

Applying psychological models to evidence-based care by the dental team: a summary paper

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INTRODUCTION

There is an ever-increasing number of medical and dental guidance documents being published, internationally and in the UK, recommending evidence-based care treatments and management pathways for clinicians to implement. However, it is well-documented that the translation of best practice recommendations into clinical practice requires more than the publication of guidelines, and that dental as well as medical patients are continuing to receive care which is not evidence-based, not needed, or even potentially harmful (Seddon *et al.*, 2001; Grol, 2001; McGlynn *et al.*, 2003; Grimshaw *et al.*, 2004).

There has been increased interest in the scientific study of methods to promote the systematic uptake of research findings into routine clinical practice over the past fifteen years (Bero *et al.*, 1998; Davidson *et al.*, 2003; Michie & Johnston, 2004; Eccles *et al.*, 2005; ICEBeRG, 2006; Grol *et al.*, 2007; Medical Research Council, 2008; Hakkennes & Dodd, 2008; Michie *et al.*, 2009). However, the literature is now littered with inconsistent intervention results across different clinical problems and behaviours (Godin *et al.*, 2008). The results of literature reviews (Grimshaw *et al.*, 2004; Davies *et al.*, 2010) suggest that this is in large part due to an evidence base which consists of limited descriptions of interventions and their context, as well as scant theoretical or conceptual rationale for intervention target, development, mechanism, or choice.

To address these issues, researchers have begun applying psychological models to clinician compliance with evidence-based practice guidelines. Applying psychological models to knowledge translation from guidance to practice allows a view of why and how behaviours change; it offers an approach to how interventions can be built; and it offers a framework to support generalisability (Godin *et al.*, 2008; Grol *et al.*, 2007; Francis *et al.*, 2009; Eccles *et al.*, 2007; Grimshaw *et al.*, 2007; McEachan *et al.*, 2011).

Most of this knowledge translation research has concentrated on medical professional behaviour. However, in the UK, medical and dental health professionals are subject to very different governmental, professional, organisational and business constraints. Little is yet known about what these differences mean for studying health professional compliance with best practice guidelines or even for the application of psychological models to knowledge translation, in particular, if results from research

in the medical setting are generalisable across to the dental setting and applicable to dental health professional behaviour. This paper describes an infant body of work applying psychological models to knowledge translation in the dental setting, which may help further an understanding of these issues. It should be noted that this is far from a systematic review of the literature, but rather a summary paper based on the British Psychological Society symposium presentation on this topic.

APPLYING PSYCHOLOGICAL MODELS TO UNDERSTANDING DENTAL BEHAVIOUR

The first step in determining whether psychological models of behaviour are applicable to knowledge translation in the dental setting is seeing if they can predict compliance with a range of evidence-based dental behaviours. One of the earliest examples of this application was associated with a randomised controlled trial (Bahrami *et al.*, 2004) examining the effects of two education interventions (audit and feedback, computer-aided learning) on the guideline recommended management of wisdom teeth (SIGN, 2000) in primary dental care. Although neither education intervention was designed using psychological theory, it was thought that assessing variables from psychological models might help elucidate the mechanism by which the trial achieved its effects as well as explore the feasibility of applying psychological theory to understanding dental professional behaviour.

The Theory of Planned Behaviour (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1998) were the social cognitive models selected for this study, chiefly because they were parsimonious to assess and both already had a history of successfully predicting many different behaviours in the health domain (Conner & Norman, 1996). Briefly, the Theory of Planned Behaviour (TPB) proposes that people are more likely to perform a behaviour (e.g. eat a healthy a diet, or in this case, follow a guideline recommended treatment) if they feel motivated (intend) to do so, if they believe that performing that behaviour will result in a valued consequence (having a positive attitude), if they believe that other people think that they should (high subjective norm), and if they believe they can overcome any significant barriers that may prevent them from performing the behaviour (high perceived control). Social Cognitive Theory (SCT) proposes that a person is more likely

to perform or change their behaviour if they are confident that they can (high self-efficacy). A questionnaire assessing these variables for wisdom teeth (third molar) best practice was distributed to all trial participants. Given that both interventions in the trial were education-based, the questionnaire also included a measure of knowledge.

The final results of the trial were that neither audit and feedback nor computer-aided learning significantly influenced behaviour (compliance with third molar best practice). Analysis of the theory-based questionnaire showed that the interventions did increase knowledge as desired, but knowledge was not actually related to compliance with third molar best practice (Bonetti *et al.*, 2009). Furthermore, the interventions did not influence model variables that actually were significantly associated with this behaviour (i.e. attitude, perceived behavioural control, self-efficacy).

