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SOCIAL COGNITION MODELS AND HEALTH BEHAVIOUR: A STRUCTURED REVIEW

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A number of social cognition models have been developed to account for socio-demographic variations in health behaviour. This paper distinguishes between: (a) motivational, (b) behavioural enactment, and (c) multi-stage models of health behaviour. The models are evaluated in terms of advancement of existing knowledge and – where appropriate – predictive utility. Common themes that appear within- and between- these categories are discussed, with consideration of ways in which theory may be advanced by future research. Each approach has associated strengths and weaknesses, suggesting that a “consensus” approach to the study of health behaviour may prove fruitful. Identification of the key constructs across different model types would allow coherent integration and promote further understanding of the psycho-social determinants of health behaviour.

KEY WORDS: Review, social cognition models, health behaviour, behavioural intentions, stages of change.

There is a considerable body of research that shows there are strong and consistent individual differences in health behaviours, some of which are attributable to sociodemographic variables (e.g., gender, socio-economic status, culture – see Blaxter, 1990; Gregory, Foster, Tyler and Wiseman, 1990). However, such sociodemographic variables are not readily open to change. Researchers have therefore focused attention on social cognitive variables which might explain the individual differences in health behaviour that have previously been attributed to sociodemographics (e.g., Rosenstock, 1974). From a public health perspective, this is of particular importance, given that psychological variables are potentially more amenable to change than sociodemographic variables. Social cognitive determinants of health behaviour therefore represent a useful area of study for health psychologists (Conner and Norman, 1996).

Following several decades of research, a number of models of health behaviour have been designed in an attempt to map out the mediators of sociodemographic variables and identify proximal determinants of health behaviour. The present review distinguishes three types of model: motivational, behavioural enactment, and multi-stage.

Motivational models focus on the motivational factors (e.g., protection motivation, threat) that underpin individuals’ decisions to perform (or not to perform) health behaviours. Indeed, much of the research associated with motivational models employs measures of intention as the dependent variable of interest (e.g., see Godin and Kok’s, 1996, review), implying that motivation is sufficient for successful behavioural enactment. Criticisms of this approach have led to the development of “behavioural enactment” models, designed to

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account for relatively poor correspondence between motivational variables (e.g., intentions) and subsequent behaviour. This second group of social cognition models focus on bridging the “gap” between motivation and behaviour. As such, they focus on action control strategies that are designed to ensure that motivation is translated into action. Third, at the most complex level are multi-stage theories that delineate processes which both facilitate behavioural enaction and provide maintenance strategies. Clearly, there are overlaps and commonalities between the models in these three categories. Nevertheless, we believe this tripartite classification has some value in elucidating the contribution made by the different types of social cognition model.

As one might expect, underlying the tripartite classification are different criteria for judging the relative efficacy of models within each category. For models that focus on predicting behaviour (i.e., motivational and behavioural enaction models), efficacy is generally judged in terms of effect size, i.e., proportion of variance explained (but see Sutton, 1998, for a discussion of alternative measures of effect size).¹ Indeed, most motivational models have been subject to meta-analytic reviews, several of which are reported here. To date, however, relatively few studies have empirically investigated behavioural enaction models. As such, the efficacy of behavioural enaction models is judged relatively less on the basis of effect size, and more on the potential of such models to extend knowledge accumulated by research on motivational models. In contrast, multi-stage models focus on classification of individuals into stages and therefore cannot be judged in terms of effect size *per se*. Moreover, the extent to which such models adequately classify individuals is not always clear (for a review see Sutton, this volume). Judgements of efficacy concerning multi-stage models therefore focuses on the extent to which the models advance clear predictions for transition between stages and for the design of interventions.

There are two broad aims of the present paper. First, to describe the principal social cognition models of health behaviour and assess the efficacy of each in relation to prediction and explanation of health behaviour.² Second, to examine how best to integrate these models.

MOTIVATIONAL MODELS OF HEALTH BEHAVIOUR

A number of motivational models of health behaviour have been proposed. These models are designed to predict behaviours at single points in time. Typically, such models have been designed with a view to identifying the variables that underlie health-related decisions, and to assess their ability to predict behaviour. Often, applications of such models are diverse (e.g., quitting smoking to live kidney donation). The models reviewed include: the health belief model, protection motivation theory, social cognitive theory, and the

¹The present review adopts Cohen's (1988, 1992) guide to judging the magnitude of effect sizes, categorising small, medium and large effects as: r^2 's = 0.10, 0.30, and 0.50, respectively. These values are the equivalent of 1% (small), 9% (medium), and 25% (large) in terms of explained variance.

²Note that whilst *prediction* of behaviour is useful (e.g., for determining where to target interventions), ideally models should be able to *explain* behaviour (see Sutton, 1998). Explanatory models posit *causal* relations between variables: manipulation of such variables will impact on subsequent behaviour. To date, few attempts have been made to establish causal relations within models of health behaviour (but see Armitage and Conner, 1999a; Dijkstra *et al.*, 1998; Weinstein *et al.*, 1998a). However, given that Sutton (1998) argues that “models that do not enable us to predict behavior are unlikely to be useful as explanatory models” (p. 1319), assessment of predictive power provides a useful basis for judgements of efficacy.

theories of reasoned action and planned behaviour.³ What follows is a brief description of each of the models, followed by a review of the efficacy of each.

Health Belief Model

The health belief model (Janz and Becker, 1984; Rosenstock, 1974) includes six determinants of behaviour: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, health motivation (one's motivation to engage in health behaviours) and cues to action. Generally, all six components are regarded as independent predictors of health behaviour. However, implicit in the conceptualisation of the health belief model (HBM) is the combination of perceived susceptibility with perceived severity (to produce perceived threat), and perceived benefits with perceived barriers (to determine evaluation of the course of action taken). As such, health behaviour is more likely to be carried out if: the individual perceives threat of disease (i.e., high susceptibility and severity); if benefits can be derived from performing the behaviour; there are few barriers to performing the behaviour, or some combination of these. Similarly, if one is "health motivated", behavioural enactment is more likely. Finally, cues to action such as symptom perception or health communication may also prompt performance of the behaviour.

Narrative reviews have tended to criticise the HBM on the grounds that the components have been formulated without definition and without any rules of combination (e.g., Sheeran and Abraham, 1996; Stroebe and Stroebe, 1995). For example, although threat may be a function of severity and susceptibility, they are presented as separate predictors of behaviour. Congruent with this, Harrison, Mullen and Green's (1992) meta-analysis of the HBM showed that, although all correlations between HBM and behaviour were statistically significant, the effect sizes were small (all r 's < 0.21, see Cohen, 1988; 1992). Harrison *et al.*'s (1992) analysis did not include assessment of the efficacy of the cues to action or health motivation components, because of the paucity of studies measuring these constructs. However, Sheeran and Abraham's (1996) review of the HBM concluded that all HBM variables correlated only weakly with behaviour. Sheeran and Abraham (1996) further suggested that weak predictive validity of the HBM was a function of poor definition of constructs, lack of combinatorial rules, and no evidence for discriminant validity between HBM components and variables from other models.

