256. Bradley EH, Bogardus. Jr ST, Tinetti ME, Inouye SK. Goal-setting in clinical medicine. *Soc. Sci. Med.* 1999;49(2):267–78.
257. Hurn J, Kneebone I, Cropley M. Goal setting as an outcome measure: a systematic review. *Clin Rehabil.* 2006;20(9):756–72.
258. Heisler M, Bouknight RR, Hayward R a, Smith DM, Kerr E a. The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. *J. Gen. Intern. Med.* [Internet]. 2002 Apr;17(4):243–52. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1495033&tool=pmcentrez&rendertype=abstract>

259. Armour C, Bosnic-Anticevich S, Brilliant M, Burton D, Emmerton L, Krass I, et al. Pharmacy Asthma Care Program (PACP) improves outcomes for patients in the community. *Thorax* [Internet]. 2007 Jun [cited 2013 Dec 24];62(6):496–502. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2117224&tool=pmcentrez&rendertype=abstract>
260. Locke EA, Latham GP. Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *Am. Psychol.* 2002;57(9):705–17.
261. Stewart M. Towards a global definition of patient centred care: The patient should be the judge of patient centred care. *BMJ.* 2001;322(February):444–5.
262. Epstein RM, Fiscella K, Lesser CS, Stange KC. Why the nation needs a policy push on patient-centered health care. *Health Aff. (Millwood)*. [Internet]. 2010 Aug [cited 2013 Dec 12];29(8):1489–95. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20679652>
263. Hrisos S, Thomson R. More required on the patient role and standardization. *Am. J. Bioeth.* 2013;13(8):62–5.
264. Nussbaum MC. Capabilities, Entitlements, Rights: Supplementation and Critique. *J. Hum. Dev. Capabilities.* 2011;12(1).
265. Robeyns I. The capability approach. Zalta EN (ed). *Stanford Encycl. Philos.* (<http://plato.stanford.edu>). 2011.
266. Sen AK. *The idea of justice.* Harvard University Press; 2009.
267. Ward J, Giles S, Hrisos S, Rhodes P, Din I, Walsh P. Involving patients in their own safety. In: Lawton R, Armitage G, editors. *Innov. Patient Saf.* London: Learning Matters, Sage Publications; 2012. p. 42–60.
268. Giguère A, Légaré F, Grimshaw J, Turcotte S, Fiander M, Grudniewicz A, et al. Printed educational materials: effects on professional practice and healthcare outcomes. *Cochrane Database Syst. Rev.* 2012;(10).
269. Cohen J. QUANTITATIVE METHODS IN PSYCHOLOGY. A Power Primer. *Psychol. Bull.* 1992;112(1):155–9.



## Glossary

ATT	Attitude
BB	Behavioural Belief
BCT	Behaviour Change Technique
BMI	Body Mass Index
BP	Blood Pressure
CB	Control Belief
CERAG	Clinical Effectiveness Research Agenda Group
CFAS	Cognitive Function & Ageing Study
CI	Contextualised Intention
COPD	Chronic Obstructive Pulmonary Disease
CQC	Care Quality Commission
CQI	Continuous Quality Improvement
EBH	Evidence-based Healthcare
EBM	Evidence-based Medicine
GHQ	General Health Questionnaire
GI	Generalised Intention
GP	General Practitioner
II	Implementation Intention
IME	Intervention Modelling Experiment
IMP	Intervention Modelling Process
IQuaD	Improving the Quality of Diabetes care
JCQ	Job Content Questionnaire
MLF	Multi-level Framework
MRC	Medical Research Council
GPRF	General Practice Research Framework

