Health Psychology
2003, Vol. 22, No. 4, 424–428

0278-6133/03/$12.00 DOI: 10.1037/0278-6133.22.4.424

BRIEF REPORTS

Some Problems With Social Cognition Models: A Pragmatic and Conceptual Analysis

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Empirical articles published between 1997 and 2001 from 4 health psychology journals that tested or applied 1 or more social cognition models (theory of reasoned action, theory of planned behavior, health belief model, and protection motivation theory; $N = 47$) were scrutinized for their pragmatic and conceptual basis. In terms of their pragmatic basis, these 4 models were useful for guiding research. The analysis of their conceptual basis was less positive. First, these models do not enable the generation of hypotheses because their constructs are unspecific; they therefore cannot be tested. Second, they focus on analytic truths rather than synthetic ones, and the conclusions resulting from their application are often true by definition rather than by observation. Finally, they may create and change both cognitions and behavior rather than describe them.

Key words: social cognition models, critique, problems, health cognitions

Despite the widespread use in health psychology of social cognition models, there have been some critiques. Conner and Norman (1996) described an overlap in the variables between the different models, Sutton (1998) concluded that although such models are designed to predict behavior they leave much of the variance in behavior unexplained, and Smedlund (2000) criticized them for their logical construction. This article highlights further problems with the health belief model (HBM; Becker & Rosenstock, 1987), the theory of reasoned action (TRA; Fishbein & Ajzen, 1975), the protection motivation theory (PMT; Rogers, 1975), and the theory of planned behavior (TPB; Ajzen, 1985) in terms of their pragmatic and conceptual basis and asks whether they can be considered good theories. Specifically it addresses the questions: Are the theories useful? Can the theory be tested? Does the theory use analytic or synthetic truths? and Does the theory access or create cognitions?

Method

The main journal outlets for health psychology work for researchers in the United States, the United Kingdom, and across other European countries are *Health Psychology*, published by the American Psychological Association; the *British Journal of Health Psychology*, published by the British Psychological Society; *Psychology and Health*, the official journal of the European Health Psychology Society and published by Brunner Routledge; and the *Journal of Health Psychology*, published by Sage. All articles published in these journals between 1997 and 2001 (inclusive) excluding commentaries, introductions to special issues, and letters to the editor that focused on the most common structured models (HBM, TRA, TPB, and PMT) were scrutinized for their pragmatic and conceptual basis. Exemplar articles were noted and illustrative quotes were recorded.

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Results

The Articles

During the 5-year period from 1997 to 2001, 923 articles were published in these four journals. Of these, 727 did not focus on health-related cognitions. The remaining 196 articles (21%) contained a substantial focus on health-related cognitions. Twenty-two of these were nonempirical reviews or discussion pieces. A total of 47 empirical articles focusing on structured models form the basis of the present article: HBM ($n = 9$), PMT ($n = 5$), TRA ($n = 5$), and TPB ($n = 33$). (Note that 5 articles focused on two models simultaneously.)

Pragmatic Basis to a Theory: Are the Theories Useful?

In the sample of articles examined, the behaviors covered were condom use, exercise, sugar restriction, sun cream use, health screening, exercise, low-fat diet, dental flossing, breast self-examination, safety helmet use, providing care for parents, donating bone marrow, hormone replacement therapy use, ecstasy use, the request for hospital autopsies, smoking, antibiotic prescribing, and voting. These articles constituted 5.1% of the total number of articles published in the four journals over the 5-year period. The journal offering most of its space to research relating to health cognitions was *Psychology and Health* (33.2%, $n = 82$), then *Health Psychology* (19.5%, $n = 63$), then the *British Journal of Health Psychology* (18.5%, $n = 25$), with the *Journal of Health Psychology* showing the least commitment to this perspective (11.9%, $n = 26$). Of these articles, the journal publishing the largest proportion of research relating to the four structured models

(HBM, PMT, TRA, and TPB) was the *British Journal of Health Psychology* (40%, $n = 10$), then *Psychology and Health* (33%, $n = 27$), then the *Journal of Health Psychology* (19.2%, $n = 5$), and the least was published in *Health Psychology* (7%, $n = 5$). From the perspective of researchers, these models are therefore useful. The models are also used to inform service development and the development of health-related interventions to promote health behaviors. This sample of articles contained five theory-based interventions. These aimed to reduce sun tanning based on the PMT (McClenden & Prentice-Dunn, 2001), to explore the relationship between alcohol use and the intention to use condoms (Conner, Graham, & Moore, 1999), to increase sun cream use using the HBM (Castle, Skinner, & Hampson, 1999), to encourage safety helmet use using the TPB (Quine, Rutter, & Arnold, 2001), and to promote cervical cancer screening using the TPB and implementation intentions (Sheeran & Orbell, 2000).