Protection Motivation Theory

Closely related to the HBM is Rogers' (1983) protection motivation theory. Within protection motivation theory (PMT), health behaviour is represented by adaptive coping (beneficial to health) or maladaptive coping (harmful to health). Both forms of coping are determined by "protection motivation". Protection motivation is the function of two appraisal processes: threat and coping. Similar to the HBM, the threat appraisal process is determined by perceived vulnerability and perceived severity. This appraisal increases protection motivation, *unless* there are advantages in performing the maladaptive behaviour (which decreases protection motivation). The second appraisal process is coping

³Health locus of control (e.g., Wallston, Wallston and DeVellis, 1978) is often treated as a social cognition model. However, as a measure of individual differences, it is fundamentally different from the other social cognition models. It is therefore not specifically referred to in this section (but for a review see Norman and Bennett, 1996).

appraisal. Coping appraisal is co-determined by the usefulness of the response (i.e., response efficacy) and confidence in one's ability to perform the behaviour (i.e., self-efficacy, see below). If an individual perceives response efficacy and self-efficacy, protection motivation increases, unless the costs incurred by performing the adaptive behaviour are too great.

Boer and Seydel's (1996) review of PMT shows it to be a useful predictor of behaviour, although few studies have looked at prediction of behaviour *per se*. In particular, Boer and Seydel (1996) illustrate the utility of PMT as a basis for developing theory-based health interventions, although to date, most studies have only manipulated self- or response-efficacy. Congruent with this, Hodgkins, Sheeran and Orbell's (1998) meta-analysis of PMT revealed that average correlations for all components were small to medium (all r 's < 0.35).⁴ In spite of this lack of predictive power, variables assessed in PMT have been shown to be particularly sensitive to health interventions (see Hodgkins *et al.*, 1998). However, given the lack of predictive power, it seems likely that manipulation of PMT cognitions would exert minimal impact on subsequent behaviour (Sutton, 1998).

Social Cognitive Theory

Bandura's (1986) social cognitive theory posits self-efficacy and outcome expectancies (related to situation and action) as central determinants of behaviour. Situation-outcome expectancies are based on the perception that some consequences are determined by the environment and are thus divorced from personal control. Action-outcome expectancies are likewise related to the belief that one's actions are instrumental to a particular outcome. Self-efficacy relates to confidence in one's own ability to carry out a particular behaviour (Bandura, 1986), and can also be found in PMT. Social cognitive theory (SCT) therefore predicts that behaviours are performed if one perceives control over the outcome, few external barriers, and confidence in one's own ability.

SCT has been used to predict a variety of health behaviours and behavioural intentions (e.g., Ellickson and Bell, 1990; Resnicow, Davis-Hearn, Smith *et al.*, 1997; Strecher, DeVellis, Becker and Rosenstock, 1986), although the model typically accounts for only small to medium proportions of variance in behaviour (e.g., Resnicow *et al.*, 1997). Indeed, the central self-efficacy component is typically the dominant predictor of behaviour (e.g., Parcel, Edmundson, Perry *et al.*, 1995), and is often the principal focus of research attention (see Bandura, 1997). For example, the concept of self-efficacy has been shown to be instrumental in: coping with stress (e.g., Lazarus and Folkman, 1987), effecting behavioural change (e.g., Ellickson and Bell, 1990), and recovery from illness (e.g., Bandura, Cioffi, Taylor and Brouillard, 1988). Moreover, the central role of self-efficacy in a number of health behaviour models (i.e., PMT, theory of planned behaviour), suggests that the concept of self-efficacy is probably more important than SCT *per se*. This is borne out by direct comparisons of SCT with other health behaviour models (e.g., Dziewaltowski, Noble and Shaw, 1990) and the recent development of the health action process approach, which supersedes SCT to some extent (see below, Schwarzer, 1992).

⁴Moreover, none of the component relationships showed sufficient reliability to satisfy Rosenthal's (1984) tolerance level. Failure to exceed this tolerance level raises the possibility that future studies (or studies not currently published) may nullify the meta-analytic data reported by Hodgkins *et al.* (1998).

The Theories of Reasoned Action and Planned Behaviour

The theory of reasoned action posits intention as the proximal determinant of behaviour (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Intention is defined as the motivation required to perform a particular behaviour. Therefore, the more one intends to perform a behaviour, the more likely is its performance. Within this framework, intention is held to be determined by attitudes (general positive/negative evaluation of behaviour) and subjective norm (global perception of social pressure).

However, as Ajzen (1988) himself conceded, "The theory of reasoned action was developed explicitly to deal with purely volitional behaviors" (p. 127); i.e., simple behaviours, where successful performance of the behaviour requires only the formation of an intention. The implication was that behaviours were solely dependent on personal agency (i.e., the formation of an intention), and that control over behaviour (e.g., personal resources or environmental determinants of behaviour) was relatively unimportant.

To counter such criticisms, Ajzen (1988) proposed "... a conceptual framework that addresses the problem of incomplete volitional control" (p. 132). The theory of planned behaviour (TPB) extends the theory of reasoned action (TRA) by including measures of perceived behavioural control as a determinant of intentions *and* behaviour. The inclusion of perceived behavioural control (PBC) as a predictor of behaviour is based on the rationale that: holding intention constant, greater perceived control increases the likelihood that enactment of the behaviour will be successful. Further, to the extent that perceived control reflects actual control, PBC will directly influence behaviour. PBC therefore acts as both a proxy measure of actual control and a measure of confidence in one's own ability.⁵ Within the TPB, PBC is posited as a third determinant of intention: the easier a behaviour is, the more likely one will intend to perform it.

Several quantitative and narrative reviews have provided support for use of the TRA and TPB in the prediction of a range of behaviours (e.g., Ajzen, 1991; Sheppard, Hartwick and Warshaw, 1988), and health behaviours in particular (e.g., Conner and Sparks, 1996; Godin and Kok, 1996; Hausenblas, Carron and Mack, 1997). For example, Godin and Kok (1996) reported a meta-analysis of 87 TPB studies applied to health behaviour. Their analyses showed that the TPB accounted for 41% of the variance in behavioural intentions ($R=0.64$, 76 correlations) and 34% of the variance in behaviours ($R=0.58$, 35 correlations) for a range of health behaviours.

In spite of the impressive amount of variance which the TPB can account for, Conner and Armitage (1998) present both narrative and meta-analytic evidence to support extension of the TPB. Two variables in particular were shown to independently contribute to the prediction of intention, over and above TPB variables: self-identity and moral norms. Self-identity refers to the salient part of an actor's self which relates behaviour to societal goals; moral norms are concerned with personal feelings of obligation to perform or not to perform a particular behaviour. Future work extending the TPB may therefore be required.