These results strongly suggest that these interventions failed in this trial because they did not influence mediating beliefs specific to this behaviour. Furthermore, the results showed that participating dentists acted according to the expectations of both models. Dentists who had a more positive attitude toward complying with third molar recommended best practice, perceived that they had more control over this behaviour or had greater self-efficacy for this behaviour, were more likely to comply. Therefore, assessing variables from psychological models made it possible to identify potential mediators which may act as more successful interim targets than knowledge when designing future interventions to influence compliance with third molar best practice.

The successful application of the Theory of Planned Behaviour and Social Cognitive Theory to understanding compliance with third molar best practice strongly supported the possibility that psychological models might be usefully applied to other guidance recommended dental behaviours, thus providing the platform for more work in this area. *Table 1* presents a summary of the psychological models which have since been applied to understanding dental behaviours in independent studies by this author and her colleagues. It also presents a brief description of model components which were significantly associated with evidence-based dental behaviours (more details on model assessment and the analyses can be found in the published papers referenced below).

It should be noted that all of these studies have a limitation in common i.e. none were designed to evidence causation, just the necessary prerequisite of significant association, and so only *possible* mediating targets for interventions were identified in this work. The dearth of psychological research investigating dental health professional behaviour at the time precluded doing more than these explorative forays. The next steps, intervention building and testing based on these data, are only now in progress, and so it is not yet possible to say just how effective this methodology is for actually changing clinical practice in the dental setting. However, the results overwhelmingly support taking these next steps. The brief overview in *Table 1* shows that psychological models and their components have now been successfully applied to furthering an understanding of compliance to a range of dental care behaviours, including taking intra-oral

radiographs (Bonetti *et al.*, 2006), placing fissure sealants (Bonetti *et al.*, 2009), providing oral health advice (Clarkson *et al.*, 2009), providing alcohol advice (Shepherd *et al.*, 2010), and decontamination best practice (Bonetti *et al.*, 2009).

Despite the limited nature of these studies, they have raised some crucial issues. The first concerns the role of knowledge in knowledge translation. The vast majority of knowledge translation interventions in dentistry use various formats (educational materials, educational outreach, education via dental audit) aimed at one target, that of increasing knowledge of best practice recommendations. The assumption is that ignorance is preventing evidence-based dental care. This prompted the inclusion of a measure of knowledge in each of our studies to help integrate this work into the dental literature. Each knowledge measure was tailored in consultation with dentists considered experts on that specific topic (i.e. involved in writing the relevant guidance, or teaching the guidance recommended behaviour). Yet, knowledge was consistently unrelated to compliance with evidence-based dental care, unlike attitude toward the behaviour, perceived control over the behaviour, and self-efficacy for the behaviour. These results suggest that a paradigm shift is required, and applying psychological models in this area will help shift the current focus of knowledge translation interventions in the dental setting toward changing behaviour rather than changing knowledge.

Other issues may have theoretical implications. First of all, this work concentrates on the behaviour of dentists, but hygienists, hygiene therapists, and dental nurses are being asked to take on more and more responsibility for implementing evidence-based care by many guidance documents. For example, stakeholders identified 11 of 16 key behaviours in the Scottish Dental Clinical Effectiveness Programme decontamination guidance document (SDCEP, 2007) could be implemented by anyone in the dental team (Bonetti *et al.*, 2009). Similarly, in the medical setting, non-medics, such as nurses, and pharmacists, are playing a more active role in health care provision. Understanding the applicability of psychological models to knowledge translation may require exploring whether who is performing the behaviour within the different settings has a modifying/mediating effect on behavioural relationships.

Additionally, the variance explained by the models in these studies varied for different behaviours, and theoretical components predicted some behaviours better than others. There is no theoretical justification for this, and further work needs to be done in understanding how the *nature* of individual health professional behaviours may be modifying theory and component applicability.

Furthermore, in these studies the cross-theory analyses (where all significantly predictive constructs, regardless of theory origin, are included in exploratory regression equations) always explained more variance in the behavioural outcomes (objective and self-report) than did the theory-specific regression equations. Similar results have been found when predicting compliance with medical best practice (Eccles *et al.*, 2007; Grimshaw *et al.*, 2007). This suggests that health professional behaviour, dental or medical, may need a more sophisticated model than used in these studies.

