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Individual-Level Factors in Colorectal Cancer Screening: A Review of the Literature on the Relation of Individual-Level Health Behavior Constructs and Screening Behavior

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Abstract

Compliance with colorectal cancer screening recommendations requires considerable conscious effort on the part of the individual patient, making an individual's decisions about engagement in screening an important contributor to compliance or noncompliance. The objective of this paper was to examine the effectiveness of individual-level behavior theories and their associated constructs **in accounting for engagement in** colorectal cancer screening behavior. We reviewed the literature examining constructs from formal models of individual-level health behavior as factors associated with compliance with screening for colorectal cancer. All published studies examining one or more constructs from the health belief model, theory of planned behavior, transtheoretical model, or social cognitive theory **and their relation to** screening behavior or behavioral intentions were included in the analysis. By and large, results of studies supported the theory-based predictions for the influence of constructs on cancer screening behavior. However, the evidence base for many of these relations, especially for models other than the health belief model, is quite limited. Suggestions are made for future research on individual-level determinants of colorectal cancer screening.

Keywords

colorectal cancer screening; decision making; individual adherence; literature review

Colorectal cancer is a serious contributor to disease morbidity and mortality in the United States and other nations. In 2008 it ranked second in cancer deaths and third in new cancer cases in the United States (1); worldwide mortality is over 600,000 deaths per year (2). Screening for colorectal cancer is a cost-effective prevention and control strategy (3); it leads to earlier detection, which is associated with improved survival (4-9). Unfortunately, only about 1/3 of colorectal cancers are diagnosed at an early stage (10-11). This is due to low rates of screening compliance -- only about 1/2 of US adults are compliant with recommendations for colorectal cancer screening (12) and only 15 states have population screening compliance rates greater than 60% (13). Increasing compliance with colorectal cancer screening recommendations is a critical need for reducing the substantial personal and social costs of colorectal cancer morbidity and mortality (14).

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Several screening tests are available to detect colorectal cancer and are widely disseminated for use in clinical practice (9,15-16). There is no single recommended screening test for colorectal cancer, and relative use of each test has changed over time (17). At the time that this literature review was conducted, four screening tests were recommended: fecal occult blood testing (taking fecal samples and placing them on a test card; recommended yearly), flexible sigmoidoscopy (endoscopic procedure that images the lower colon; recommended every five years), colonoscopy (endoscopic procedure with anesthesia that images the entire colon; recommended every ten years), and double-contrast barium enema (x-ray procedure following barium/air enema; recommended every five years)(18-23). Newer recommendations have added other stool-based testing (e.g., stool DNA tests) and newer imaging techniques (e.g., computerized tomography colonography; 24).

Studies have been done on a number of demographic, social, and environmental determinants of colorectal cancer screening (e.g., insurance coverage, discussion with a medical professional (25-27)). Given that screening ultimately requires behavioral action on the part of the individual person (e.g., going to a colonoscopy appointment; completing and mailing an FOBT card), understanding factors involved in individual decision making regarding screening is necessary to improve upon suboptimal screening compliance. The health behavior literature includes numerous theoretical models that describe factors serving as inputs to individual behavioral choices about engaging in health-related behaviors (28-30). The importance of theory-based approaches for both understanding health behavior and developing behavior change interventions is frequently discussed (28,31-33).

Previous reviews of the literature on determinants of colorectal cancer screening have included some variables that address individual-level determinants related to engaging in screening tests. However, to our knowledge no previous review has systematically examined the extent to which major theoretical models of individual behavior have been examined in the context of colorectal cancer screening behavior and not all of the constructs commonly examined in such models have been included in past literature reviews. Moreover, the existing reviews are five or more years old. There are, therefore, multiple newer studies that have not previously been reviewed. This is especially true for colonoscopy screening, which was the newest screening test widely used in clinical practice at the time of the last review (25).

The key objective for this systematic review is to examine the state of understanding of how individual-level health behavior models have been addressed in the literature on colorectal cancer screening behavior. The purpose is to provide an assessment of what constructs and theoretical models have and have not been studied, to explore the sufficiency of our examination of these constructs in the context of colorectal cancer screening, and to summarize the support found for the role of such constructs **as factors associated with** colorectal cancer screening behavior.