Integrating and Extending Motivational Models

Meta-analyses of motivational models suggest they provide parsimonious accounts of health behaviour. In terms of behavioural prediction, the TPB provides an improvement on

⁵Indeed, Ajzen (1991) argues that perceived behavioural control and self-efficacy are synonymous (but see Armitage and Conner, 1999a,b; Terry and O'Leary, 1995, for alternative views).

the HBM, SCT and PMT. This finding is borne out by studies that have directly compared the models, and shown the TPB to be the superior predictor of intentions and behaviour (e.g., Conner and Norman, 1994; Quine, Rutter and Arnold, 1998; Weinstein, 1993, but see Dziewaltowski *et al.*, 1990). The possibility exists, however, that the apparent superiority of the TPB may simply reflect better definition of the constructs (cf. Sheeran and Abraham, 1996).

Moreover, given the level of overlap between the different health behaviour models and findings that support extension of the TPB, this view is perhaps somewhat misguided. The models reviewed above are all rooted in subjective expected utility and expectancy–value theories (e.g., Edwards, 1954; Peak, 1955),⁶ and most include measures of perceived control (e.g., perceived barriers, self-efficacy) and intention (e.g., protection motivation, health motivation). Given the level of overlap between the motivational models, the implication is that all five might usefully be combined. Indeed, Fishbein and colleagues (see Fishbein, 1997; Fishbein, Triandis, Kanfer *et al.*, in press) have recently proposed a “major theorists” model that incorporates constructs taken from several of the models reviewed above (i.e., attitudes, norms, self-efficacy, intentions, skills and abilities, environmental constraints, self-image, and emotional reactions). Further research is required to obtain convergent and discriminant validity for the constructs highlighted by Fishbein and colleagues, and those reviewed above.

Motivational models of health behaviour have generally been shown to be useful predictors of health-related behaviour. However, many applications of these models employ intention as the dependent variable, implicitly assuming near-perfect correspondence between intention and behaviour. One particular concern, however, has been the gap between intention and behaviour: as might be expected, a much larger proportion of the variance in intention is explained than that in behaviour (e.g., Conner and Armitage, 1988). For example, Sheeran and Orbell’s (1998) recent meta-analysis of condom use reported a mean correlation of $r=0.44$ between intention and subsequent behaviour. Thus, on average, intention accounts for approximately 19% of the variability in condom use – a “medium” effect size in Cohen’s terms (Cohen, 1988; 1992). Therefore, motivational models provide only a partial account of how motivation is translated into action.

BEHAVIOURAL ENACTION MODELS

The following section deals with two social cognition models that elaborate on the processes that follow intention formation.

Gollwitzer’s Implementation Intentions

Gollwitzer (1993) elaborates on the intention construct, making a distinction between goal intentions and implementation intentions. Whilst the former is concerned with intentions to perform a behaviour or achieve a goal (“I intend to achieve x”), the latter is concerned with plans as to when, where and how the goal intention will be translated into action (“I intend to initiate the goal-directed behaviour x when situation y is encountered”). The important

⁶Subjective expected utility theory is based on the assumption that individuals seek to maximise their utility. When choosing which option maximises utility, individuals assess the probability of specific outcomes occurring and weigh them by the utility associated with those outcomes. Expectancy–value theory extends this by multiplying the probability of outcomes occurring by personal evaluation.

point about implementation intentions is that they commit the individual to a specific course of action when certain environmental conditions are met; in so doing they help translate goal intentions into action. Gollwitzer (1993) argues that implementation intentions pass control over to the environment, which acts as a cue to action (e.g., when certain conditions are met, the intention leads to behavioural performance).

Gollwitzer (1993) has compiled a range of experimental evidence to support the view that the formation of implementation intentions can aid the performance of intended behaviour. To date, Gollwitzer's (1993) ideas have not been widely applied to the prediction of health behaviour. One exception is Orbell, Hodgkins and Sheeran's (1997) study of breast self-examination. At the end of their TPB questionnaire, half the women were asked to indicate when and where in the next month they intended to perform breast self-examination. Despite no difference in goal intentions, a one-month follow-up revealed that 64% of those women who formed implementation intentions had performed breast self-examination (versus 16% in the "no implementation intention" group). Similarly, in an earlier study on exercise behaviour, Kendzierski (1990) found that respondents were more likely to implement their intentions to exercise when they had engaged in some prior planning. Further work needs to be conducted to establish the utility of implementation intentions in predicting health behaviour. However, initial findings are encouraging and suggest that those who make such plans of action are more likely to initiate and maintain behaviour (see also Sheeran and Orbell, 1999; Verplanken and Faes, in press).

Bagozzi's Goal Theory

Bagozzi (1992, 1993) has developed a theory of goal pursuit that examines motivational influences on goal intentions and trying. Briefly, goal intentions are a function of desires, which in turn are derived from attitudes (toward process, success and failure), subjective norms (cf. TRA) and goal efficacy (cf. self-efficacy). Goal intentions are held to determine trying. In this context, "trying" refers to the processes that initiate and regulate instrumental acts (i.e., those that lead to goal attainment). Of particular interest to the present paper are the ways in which such goal intentions are translated into action.

Once a goal intention has been formed, the means by which that goal will be attained are chosen with reference to three appraisals: self-confidence (cf. self-efficacy), likelihood of goal attainment, and the perception of pleasantness/unpleasantness. Bagozzi (1992) argues that the initiation of goal pursuit is then determined by "trying". Trying is held to be a function of three processes: decisions with respect to means (see above), planning and control of goal-directed behaviour, and maintenance of commitment. Planning and control of goal-directed behaviour are held to be a function of implementation intentions (Gollwitzer, 1993) and monitoring of progress. Commitment to the goal reflects the dispositional (cf. Kuhl, 1992) or purposive mental activities that are required to maintain or disengage from goal commitment (or implementation intentions).

Bagozzi's model builds upon the motivational models reviewed above by outlining the way in which motivational variables (e.g., intentions) are translated into action. Although the model has not been widely applied in the field of health psychology, there is some evidence to suggest it may make a useful contribution. In a study of body weight regulation, Bagozzi and Edwards (in press) reported that goal intentions influenced trying, which prompted the initiation of instrumental acts (i.e., diet, exercise). These instrumental acts then determined the degree of goal attainment. Similarly, Bagozzi and Kimmel (1995) compared portions of goal theory with the theories of reasoned action and planned behaviour.

Whilst the findings were not entirely consistent with the theory, larger proportions of variance in behaviour were accounted for by variables from goal theory. Further empirical support for applications of the model in the health field are required, although the findings suggest that Bagozzi's model represents an advance on the motivational models reviewed above.

Behavioural Enaction Models: a Summary

The behavioural enaction models are principally concerned with improving intention-behaviour relations. To date, few studies have applied them in health contexts, which provides a clear direction for future research. That both models focus on implementation intentions suggests the utility of such a construct, as do studies that have employed implementation intentions as experimental manipulations, with striking effects on behaviour (Orbell *et al.*, 1997; Sheeran and Orbell, 1999). As Fishbein (1997) has argued: the ultimate challenge for any model is that it should be able to account for, and promote, behaviour change. Further application of the models reviewed above to such a purpose is a priority for health psychologists.