Conceptual Basis to a Theory: Can the Theory Be Tested?

A good theory should consist of constructs that are sufficiently specific so as to generate hypotheses. Such hypotheses should be testable, and, in principle at least, a good theory should be able to be rejected. Of the articles examined, almost all indicated that they were "testing" a theory, and nearly three quarters concluded that their data provided support for their particular model. For example, Povey, Conner, Sparks, James, and Shepherd (2000) concluded that "the results from this study suggest that the TPB is generally a useful framework to predict health eating intentions and behaviour" (p. 1004), Steen, Peay, and Owen (1998) concluded from their study of intentions to minimize sun exposure that "our findings generally supported the theory of reasoned action" (p. 116), and Flynn et al (1997) concluded from their study of voting behavior using the TPB that "legislator surveys that use this conceptual model can provide results relevant to understanding tobacco policy development" (p. 401). But what do such statements of support really mean? What results would indicate that the models being used were not a useful framework? Could data be collected that would lead to the model being rejected?

Within the present sample, two thirds reported that at least one of the variables within the given model did not predict the outcome variable being studied. For example, many studies using the TPB reported no role for subjective norms (e.g., Bozionelos & Bennett, 1999; De Wit, Stroebe, De Vroome, Sandfort, & Van Griensen, 2000; Jamner, Wolitski, Corby, & Fishbein, 1998), some showed no predictive role for perceived behavioral control (e.g., Flynn et al., 1997; Sutton, McVey, & Glanz, 1999), and some showed no role for attitudes (e.g., Yzer, Siero, & Buunk, 2001). Similarly, some studies using the HBM reported no role for susceptibility (e.g., Castle et al., 1999; Pakenham, Pruss, & Clutton, 2000), and those using the PMT found no role for a range of variables (e.g., Murgraff, White, & Phillips, 1999; Plotnikoff & Higginbotham, 1998). Further, all of the articles examined left much of the variance unexplained, with explained variance ranging from 1% to 65% for behavior and 14% to 92% for behavioral intentions.

The variables described by the models may not be predictive and the variance explained is low, but, instead of rejecting the models, several explanations are offered. The first explanation argues that the model should be accepted but that the variables were not operationalized properly. For example, Murgraff et al. (1999) suggested from their study of the PMT that their results may be due to the "wording of the intention measure" (p. 348); similarly Castle et al. (1999) suggested that "the operationalisation of constructs of the Health Belief Model may not have been optimal" (p. 526). The second explanation suggests that the model should be accepted but that sample characteristics may explain their results. For example, Hagger, Chatzisarantis, Biddle, and Orbell (2001) argued that the usefulness of the TPB depends on the type of population used and that the young people in their study may have different cognitive predictors of their behavior than an older sample. Similarly, De Wit et al. (2000) suggested that the type of population being considered by those answering the questionnaire may also influence the way the cognitions relate to behavior and differentiate between casual and primary sexual partners in their study using the TPB. Other studies explain the failure of the model in terms of the type of behavior studied. For example, Sheeran, Conner, and Norman (2001) argued that the low variance found in their study using the TPB is "probably because the health screening was a novel behaviour for participants" (p. 17), and Murgraff et al. (1999) suggested that the performance of the PMT in their study of single-occasion drinking was due to participants being "exposed to a new, previously unknown threat to their health" (p. 347). Sutton et al. (1999) also explained the failure of the TPB in their study assessing intentions to use condoms in terms of the characteristics of the behavior in question. Finally, several articles argued that the model being studied should be accepted but only if it is extended. For example, Sparks, Conner, James, Shepherd, and Povey (2001) argued for the addition of ambivalence, and Trafimow (2000) argued for the addition of habit to the TPB.