The review focuses on decision-making constructs from four key models: the health belief model (34), the theory of planned behavior (35), social cognitive theory (36), and the transtheoretical model (37). These four were selected because they are collectively widely used in the field (28) and have been applied across a range of health-related contexts. Because many health behavior models share common underlying assumptions, constructs from these four models also collectively provide a fairly comprehensive representation of constructs included in other health behavior models (30,38).

To address these objectives, we conducted a comprehensive search for published empirical studies examining the relation between constructs included in the four models and colorectal cancer screening behavior and/or behavioral intentions. Relevant studies were reviewed and

their findings concerning the relation of the constructs and behavioral outcomes were coded. In addition, we examined the relation of a number of methodological, measurement, and population characteristics of the studies to their findings about the relation of constructs and behavioral outcomes.

Method

Literature Review Procedures

Inclusion Criteria—The focus of this review is on the relation between theoretical model-based constructs and behavior. The key pre-defined inclusion criteria were that the article: 1) must include measurement of at least one relevant model construct (see Table 1 for a list of models and constructs included in the search); 2) must include a measurement of either engagement in screening behavior or intention to engage in screening behavior; and 3) must report at least one statistical test of the relation between a relevant construct and behavior or behavioral intentions (either by reporting the inferential statistic used to test the relation or by clearly stating in writing the nature of the relation between the two constructs). Given this focus on relations between model constructs and behavior, only study designs which included a quantitative assessment of the relevant constructs were included; other study designs were excluded (e.g., focus groups; open-ended interview studies). Eligible studies were limited to those published in English language journals and to those published in a peer-reviewed journal (i.e., not a dissertation or a thesis).

Database Search—To retrieve the most complete set of potentially applicable articles, a series of keyword searches was conducted in both MEDLINE and PSYCINFO. An initial search was conducted in November 2007; a second search was conducted in November 2008 to add additional relevant articles published in the time since the initial search. In both databases, searches were based on all possible combinations of a term referring to the screening test (see the “screening test names” column in Table 2 for a complete list) and a term referring to a model construct or full model. For the construct terms, terms were selected to capture the widest possible number of relevant articles. For example, the construct “social norms” is referred to as social norms, subjective norms, **and** behavioral norms across articles. For this reason, the term “norm” was selected as the key search term as it would capture any of the above synonyms; all search terms were used as “includes” versus “exact” to allow for this wide capture (see “construct/model names” column in Table 2 for a full list). No parameters were set for start date to allow capture of all relevant articles. In addition to this database search, the reference **lists** for both articles included in the review and previous systematic reviews of colorectal cancer screening were screened for additional possible articles.

Article Screening Process—Based on the inclusion criteria described above, all of the titles retrieved from these searches were screened by two authors (MK and AB or MK and MZ); abstracts were then retrieved for any title judged as relevant by either author. As with the titles, all abstracts were then screened by two authors and full articles were retrieved and reviewed for any abstracts judged as relevant. Each of the retrieved full articles was screened using the inclusion criteria; this set of inclusion criteria and screening resulted in a final set of 81 papers included in the literature review (a complete list of articles included in the review can be found in the Appendix).

Coding of Relevant Articles—For each of the 81 included articles, multiple aspects of study design, study population, measures for key constructs, and results were coded. All included articles were independently read and coded by two authors (MK and AB or MK and MZ). All disagreements in coding were resolved by discussion.

Study design codings included method of data collection (e.g., telephone, mail survey, in person) and design (e.g., cross-sectional, longitudinal). Population codings included number of participants, race, gender, ethnicity, country of study, and any other notable population features. Measures codings included: specific screening tests assessed, type of behavior measured (intentions versus actual behavior), method for assessing behavior (self-report, chart review), constructs assessed, and method for assessing each included construct. Coding of the study results included nature of the relation (positive relation, negative relation, or no effect) and, where reported, inferential statistics for the test of the relation. In the case of longitudinal studies, wherever possible the relation coded was between assessment of the construct at the initial time point and assessment of the behavior or intention at the follow-up time point. A summary of these design characteristics is reported in Table 3.

Results

How Thoroughly Have Constructs Been Examined?