MULTI-STAGE MODELS OF HEALTH BEHAVIOUR

The multi-stage models differ from the motivational and behavioural enaction models reviewed above in so far as they conceptualise health behaviours as encapsulating several discrete stages (but see Bagozzi and Edwards, *in press*). A variety of theoretical multi-stage models have been developed which try to describe the process of behaviour change in more detail. They describe the factors that might influence behaviour change in different stages (see Baranowski, 1989; Karoly, 1993, for reviews of some of these).

Stage theories suggest two things: (a) that people at different stages will behave in qualitatively different ways, (b) that the kinds of interventions and information needed to move closer to action or adoption of a new behaviour will vary from stage to stage (Sutton, *this volume*; Weinstein, 1988). "Explicit in a stage theory is the idea that the variables important in producing movement toward action vary from one stage to the next" (Sandman and Weinstein, 1993). All these models assume behaviour change is a multi-stage process with differing influences at each stage. For instance, in Prochaska and DiClemente's (1992) model, change consists of five stages: precontemplation, contemplation, preparation, action, and maintenance. At each stage, the importance of differing influences to progression will change. In the contemplation stage, expectancy-value considerations of salient outcomes may well be the most important predictors of successful progression. However, in the action and maintenance stages, control factors may be the dominant influences. A number of process models of change have been proposed within health psychology, the most prominent being: health action process approach (Schwarzer and Fuchs, 1996), Heckhausen's (1991) Rubicon model, Kuhl's (1981) action control theory, transtheoretical model of change (Prochaska and DiClemente, 1992), and precaution adoption process (Weinstein, 1988).

Health Action Process Approach

Schwarzer's (1992) health action process approach (HAPA) model argues that the adoption, initiation and maintenance of health behaviour is a process consisting of two distinct phases: a motivational phase and a volitional phase. The motivational phase roughly

equates with the kinds of processes outlined in SCT and TPB (see above). However, Schwarzer is clear that he sees a distinct temporal and causal ordering amongst self-efficacy and outcome expectancies, rather than them being concurrent independent predictors. Outcome expectancies are seen as precursors to self-efficacy where individuals have experience of the behaviour. Where individuals lack direct experience of the behaviour, outcome expectancies may have a direct impact upon intentions. Variables such as threat (susceptibility \times severity) which appear in models such as the HBM are seen as more distal antecedents of outcome expectancies. Note that this is congruent with the weak predictive utility of such constructs.

The volitional phase extends the more static social cognition models beyond motivation. The volitional phase is split into three overlapping stages: planning, action, and maintenance. The planning stage (or “volitional process”) is a post-intentional and pre-actional process and describes how individuals prepare for the intended behaviour by imagining scenarios of how and under which circumstances they could perform specific acts (cf. Bagozzi, 1992; Gollwitzer, 1993; Karoly, 1993). Self-efficacy is held to play a crucial role in this stage because individuals rely more or less on optimistic self-beliefs when facing self-imposed challenges. Subsequent behavioural performance, which represents the next (action) stage, then represents a successful outcome of cognitive activities in the planning/preparation stage. Self-referent thought about how to prepare and initiate a novel health behaviour during this stage will be reflected in individual differences in subsequent health behaviours. This action stage is seen as a description of the factors influencing how hard people try, and how long they persist in performing a behaviour. Maintenance of the behaviour is seen as the third volitional stage.

Whilst Schwarzer and Fuchs (1996) detail the measurement of components in the motivational phase and present an application of the HAPA to food choice, they fail to operationalise the relevant variables in the volitional phase. Indeed this can be seen to be a major criticism of stage models – the failure to develop clear operationalisations of key constructs and over-reliance on cross-sectional designs (see Sutton, this volume). In overview, HAPA appears useful in clarifying the distinction between motivational and volitional processes and in describing the role that some social cognitive variables play in these two phases. However, the model is also vague about what happens, and what role social cognitive variables might play in the volitional phase. More precise specification of the role of volitional components and their operationalisation for measurement purposes is required before the HAPA can be adequately tested. In spite of these criticisms, the model provides a useful bridge between the motivational and behavioural enaction models reviewed above, and the other multi-stage models reviewed below.

Heckhausen's Rubicon Model

Congruent with the HAPA, Heckhausen (1991) argues that an organism selects a particular behaviour because of expected consequences, and then implements it with some measure of energy along a particular path. As such, he posits a motivational–volitional dual process. The model posits four stages: intention formation, post-decision, action and evaluation, although the only substantive difference between the models is Heckhausen's (1991) inclusion of an evaluative component. This post-actional stage is characterised by attributions of causality and evaluations of process and outcome.

The Rubicon model is very clear in elucidating several distinct phases with clear boundaries between stages, and in providing description of the social cognitive variables that are

relevant at each stage. To date, no empirical work has assessed the efficacy of the model. However, the clear boundaries between the stages may be to its advantage, particularly if one considers that models such as the transtheoretical model of change (Prochaska and DiClemente, 1992, see below) consider stages as continua, with few references to the cognitions which move individuals from one stage to the next.

Kuhl's Action Control Theory

Julius Kuhl (1981, 1985) was actually the first theorist to clearly distinguish between motivational and volitional issues (choice- versus executive-motivation). Congruent with the stage models reviewed thus far, he clearly notes that the selection of an action alternative via the motivational process does not necessarily lead to its execution. Kuhl delineates two types of processes that facilitate the implementation of intentions: action- and implementation-control. Implementation control influences the step-by-step course of action (cf. Scheier and Carver's, 1988, feedback loops). Action control is more concerned with the general successful implementation of an intention.

Kuhl argues that there are seven mediating control strategies that enable the individual to overcome obstacles. These include emotion control, motivation control and coping with failure, the effects of which may be moderated by two modes: action- and state-orientation. These modes may be activated through aversive situations and/or through individual differences (cf. Gollwitzer, 1993). Action orientation presses for transforming an intention into action, while state orientation is concerned with consideration of cognitions related to the past, present and future state. Kuhl has developed an action-control scale with three sub-scales to assess decision-related, performance-related and failure-related types of action versus state orientation. These have been found to be predictive of successfully implementing intentions (i.e., action oriented are more likely to implement plans). Kuhl's research provides some insight into what processes might be relevant in a "volitional" stage. However, few measures of these variables have been developed aside from the styles measures. Development of clear operationalisations of these constructs is an essential pre-requisite for progress in this area.

Transtheoretical Model of Change

In their psychotherapy research, Prochaska and DiClemente (1983, 1984, 1992) noted that people appeared to go through similar stages of change no matter what therapy they were undergoing. Five distinct stages are elucidated.⁷ The first stage is precontemplation, where individuals have no intentions to change their behaviour in the foreseeable future. Operationally, Prochaska and DiClemente define individuals as precontemplative if they are not seriously intending to change their behaviour in the next six months. Six months is selected because this is assumed to be about as far in the future as most people plan a specific behaviour change, although the precise importance of this time frame is not clear.