The majority of the articles did not strongly support the models being used either in terms of the expected associations between variables or in terms of the models' ability to predict the designated outcome variable. But such data are not used to reject the model in question. Instead, explanations are offered that function as caveats perpetuating the belief that the models have been verified. All data can be used to indicate the strength of a social cognition model, but it would appear that no data can be collected to show that it is wrong. They therefore cannot be tested.

Are the Models Testing Analytic or Synthetic Truths?

Philosophy of science differentiates between two types of truth: synthetic truth that can be known through exploration and testing and analytic truth that is true by definition. A good theory should generate synthetic rather than analytic truths to avoid being tautological. Almost all articles correlated cognitions such as *perceived behavioral control*, *attitudes*, *severity*, *susceptibility*, and the *costs and benefits of a behavior* with the cognition *behavioral intention*. At times the operationalization of these different cognitions appeared very similar. For example, Lugoe and Rise (1999) correlated perceived behavioral control measured by the statement, "How certain are you that you would be able to use a condom at the next intercourse?" with intentions that were operationalized as "I intend to use a condom at the next sexual intercourse." Similarly, the same two cognitions were operationalized by Masalu and Astrom (2001) as "How easy or difficult will it be for you to avoid between-meal intake of sugared snacks and drinks in future?" (p.

439) and "How likely or unlikely is it that you will avoid between-meal intake of sugared snacks and drinks in future?" (p. 438) and by Rapaport and Orbell (2000) as "Even if I wanted, I might not be able to provide practical assistance/emotional support for a parent of mine in need of care within the next twenty years" (p. 314) and "If a parent of mine were in need of care within the next twenty years, I intend to personally provide practical assistance/emotional support" (p. 315). If they are significantly correlated, then is it really surprising? Such cognitions are defined as different and yet operationalized in similar ways. The majority of studies explored analytic truths that were true by definition rather than by exploration.

Over two thirds of these articles also correlated these same cognitions with a measure of behavior. For example, Plotnikoff and Higginbotham (1998) assessed diet and exercise, Yzer et al. (2001) assessed condom use, and Conner, Sherlock, and Orbell (1998) assessed ecstasy use. These could be considered to be assessing synthetic truths as the cognition is operationalized differently to the behavior. However, although one article (Jones, Abraham, Harris, Schulz, & Chrispin, 2001) assessed the reliability of their self-reported behavior, only a quarter of articles used an objective measure of behavior that was not reliant on self-report (e.g., Flynn et al., 1997; McClendon & Prentice-Dunn, 2001; Pakenham et al., 2000; Sheeran et al., 2001; Sheeran & Orbell, 2000). Such self-reported behavior could also be contaminated by the self-reported cognitions, and any association found between the two could also reflect a truth by definition rather than one that requires an empirical test.

Are They Accessing or Creating Cognitions?

All of the articles asked participants to complete a questionnaire to describe their cognitions. This procedure is based on the assumption that the answers given will reveal preexisting states of mind rather than ones that have been generated by the questionnaire. It is possible, however, that cognitions may be created simply by completing a questionnaire. This finds reflection in the use of questions to manipulate affect and cognition in both the cognitive and clinical literatures (e.g., Wenzlaff & Wegner, 2000). This might be particularly the case if the behavior being considered is novel and unfamiliar and is illustrated by several articles in the present sample. For example, Cecil, Pinkerton, and Bogart (1999) used the HBM in the context of the female condom. However, 93% of their sample had never used a female condom and yet were asked to provide details of their attitudes toward them. Questionnaire statements such as "the appearance of the female condom turns me off" (p. 170) and "female condom decreases sexual pleasure for a man" (p. 170) might not be accessing such cognitions but creating them in this novice sample. Likewise Bagozzi, Lee, and Van Loo (2001) explored decisions to donate bone marrow using the framework of the TRA. As a means of gaining informed consent, all of the participants were given a brief description "of the need for bone marrow donation" that was introduced as follows: "Because most people are unfamiliar with bone marrow donation, we have prepared a short summary of the reasons for collecting bone marrow" (p. 38). Information was then provided "compiled from a variety of sources including publications from the National Marrow Donor Program" (p. 38). For many participants, these may be novel areas for consideration, and their cognitions may easily be manipulated. Such questionnaire items could create feelings of guilt and a sense of duty in the participants, shifting their cognitions toward that which might seem more socially desirable. It may not, however, only be novelty that can create a shift in cognitions. In line with the cognitive and clinical literatures (e.g., Wenzlaff & Wegner, 2000), even focusing on a familiar behavior could create a shift in cognitive set. Accordingly, completing questions about an individual's cognitions may change and create rather than access the way in which they think.