We first assessed the number of studies examining the relation of each of the studied constructs to behavior or behavioral intentions. The results are presented in Table 4. As can be seen in the table, for the three most common screening tests (FOBT, sigmoidoscopy, colonoscopy), the constructs of benefits, barriers, and perceived susceptibility have been relatively well examined, with each having been assessed in more than 25 studies. However, the evidence base is much sparser for the remaining constructs. Only one study has examined the construct of global evaluative attitudes about the screening behavior, a key construct in the theory of reasoned action/theory of planned behavior. In addition, very few studies have examined perceived severity, social norms, and perceived behavioral control.

The evidence base also varies considerably by type of screening test. **As can be seen in the table**, for each construct more studies have examined FOBT than any other screening test, and the numbers of studies are, not surprisingly, especially low for newer screening tests (e.g., **Fecal DNA**). Even though colonoscopy is frequently used and preferred by many providers, the number of studies assessing colonoscopy is lower than for either FOBT or sigmoidoscopy (this is likely wholly attributable to the fact that introduction and adoption of colonoscopic screening was more recent than either FOBT or sigmoidoscopy).

Finally, we examined how many studies had fully investigated a given theoretical construct (i.e., included all of the constructs from a given theory). This was done for the health belief model, the theory of reasoned action, and the theory of planned behavior (social cognitive theory and the transtheoretical model both include a variety of constructs that do not fall under the parameters for this literature review and thus were not examined in this analysis). Thirteen studies examined all of the constructs in the health belief model, but no studies included all of the constructs from either the theory of reasoned action or the theory of planned behavior.

How Consistent is the Evidence Base with Predictions from Health Behavior Theories?

The second question examined was how well the evidence base in the literature supported the predictions made by the theoretical models. With the exception of perceived barriers, the hypothesis derived from the theoretical models for each construct would be for a positive relation; that is, as attitude or social norms become more positive; as one perceives more personal susceptibility or severity; as one perceives more benefits to the behavior or greater behavioral control over the behavior, likelihood of engaging in the screening behavior should increase. For perceived barriers, a negative or inverse relation is predicted – as one

perceives more barriers to engagement in the behavior, the likelihood of engaging in the behavior should decrease.

The number of published studies which found a positive, a negative, or no significant relation between each decision-making construct and behavior or behavioral intentions is reported in Table 5. As can be seen in the **table**, for each of the investigated constructs the majority of the studies supported the hypotheses derived from the theoretical models. **It was** virtually never the case that the relation reported **was the** opposite of the one predicted by the model. However, for each of the constructs except attitudes and social norms, notable minorities of the studies (typically about 1/3) reported no relation between the construct and behavior or behavioral intentions.

Relation of Methodological Features to Study Findings

Given the heterogeneity in findings for each of the constructs' theory driven predictions, we examined whether methodological features explained differences between studies which found support for the theory- predicted relation versus no support (given the small number, "counter-supportive findings" were excluded from the analysis). To do so, we examined the relation between study design (cross-sectional versus longitudinal – 5 retrospective studies were excluded), type of behavior studied (behavioral intentions versus actual behavior; studies that included both were included as actual behavior), type of behavior measure for actual behavior studied (self-report versus chart review), data collection method (mail, telephone, or in-person survey; three studies that used multiple methods were excluded), gender of participants (male only, female only, or both male and female), age studied (only participants over 50 versus participants both under and over 50), country in which the study was conducted (USA versus other), year of publication (2000 or earlier versus 2001 or later), and sample size (< 250, 251-600, >600). In each case, we used Fisher's exact test (given the small n's in some cells; e.g., longitudinal studies examining social norms) to examine whether the proportion of studies finding the predicted relation differed as a function of the methodological variable. Given the very small number of studies in some categories when broken down by both decision-making variable and type of test, this analysis was conducted aggregating across specific colorectal cancer screening tests (studies which examined more than one screening test were only included once in this analysis). Similar results were found for multivariate analyses.