Contemplation is the next stage, where individuals are thinking about making a change in the next six months, but have as yet taken no action or made any preparations. Contemplators are assumed to be aware of the problem and actively considering overcoming it within the next six months, but are as yet not committed to taking action. Preparation is the third stage, where individuals are preparing to make a change in their behaviour. Preparation

⁷Note that "termination" has recently been proposed as a sixth stage (see Sutton, this volume).

is distinguished by both intentional and behavioural criteria. There is an intention to take action in the next month, and frequently these individuals have taken unsuccessful action to change the behaviour in the past year. There is also some reduction in the problem behaviour.

Action is the fourth stage, where individuals are actively engaged in making a change in their behaviour. Individuals modify their behaviour, experiences or environment in order to overcome their problems. There are also overt changes in behaviour requiring considerable commitment of time and energy by the individual. For behaviour change (particularly addictive behaviour change), the action stage may last anything from one day to six months after having made the first overt change. Maintenance is the final stage where individuals are attempting to maintain a behaviour change. This stage starts six months after change (action) was attempted and may last considerable periods; some individuals may remain in this stage for the rest of their lives. Essential to this stage of behaviour change is the idea of stabilising behaviour and avoiding relapse. Maintenance is seen to end when successful change of a problem behaviour is achieved:

“... individuals successfully terminate an addictive behavior when their temptation levels are zero and their confidence levels are 100% across all problem situations.”
(Prochaska and DiClemente, 1986, p. 11)

Whilst all individuals are held to move through these stages it is assumed that the rate of progression will vary dramatically between individuals and behaviours. Some individuals may regress: where individuals attempting to give up smoking relapse and become smokers again, for example. Other individuals may become “stuck” in one stage and fail to achieve further behaviour change. Prochaska and DiClemente note that three revolutions through the stages is quite common before stability returns to the behaviour (i.e., lack of further change).

The stages of change are assumed to help us understand when shifts in attitudes, intentions and behaviour will occur, although they tell us little about how such changes do occur. Similarly, the role of other social cognitive variables and changes in such variables by stage remains mostly unclear (see Sutton, this volume). For example, in a study of fat intake, Brug, Hospers and Kok (1997) report that attitudes and social pressure to change were highest among contemplators and preparators. However, supporting evidence from other studies is currently lacking. The model has been applied to a number of behaviours, including: smoking cessation (DiClemente, Prochaska, Fairhurst *et al.*, 1991), exercise (Marcas, Rakowski and Rossi, 1992), alcohol treatment (DiClemente and Hughes, 1990), weight control (O’Connell and Velicer, 1988), and dietary change (e.g., Curry, Kristal and Bowen, 1992; Glanz, Patterson, Kristal *et al.*, 1994), although the majority of studies have employed cross-sectional designs, which makes true evaluation of such models difficult (see Sutton, this volume).

The transtheoretical model of change (TTM) has a number of appealing features. First, it has intuitive appeal, it is linked to practice, and it (at least superficially) appears to give us some insight into the processes of change. It also gives methods for moving people from one stage to the next and has been applied widely. More problematic is the fact that the model is not operationalised in social cognitive terms and so tells us very little about the role of such variables (or any other variables for that matter) in the change process (but see de Vries and Mudde, 1998; Dijkstra, de Vries, Roijackers and van Breukelen, 1998). Such a description might allow one to specify why a particular intervention is more or less important at one stage or another (i.e., how they might operate). The one social cognitive measure widely used, decisional balance, appears to be a rather crude measure and its links to other social cognition variables unclear. A second problem with the model is that the description of

change is ultimately unsatisfying except in very global terms – we are told little at the micro level about how people change and why some individuals will be successful and others not.

Precaution Adoption Process

To date, precaution adoption process (PAP; Weinstein, 1988; Weinstein and Sandman, 1992) has only been applied to complex self-protective behaviours (home radon testing, in particular). Although the PAP outlines seven separate stages, they overlap considerably with both HAPA and TTM. The PAP model distinguishes between not having heard of an issue, to having heard of it, then becoming engaged in it (equivalent to contemplation). Deciding not to engage in the behaviour is a separate stage, the fifth stage is planning (but not actually acting). The sixth stage is an action stage, whereby individuals take some action. Potentially, action may be inhibited by having too many options (the “messy desk” analogy), although integration of this model with Gollwitzer’s (1993) implementation intentions might commit individuals to one behaviour in particular (see above). The final stage maps directly onto Prochaska and DiClemente’s (1992) maintenance stage.

A number of studies have provided support for the PAP model in the context of home radon testing (e.g., Sandman and Weinstein, 1993; Weinstein, Sandman and Roberts, 1990). However, a recent study by Weinstein and colleagues (Weinstein, Lyon, Sandman and Cuite, 1998a) provides the strongest evidence to date in support of the PAP model. Weinstein *et al.* (1998a) tailored interventions to individuals in specific stages. Findings indicated that these matched interventions resulted in progression through stages congruent with the PAP model. Similar to TTM, however, description of what actually occurs in terms of social cognitive variables is rather imprecise. Therefore, although the model appears to be useful for categorisation and intervention, exactly which social cognitive variables are being manipulated is unclear. Moreover, the model has only been tested with respect to one unusual behaviour in a limited number of studies. In spite of this criticism, the PAP model has potential for future research, and integration with motivational and volitional accounts of behaviour may prove useful (for a review, see Weinstein, Rothman and Sutton, 1998b).

General Integration and Critique of Stage Models

From the above it can be seen that there are a variety of stage models in the current literature with a number of overlapping constructs. At a general level, such models suggest the importance of different variables in producing change at different time points in a process of behaviour change. Aspects of this argument do seem persuasive in that early on in the adoption of a new behaviour, knowledge inputs might be important. Later in the change process, inputs which increase motivation to change, and subsequently suggest means for overcoming barriers to change may be more relevant. Hence, there may be a close link between the stage and the most effective intervention. However, the case is far from proven (although see Dijkstra *et al.*, 1998; Weinstein *et al.*, 1998a, for promising future directions). Essentially, multi-stage models differ from behavioural enaction models only in so far as they suggest that social cognitive influences on health behaviour are qualitatively different in each stage.

A different issue concerns the number and type of different stages. Nearly all the multi-stage models considered seem to distinguish a motivational and volitional stage, but any number of additional stages are included. It seems likely that the number of distinguishable stages will vary depending on the behaviour in question. The models tend to be much

vaguer about what actually happens within each stage. For example, models such as the TPB may do quite a good job of describing the motivational stage that ends with the formation of an intention. However, within multi-stage models, the important variables and how they are to be combined to predict change in the volitional stage of behaviour change are far from clear. In addition, it seems unclear the extent to which motivational variables play a role in subsequent stages of change.