Completing a questionnaire may also change a participant's subsequent behavior. About half of the articles assessed behavior at a follow-up time point. This methodological approach is considered appropriate if synthetic rather than analytic truths are being assessed. The process of completing a baseline measure of cognitions may, however, determine rather than simply predict subsequent behavior. For example, Morrison, Baker, and Gillmore (1998) asked teenagers to complete a range of cognitive measures based on the TRA at baseline and then assessed their behavior 3 months later. Although the teenagers' subsequent behavior was predicted by the earlier cognitions, completing items relating to their intentions to use condoms, their attitudes toward them, and their perceptions of what their significant others thought about condoms may have raised the salience of condom use, created a sense that this behavior was socially desirable, and therefore changed their subsequent behavior. Similarly, Masalu and Astrom (2001) asked a large sample of students to record their cognitions about consuming sugared snacks and drinks in line with the TPB. Items rated included "How likely or unlikely is it that you will avoid between meal intake of sugared snacks and drinks in future?" (p. 438) and "Most people important to me think that I should avoid between meal intake of sugared snacks and drinks in the future" (p. 438). They then assessed self-reported consumption 4 weeks later. Baseline beliefs predicted behavior at follow-up. But they may also have raised the issue of between-meal snacks and drinks and changed the participants' behavior.

Discussion

This article explored the pragmatic and conceptual basis to a series of articles based on four social cognition models. This analysis showed these models are useful and fruitful and provide a framework for the development of interventions designed to change health-related behaviors. The models pass the present article's criteria to assess their pragmatic basis.

The results from the analysis of their conceptual basis are less positive. Most articles using the social cognition models purport to "test," "apply," or "assess the utility" of the model in question. In line with this, the majority of studies reported results that were not consistent with the predicted associations between constructs and left much of the variance in the outcome variable unexplained. However, rather than using the data to challenge the models, a range of explanations were offered relating to the wording used, the population studied, the behavior of concern, or the need for additional variables. All data are used to support the models, but it is not clear what data would enable the models to be rejected. Therefore they cannot be tested. Further, most studies using the social cognition models assessed associations between constructs that were true by definition rather than by observation. This focus

on analytic truths was illustrated by the multiple correlations between cognitions such as perceived behavioral control and behavioral intention but was also implicit within those associations between cognitions and self-reported behavior. Finally, although intended to measure an individual's cognitions, the use of questionnaires based on social cognition models may change rather than access the way a person thinks. Such a methodological approach may also change any subsequent behavior. This problem seems particularly pertinent to the more recent interest in the relationship between intentions and behavior and the intention behavior gap (e.g., Bagozzi, 1993; Gollwitzer, 1993). Researchers studying this area ask participants to rate their intentions to perform a particular behavior such as taking vitamins, performing breast self-examination, and doing exercise (e.g., Orbell, Hodgkins, & Sheeran, 1997; Sheeran & Orbell, 1998). These data are regarded as illustrating and describing the respondents' views. Some researchers then ask respondents to describe when and where this behavior will be performed in line with "action plans" or "implementation intentions" (e.g., Orbell et al., 1997; Sheeran & Orbell, 1998). This second set of data is considered an intervention as it has been shown to change subsequent behavior. The first process of questioning is conceptualized as descriptive and as a method of data collection that elicits views. In direct contrast, the second process is conceptualized as manipulative and considered to change views. The process of making a participant construct an implementation intention is now promoted as one of the simplest and more powerful mechanisms for bringing about change (Sheeran & Orbell, 1998, 2000). This must also indicate that all question asking can also bring about change. It seems unlikely that the same process of question asking can be descriptive and passive for some of the time and interventional and active at others.

In conclusion, the present analysis indicates that social cognition models such as the HBM, PMT, TPB, and TRA can be considered pragmatic tools for health psychologists and researchers from allied research areas to draw upon. But in using them for this purpose, one should recognize the essential flaws in their conceptual basis. These models cannot be tested, they focus on analytic truths rather than synthetic ones, and they may create and change both cognitions and behavior rather than describe them and as such do not pass the criteria set for a good theory. If they are to be given the status of theories, then it is recommended that the critical eye that psychologists place on other areas of research also be cast on this one.

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