NB	Normative Belief
ND	Netherlands
NHS	National Health Service
NICE	National Institute for Clinical Excellence
OCB	Organisational Citizenship Behaviour
OFF	Oxman, Fretheim, Flottorp (Theory)
OJ	Organisational Justice
OLT	Operant Learning Theory
PBC	Perceived Behavioural Control
PCT	Primary Care Trust
PI	Personalised Intention
QI	Quality Improvement
QOF	Quality and Outcomes Framework
RCT	Randomised Controlled Trial
SCT	Social Cognitive Theory
SDM	Shared Decision Making
SEM	Structural Equation Modelling
SN	Subjective Norm
TACT	Target, Action, Context, Time
TCI	Team Climate Inventory
TPB	Theory of Planned Behaviour
TQM	Total Quality Management
TRA	Theory of Reasoned Action
URTI	Upper Respiratory Tract Infection

## Appendix 1: Copies of supporting publications

1. **Hrisos S**, Eccles MP, Johnston M, Francis J, Kaner EFS, Steen IN, Grimshaw J. Developing the content of two behavioural interventions. Using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics#1. *BMC Health Services Research*. 2008, 8:11  
<http://www.biomedcentral.com/content/pdf/1472-6963-8-11.pdf>
2. **Hrisos S**, Eccles MP, Johnston M, Francis J, Kaner EFS, Steen IN, Grimshaw J. An intervention modelling experiment to change GPs' intentions to implement evidence-based practice: Using theory-based interventions to promote GP management of upper respiratory tract infection without prescribing antibiotics #2. *BMC Health Services Research*. 2008, 8:10  
<http://www.biomedcentral.com/content/pdf/1472-6963-8-10.pdf>
3. **Hrisos S**, Eccles MP, Johnston M, Francis J, Dickinson HO, Kaner EFS, Beyer F. Are there valid proxy measures of clinical behaviour? Systematic review. *Implementation Science*. 2009, 4:37  
<http://www.implementationscience.com/content/pdf/1748-5908-4-37.pdf>
4. **Hrisos S**, Eccles MP, Francis J, Bosch M, Dijkstra R, Johnston M, Grol R, Kaner EFS, Steen IN. Using psychological theory to understand the clinical management of type 2 diabetes in Primary Care: a comparison across two European countries. *BMC Health Services Research*. 2009, 9:140 <http://www.biomedcentral.com/1472-6963/9/140>
5. Eccles MP, **Hrisos S**, Francis J, Steen IN, Bosch M, Johnson. Can the collective intentions of individual professionals within healthcare teams predict the team's performance: developing methods and theory? *Implementation Science*. 2009. 4:24.  
<http://www.implementationscience.com/content/4/1/24>
6. Eccles MP, **Hrisos S**, Francis J, Stamp E, Johnston M, Hawthorne G, Steen IN, Grimshaw J, Elovainio M, Pesseau J and Hunter M. Instrument development, data collection, and characteristics of practices, staff, and measures in the Improving Quality of Care in Diabetes (IQuaD) Study. *Implementation Science* 2011, 6:61.  
<http://www.implementationscience.com/content/6/1/61>
7. Hawthorne G, **Hrisos S**, Stamp E, Elovainio M, Francis JJ, Grimshaw J, Hunter M, Johnston M, Pesseau, Steen N, Eccles MP. Diabetes Care Provision in UK Primary Care Practices. *PLoS ONE*. 2012. 7(7): e41562. doi:10.1371/journal.pone.0041562. <http://t.co/hxDCMCJF>
8. **Hrisos S**, Thomson, RG. More required on the patient role and standardization *American Journal of Bioethics*. 2013, 13:8: 62-65  
<http://www.tandfonline.com/doi/abs/10.1080/15265161.2013.807184?journalCode=uaib20#.UspwYLRptfw>

## Appendix 2: TRACII Questionnaire

Available at: <http://www.biomedcentral.com/content/supplementary/1472-6963-8-10-S1.doc>

The graded task intervention available at:

<http://www.biomedcentral.com/content/supplementary/1472-6963-8-10-S2.doc>

The persuasive communication intervention available at:

<http://www.biomedcentral.com/content/supplementary/1472-6963-8-10-S3.doc>

### Appendix 3: IQuaD Questionnaires

- Clinician Q1
- Clinician Q2
- Patient Q1

All available at: <http://www.implementationscience.com/content/6/1/61>