There are a number of further criticisms of multi-stage models. For example, the extent to which multi-stage models truly describe the processes people go through in changing behaviour, and whether individuals must move through the stages sequentially (e.g., does one need motivation in the form of a strong intention, or are good volition skills enough to successfully change a behaviour?) is currently unclear. Similarly, congruent with Sutton's (this volume) comments concerning pseudo-stages, the extent to which different stages are clearly distinguishable is a matter for future research and debate.

CONCLUSIONS AND FUTURE DIRECTIONS

The present paper reviews the relative efficacy of motivational, behavioural enaction, and multi-stage models of health behaviour. In terms of predictive utility, current research suggests that motivational models provide an incomplete account of health behaviour, when compared with behavioural enaction and multi-stage models. This is perhaps unsurprising: behavioural enaction models provide additional variables that are held to mediate the intention-behaviour relationship; multi-stage models conceptualise health behaviours in terms of a number of discrete stages. In comparison, motivational models are perhaps oversimplistic. Potentially the most important issue for future research is therefore to assess the relative effectiveness of behavioural enaction versus multi-stage models.

On the grounds of parsimony, behavioural enaction models seem to offer more than multi-stage models. Research to date suggests that the addition of less than three constructs to a motivational model will significantly increase the proportion of variance explained in health behaviour (e.g., Orbell *et al.*, 1997; Sheeran and Orbell, 1999). However, given the paucity of longitudinal studies addressing this issue, research may yet demonstrate the value of models that conceptualise several discrete stages (e.g., Dijkstra *et al.*, 1998; Weinstein *et al.*, 1998a). In particular, further examination of issues concerning operationalisation and identification of key variables within multi-stage models may allow such models to supersede models of behavioural enaction.

There are a number of ideas that are worthy of further consideration on the basis of the present review. First, there are large numbers of studies that provide tests of both motivational and multi-stage models, and research attention is beginning to be focused on behavioural enaction models (e.g., Hinsz and Ployhart, 1998; Sheeran and Orbell, 1999; Verplanken and Faes, in press). However, relatively few studies have investigated the ability of the models to inform health interventions. As Sutton (1998) has argued, whilst it is important that social cognition models are predictive of behaviour, it is the knowledge that such models explain and cause behaviour that is of particular import. There are three principal ways in which such issues may be addressed: (a) designing studies which allow testing of causal relationships (e.g., Armitage and Conner, 1999a); (b) conducting experimental manipulations of hypothesised variables (e.g., Brubaker and Wickersham, 1990); (c) assessing the impact of different types of interventions that move people through multi-stage models (e.g., Dijkstra *et al.*, 1998; Weinstein *et al.*, 1998a).

Second, common to all the stage models, further investigation of measures that adequately classify individuals into different stages on a large sample would seem appropriate. To date, the reliability and validity of stage classification measures has received only scant attention in the literature (but see Donovan, Jones, D'Arcy, Holman and Corti, 1998). Moreover, assessment of a range of social cognitive variables in these same individuals might provide some insight (at least cross-sectionally) into how social cognitive variables differ across stages (cf. Courneya, 1995).⁸ Third, given the diverse range of social cognition models available to health psychologists, it is appropriate to look to integrating models of health behaviour. In spite of the diverse nature of social cognition models in health psychology, the present review has identified a number of variables that these models hold in common. In particular: self-efficacy (or perceived control in general); beliefs about outcomes associated with performing health behaviour; and a distinction between motivational (intentional) processes on the one hand, and volitional processes on the other. Multiple testing of models within single studies would provide evidence for discriminant validity between apparently overlapping constructs (for example, the volitional phase of Schwarzer versus the post-decision/action stages of Heckhausen).

A related issue is one of mapping the descriptive/clinical power of multi-stage models onto the explanatory power of intention and behavioural enactment models. One approach to this might be to argue that separate stages encapsulate a series of discrete behaviours. To date, we have a fairly clear idea of the social cognitive determinants of intentions (or non-intentions) from models such as PMT and TPB. Once individuals have formed an appropriate intention, there are theories which outline how those intentions may be put into effect. Potentially, multi-stage theories provide an over-arching framework to describe and delineate the component behaviours required for achieving health goals (e.g., quitting smoking).

The present review provides criteria for a general model of health behaviour: one that encapsulates intention formation and behavioural enactment, combined with an appreciation that successful performance of health behaviour may require a number of levels of preparation and practise. However, the minimum requirement for an adequate test of such models is the use of a prospective design (e.g., Sutton, this volume; Weinstein *et al.*, 1998b). For example, it would be interesting to follow individuals through a number of stages and monitor how various social cognitive variables change as individuals progress or relapse (cf. de Vries and Mudde, 1998). Linked to this idea might be the development of an intervention study which attempted to match individuals in different stages to different targeted interventions and then monitored the effectiveness of differing interventions (see Dijkstra *et al.*, 1998; Weinstein *et al.*, 1998a). What is clear is that an adequate social cognitive model of health behaviour should be able to not only predict behaviour, but also account for, and promote behaviour change (Fishbein, 1997).

⁸One anonymous reviewer pointed out that it is also possible that both stage and relevant social cognitive variable may be the product of a third – as yet unidentified – variable. A further complication is introduced if one considers that classification of individuals into multiple stages is usually operationalised in terms of past behaviour (e.g., “Have you been [eating a low fat diet] for the last 6 months or more?”). Given that past behaviour has been shown to independently predict subsequent behaviour over and above a range of social cognitive variables, this introduces a potential confound when attempts are made to identify important variables within stages (see Conner and Armitage, 1998; Sutton, 1994).