The models in these studies were selected because qualitative work supported their choice, because the author and her colleagues were familiar with them, and because these studies aimed to explore how applicable already proven models were to health professional behaviour in the dental setting. This selection criteria was adequate for the simple purpose of determining the general feasibility of applying psychological models to knowledge translation in the dental setting. Identifying attitude, perceived behavioural control and self-efficacy as consistent predictors of compliance, supports integrating their parent models when investigating evidence-based dental behaviour. However, this result may be largely due to how often these specific models were included. Had other models been chosen as often, different components may have consistently predicted dental behaviour, and the integration of different models supported. The models employed in these studies are only a tiny subset of a vast number of existing models with evidenced relationships between their components and behaviour.

This model selection issue is pertinent to the relevance and potency of using psychology models per se, as well as to the study of knowledge translation and health professional behaviour, regardless of setting. In the health psychology arena, progress toward addressing this issue is being made with the development of the Theoretical Domains Framework (Michie *et al.*, 2005). An expert consensus process was employed to identify psychological and organisational models found relevant to clinician behaviour change. Approximately 33 models and 128 model components were used to identify 12 domains of possible mediators of health professional behaviour: knowledge; skills; social/professional role and identity; beliefs about capabilities; beliefs about consequences; motivation and goals; memory, attention and decision processes; environmental context and resources; social influences; emotion; behavioural regulation; and nature of the behaviour. The TDF is still in development, and unresolved issues remain: Domain number, the relationships between the theoretical domains, clarifying boundaries between domains, how best to elaborate and operationalize the framework, how best to design interventions informed by TDF-based analysis, and how best to accumulate evidence to refine the content of the framework (Francis *et al.*, 2012; Cane *et al.*, 2012). Nevertheless, exploratory research applying this framework to health professional behaviour in the medical setting is showing this as an effective tool to create a rationale for model selection and intervention design in knowledge translation research (Francis *et al.*, 2009; French *et al.*, 2012). To date (to the author's knowledge), no work has yet been published showing the results of applying the TDF to health professional behaviour in the dental setting. However, there is no plausible reason not to do so, particularly since the issues of creating a theoretically-based rationale for intervention target, development, mechanism, and choice, are certainly generalizable across the health care settings.

This article briefly described research supporting the application of psychological models to furthering an understanding of compliance with evidence-based dental behaviour, as well as issues that may influence how this work is taken forward. It is readily acknowledged that much more work, and a much more systematic approach, is needed to progress and realise the huge

potential that applying psychology in the dental setting has to significantly contribute to dentistry, evidence-based oral health care and knowledge translation, as well as to the discipline's current developments.

Applying psychological models to evidence-based care

Table 1. Overview of some studies applying psychological models to understanding compliance with dental guidance recommended behaviours

Dental Behaviour	Models Applied	Components significantly associated with behaviour
Third Molar Management ¹	Theory of Planned Behaviour (TPB) ⁷ Social Cognitive theory (SCT) ⁸	TPB: Attitude, Perceived Behavioural Control (PBC), SCT: Self-efficacy (SE)
Taking intra-oral radiographs ²	Theory of Planned Behaviour ⁷ Social Cognitive theory ⁸ Operant conditioning (OC) ⁹ Implementation Intentions (II) ¹⁰ Common Sense Self-regulation Model ¹¹ Precaution Adoption Process ¹²	TPB: Intention, PBC, SCT: SE, Perceived Risk OC: Anticipated Consequences, Habit II: Action planning
Placing Fissure Sealants ³	Theory of Planned Behaviour ⁷ Social Cognitive theory ⁸ Operant conditioning ⁹ Implementation Intentions ¹⁰ Common Sense Self-regulation Model ¹¹ Precaution Adoption Process ¹²	TPB: Intention, Attitude, PBC SCT: SE, Perceived Risk, Outcome Expectancies OC: Habit II: Action planning
Providing Oral Health advice ⁴	Social Cognitive theory ⁸ Implementation Intentions ¹⁰	SCT: SE II: Action planning
Providing alcohol advice ⁵	Theory of Planned Behaviour ⁷ Social Cognitive theory ⁸	TPB: Attitude, PBC SCT: SE
Decontamination best practice ⁶	Theory of Planned Behaviour ⁷	Attitude, PBC

¹Bonetti et al., 2009

²Bonetti et al., 2006

³Bonetti et al., 2009

⁴Clarkson et al., 2009

⁵Shepherd et al., 2010

⁶Bonetti et al., 2009

⁷Ajzen, 1991

⁸Bandura, 1998

⁹Blackman, 1974

¹⁰Gollwitzer, 1993

¹¹Leventhal et al., 1984

¹²Weinstein et al., 1998.

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