References

- Ajzen, I. (1988) *Attitudes, personality and behavior*. Milton Keynes, UK: Open University Press.
- Ajzen, I. (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, **50**, 179–211.
- Ajzen, I. and Fishbein, M. (1980) *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Armitage, C.J. and Conner, M. (1999a) The theory of planned behaviour: assessment of predictive validity and “perceived control”. *British Journal of Social Psychology*, **38**, 35–54.
- Armitage, C.J. and Conner, M. (1999b) Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low fat diet using the theory of planned behavior. *Journal of Applied Social Psychology*, **29**, 72–90.
- Bagozzi, R.P. (1992) The self-regulation of attitudes, intentions, and behavior. *Social Psychology Quarterly*, **55**, 178–204.
- Bagozzi, R.P. (1993) On the neglect of volition in consumer research: A critique and proposal. *Psychology and Marketing*, **10**, 215–237.
- Bagozzi, R.P. and Edwards, E.A. (in press) Goal setting and goal pursuit in the regulation of body weight. *Psychology and Health*.
- Bagozzi, R.P. and Kimmel, S.K. (1995) A comparison of leading theories for the prediction of goal-directed behaviours. *British Journal of Social Psychology*, **34**, 437–461.
- Bandura, A. (1986) *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1997) *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company.
- Bandura, A., Cioffi, D., Taylor, C.B. and Brouillard, M.E. (1988) Perceived self-efficacy in coping with cognitive stressors and opioid activation. *Journal of Personality and Social Psychology*, **55**, 479–488.
- Baranowski, T. (1989) Reciprocal determinism at the stages of behavior change: An integration of community, personal, and behavioral perspectives. *International Quarterly of Community Health Education*, **10**, 297–327.
- Blaxter, M. (1990) *Health and lifestyles*. London: Routledge.
- Boer, H. and Seydel, E.R. (1996) Protection motivation theory. In: M. Conner and P. Norman (Eds.), *Predicting health behaviour* (pp. 95–120). Buckingham, UK: Open University Press.
- Brubaker, R.G. and Wickersham, D. (1990) Encouraging the practice of testicular self-examination: A field application of the theory of reasoned action. *Health Psychology*, **9**, 154–163.
- Brug, J., Hospers, H.J. and Kok, G. (1999) Differences in psychosocial factors and fat consumption between stages of change for fat reduction. *Psychology and Health*, **12**, 719–727.
- Cohen, J. (1988) *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Prentice-Hall.
- Cohen, J. (1992) A power primer. *Psychological Bulletin*, **112**, 155–159.
- Conner, M. and Armitage, C.J. (1998) Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, **28**, 1429–1464.
- Conner, M. and Norman, P. (1994) Comparing the health belief model and the theory of planned behaviour in health screening. In: D.R. Rutter and L. Quine (Eds.), *Social psychology and health: European perspectives* (pp. 1–24). Aldershot, UK: Avebury.
- Conner, M. and Norman, P. (Eds.) (1996) *Predicting health behaviour*. Buckingham, UK: Open University Press.
- Conner, M. and Sparks, P. (1996) The theory of planned behaviour and health behaviours. In: M. Conner and P. Norman (Eds.), *Predicting health behaviour* (pp. 121–162). Buckingham, UK: Open University Press.
- Courneya, K.S. (1995) Understanding readiness for regular physical activity in older individuals: An application of the theory of planned behavior. *Health Psychology*, **14**, 80–87.
- Curry, S., Kristal, A. and Bowen, D. (1992) An application of the stage model of behaviour change to dietary fat reduction. *Health Education Research*, **7**, 97–105.
- de Vries, H. and Mudde, A.N. (1998) Predicting stage transitions for smoking cessation applying the attitude-social influence-efficacy model. *Psychology and Health*, **13**, 369–385.
- DiClemente, C.C. and Hughes, S.O. (1990) Stages of change profiles in outpatient alcoholism treatment. *Journal of Substance Abuse*, **2**, 217–235.
- DiClemente, C.C., Prochaska, J.O., Fairhurst, S.K., Velicer, W.F., Velasquez, M.M. and Rossi, J.S. (1991) The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology*, **59**, 295–304.
- Dijkstra, A., de Vries, H., Roijackers, J. and van Breukelen, G. (1998) Tailored interventions to communicate stage-matched information to smokers in different motivational stages. *Journal of Consulting and Clinical Psychology*, **66**, 549–557.
- Donovan, R.J., Jones, S., D’Arcy, C., Holman, J. and Corti, B. (1998) Assessing the reliability of a stage of change scale. *Health Education Research*, **13**, 285–291.
- Dzewaltowski, D.A., Noble, J.M. and Shaw, J.M. (1990) Physical activity participation – social cognitive theory versus the theories of reasoned action and planned behavior. *Journal of Sport and Exercise Psychology*, **12**, 388–405.
- Edwards, W. (1954) The theory of decision making. *Psychological Bulletin*, **51**, 380–417.
- Ellickson, P.L. and Bell, R.M. (1990) Drug prevention in junior high: A multi-site longitudinal test. *Science*, **247**, 1299–1305.

- Fishbein, M. (1997) Predicting, understanding, and changing socially relevant behaviors: Lessons learned. In: C. McGarty and S.A. Haslam (Eds.), *The message of social psychology* (pp. 77–91). Oxford: Blackwell.
- Fishbein, M. and Ajzen, I. (1975) *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA.: Addison-Wesley.
- Fishbein, M., Triandis, H.C., Kanfer, F.H., Becker, M.H., Middlestadt, S.E. and Eichler, A. (in press) Factors influencing behavior and behavior change. In: A. Baum, T. Revenson and J. Singer (Eds.), *Handbook of Health Psychology*. Hillsdale, NJ: Lawrence Erlbaum.
- Glanz, K., Patterson, R.E., Kristal, A.R., DiClemente, C.C., Heimendinger, J., Linnan, L. and McLerran, D.F. (1994) Stages of change in adopting healthy diets: Fat, fiber, and correlates of nutrient intake. *Health Education Quarterly*, **21**, 499–519.
- Godin, G. and Kok, G. (1996) The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion*, **11**, 87–98.
- Gollwitzer, P.M. (1993) Goal achievement: The role of intentions. In: W. Stroebe and M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 4, pp. 141–185). Chichester, UK: Wiley.
- Gregory, J., Foster, K., Tyler, H. and Wiseman, M. (1990) *Dietary and nutritional survey of British adults*. London: HMSO.
- Harrison, J.A., Mullen, P.D. and Green, L.W. (1992) A meta-analysis of studies of the health belief model with adults. *Health Education Research*, **7**, 107–116.
- Hausenblas, H.A., Carron, A.V. and Mack, D.E. (1997) Application of the theories of reasoned action and planned behavior to exercise behavior: A meta-analysis. *Journal of Sport and Exercise Psychology*, **19**, 36–51.
- Heckhausen, H. (1991) *Motivation and action*. Berlin: Springer.
- Hinsz, V.B. and Ployhart, R.E. (1998) Trying, intention, and the processes by which goals influence performance: An empirical test of the theory of goal pursuit. *Journal of Applied Social Psychology*, **28**, 1051–1066.
- Hodgkins, S., Sheeran, P. and Orbell, S. (1998) *Prediction and intention in health-related behaviour: A meta-analytic review of protection motivation theory*. Unpublished manuscript, University of Sheffield, UK.
- Janz, N. and Becker, M.H. (1984) The health belief model: A decade later. *Health Education Quarterly*, **11**, 1–47.
- Karoly, P. (1993) Mechanisms of self-regulation: A systems view. *Annual Review of Psychology*, **44**, 23–52.
- Kendzierski, D. (1990) Decision making versus decision implementation: An action control approach to exercise adoption and adherence. *Journal of Applied Social Psychology*, **20**, 27–45.
- Kuhl, J. (1981) Motivational and functional helplessness: The moderating effect of state versus action orientation. *Journal of Personality and Social Psychology*, **40**, 155–170.
- Kuhl, J. (1985) Volitional mediators of cognition-behavior consistency: Self-regulatory processes and action versus state orientation. In: J. Kuhl and J. Beckman (Eds.), *Action control: From cognition to behavior* (pp. 101–128). New York: Springer.
- Kuhl, J. (1992) A theory of self-regulation: A new theory for old applications. *Applied Psychology: An International Review*, **41**, 97–130.
- Lazarus, R.S. and Folkman, S. (1987) Transactional theory and research on emotions and coping. *European Journal of Personality*, **1**, 141–170.
- Marcas, B.H., Rakowski, W. and Rossi, J.S. (1992) Assessing motivational readiness and decision making for exercise. *Health Psychology*, **11**, 257–261.
- Norman, P. and Bennett, P. (1996) Health locus of control. In: M. Conner and P. Norman (Eds.), *Predicting health behaviour* (pp. 62–94). Buckingham, UK: Open University Press.
- O'Connell, D.O. and Velicer, W.F. (1988) A decisional balance measure and the stages of change model for weight loss. *International Journal of the Addictions*, **23**, 729–750.
- Orbell, S., Hodgkins, S. and Sheeran, P. (1997) Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin*, **23**, 945–954.
- Parcel, G.S., Edmundson, E., Perry, C.L., Feldman, H.A., O'Hara-Tompkins, N., Nader, P.R., Johnson, C.C. and Stone, E.J. (1995) Measurement of self-efficacy for diet-related behaviors among elementary school children. *Journal of School Health*, **65**, 23–27.
- Peak, H. (1955) Attitude and motivation. In: M.R. Jones (Ed.), *Nebraska symposium on motivation* (Vol. 3, pp. 149–188). Lincoln: University of Nebraska Press.
- Prochaska, J.O. and DiClemente, C.C. (1983) Stages and processes of self-change in smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, **51**, 390–395.
- Prochaska, J.O. and DiClemente, C.C. (1984) *The transtheoretical approach: Crossing the traditional boundaries of change*. Homewood, IL: J. Irwin.
- Prochaska, J.O. and DiClemente, C.C. (1986) Toward a comprehensive model of change. In: W.E. Miller and N. Heather (Eds.), *Treating addictive behaviors* (pp. 3–27). London: Plenum Press.
- Prochaska, J.O. and DiClemente, C.C. (1992) Stages of change in the modification of problem behaviors. In: M. Hersen, R.M. Eisler and P.M. Miller (Eds.), *Progress in behavior modification* (pp. 184–218). Sycamore, IL: Sycamore Press.
- Quine, L., Rutter, D.R. and Arnold, L. (1998) Predicting and understanding safety helmet use among schoolboy cyclists: A comparison of the theory of planned behaviour and the health belief model. *Psychology and Health*, **13**, 251–269.

- Resnicow, K., Davis-Hearn, M., Smith, M., Baranowski, T., Lin, L.S., Baranowski, J., Doyle, C. and Wang, D.T. (1997) Social-cognitive predictors of fruit and vegetable intake in children. *Health Psychology*, **16**, 272–276.
- Rogers, R.W. (1983) Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In: J.T. Cacioppo and R.E. Petty (Eds.), *Social psychophysiology* (pp. 153–176). New York: Guilford.
- Rosenstock, I.M. (1974) Historical origins of the health belief model. *Health Education Monographs*, **2**, 1–8.
- Rosenthal, R. (1984) *Meta-analytic procedures for social research*. Beverly Hills, CA: Sage.
- Sandman, P.M. and Weinstein, W.D. (1993) Predictors of home radon testing and implications for testing promotion programs. *Health Education Quarterly*, **20**, 471–487.
- Scheier, M.F. and Carver, C.S. (1988) A model of behavioral self-regulation: Translating intention into action. *Advances in Experimental Social Psychology*, **21**, 303–346.
- Schwarzer, R. (1992) Self-efficacy in the adoption and maintenance of health behaviors: Theoretical approaches and a new model. In: R. Schwarzer (Ed.), *Self-efficacy: thought control of action* (pp. 217–243). London: Hemisphere.
- Schwarzer, R. and Fuchs, R. (1996) Self-efficacy and health behaviours. In: M. Conner and P. Norman (Eds.), *Predicting health behaviour* (pp. 163–196). Buckingham, UK: Open University Press.
- Sheeran, P. and Abraham, C. (1996) The health belief model. In: M. Conner and P. Norman (Eds.), *Predicting health behaviour* (pp. 23–61). Buckingham, UK: Open University Press.
- Sheeran, P. and Orbell, S. (1998) Do intentions predict condom use? Meta-analysis and examination of six moderator variables. *British Journal of Social Psychology*, **37**, 231–250.
- Sheeran, P. and Orbell, S. (1999) Implementation intentions and repeated behaviour: Augmenting the predictive validity of the theory of planned behaviour. *European Journal of Social Psychology*, **29**, 349–369.
- Sheppard, B.H., Hartwick, J. and Warshaw, P.R. (1988) The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, **15**, 325–343.
- Strecher, V.J., DeVellis, B.M., Becker, M.H. and Rosenstock, I.M. (1986) The role of self-efficacy in achieving health behavior change. *Health Education Quarterly*, **13**, 73–92.
- Stroebe, W. and Stroebe, M.S. (1995) *Social psychology and health*. Buckingham, UK: Open University Press.
- Sutton, S. (1994) The past predicts the future: Interpreting behaviour-behaviour relationships in social psychological models of health behaviour. In: D.R. Rutter and L. Quine (Eds.), *Social psychology and health: European perspectives* (pp. 71–88). Aldershot, UK: Avebury.
- Sutton, S. (1998) Explaining and predicting intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*, **28**, 1318–1339.
- Sutton, S. – submitted to this volume of *Psychology and Health*.
- Terry, D.J. and O’Leary, J.E. (1995) The theory of planned behaviour: The effects of perceived behavioural control and self-efficacy. *British Journal of Social Psychology*, **34**, 199–220.
- Verplanken, B. and Faes, S. (in press) Good intentions, bad habits and effects of forming implementations in healthy eating. *European Journal of Social Psychology*.
- Wallston, K.A., Wallston, B.S. and DeVellis, R. (1978) Development of multidimensional health locus of control (MHLC) scales. *Health Education Monographs*, **6**, 160–170.
- Weinstein, N.D. (1988) The precaution adoption process. *Health Psychology*, **7**, 355–386.
- Weinstein, N.D. (1993) Testing four competing theories of health-protective behavior. *Health Psychology*, **12**, 324–333.
- Weinstein, N.D., Lyon, J.E., Sandman, P.M. and Cuite, C.L. (1998a) Experimental evidence for stages of health behavior change: The precaution adoption process model applied to home radon testing. *Health Psychology*, **17**, 445–453.
- Weinstein, N.D., Rothman, A.J. and Sutton, S.R. (1998b) Stage theories of health behavior. *Health Psychology*, **17**, 290–299.
- Weinstein, N.D. and Sandman, P.M. (1992) A model of the precaution adoption process: Evidence from home radon testing. *Health Psychology*, **11**, 170–180.
- Weinstein, N.D., Sandman, P.M. and Roberts, N.E. (1990) Determinants of self-protective behaviour: Home radon testing. *Journal of Applied Social Psychology*, **20**, 783–801.