Design type influenced the findings for severity; longitudinal studies were more likely to show effects; $\chi^2 (1) = 5.92$, exact $p = 0.04$. It also influenced findings for social norms, with cross-sectional studies more likely to show effects; $\chi^2 (1) = 8.56$ $p = 0.03$. There were no other significant effects for design type. Behavior measure strategy influenced findings for perceived risk, with self report studies more likely to show effects; $\chi^2 (1) = 8.00$, $p = 0.008$. There were no other significant effects for behavior measure. There were no significant effects for behavior type (intentions versus actual behavior), data collection method, gender inclusion, age range, country, year of publication, or sample size. Given that sample size is a known influence on statistical power (39), we also conducted analyses to see whether sample size (as a continuous variable) significantly differed for those studies which showed a theory-predicted effect relative to those which did not. There was no significant difference for any of the theory-related constructs, all $ts < 1.3$, *ns*.

Discussion

The overarching finding from this literature review is that, by and large, constructs from health behavior models **are associated with** colorectal cancer screening behavior. For each of the constructs except perceived severity, the majority of included studies found showed support for the theory-derived, predicted relation between the construct and screening

behavior. Given that none of these theoretical models were developed specifically in the colorectal cancer screening context and that screening behavior has a number of features which differentiate it from other types of health behaviors, the observation that the models are effective **at accounting for** screening behavior is an important one for our understanding of how individuals make decisions about colorectal cancer screening. These models are frequently suggested as starting points for developing interventions to change behaviors (28,40-41), so knowledge of their effectiveness at accounting for screening decisions is an important precondition for designing effective interventions.

However, although the majority of studies examining a given construct found support for the theory-derived predictions and few or no studies found the opposite relation, a notable minority of studies found no relation. The reason for this heterogeneity in findings remains unexplained -- the difference in findings was not due to **sample size**, methodological, participant, **or** measurement characteristics examined in the literature review.

What do we know about the degree of research coverage of health behavior theories in the context of colorectal cancer screening behavior? First, although numerous studies have looked at one or more constructs from formal health behavior models, the degree to which constructs have been examined **as influences on** screening varies widely. Perceived benefits and perceived barriers have been fairly well examined in the literature, but significantly less attention has been given to other important behavioral influences, especially attitudes about the behavior and perceptions of social norms regarding the behavior. Moreover, very few studies have examined all of the constructs in a given theoretical model and only the health belief model has been fully examined within the context of a single study.

This is an important limitation to the literature. The constructs examined are all parts of well-developed theoretical models and their utility for understanding behavior has been demonstrated in numerous other health behavior contexts. However, it may not be the case that constructs are equivalently applicable across behaviors, and thus examining the utility of each construct for understanding and addressing colorectal cancer screening behavior is a remaining research need. Moreover, one cannot necessarily assume that decision-making processes will work equivalently across screening tests. For example, issues around self-efficacy/perceived behavioral control may be stronger for colonoscopy, which involves a relatively complicated, self-directed preparation protocol to be followed for successful screening. In addition to being a research limitation, the issue of coverage of constructs and tests is a limitation for clinical application of study findings. In other domains, interventions based on constructs such as social norms and self-efficacy have been effective at changing behavior. Such interventions may be effective for colorectal cancer screening behavior as well, but without a base of knowledge about the influence of the constructs on behavior it is difficult to predict the likely effect of such interventions.

Issues in the Literature

This summary of findings raises a number of issues of concern in the literature: the unexplained heterogeneity in findings, relative scarcity of research coverage of some decision making constructs for some tests, and piecemeal selection of constructs from models. In addition to these issues which arise directly from the findings of the literature review, some additional concerns were observed in the course of conducting the review of the literature.

First, it was observed that there is a substantial lack of consistency in how constructs are conceptually and operationally defined and how they are labeled. In several cases, an article stated that a construct from one of the included models was assessed, but closer inspection of the measure used revealed that the way the construct was defined differed in substantive

ways from the conceptual definition in the given model. For example, several studies were excluded because they stated that attitudes toward the screening procedure were measured but had operational definitions of attitude that did not mesh with the common conceptual definition. In the decision-making literature, one's attitude toward a behavior is the overall evaluation one has of the behavior (e.g., whether one evaluates it positively or negatively(42)). Several articles included in the review included an "attitudes" construct but actually assessed other decision-making constructs (e.g., perceived benefits and barriers; 43) or the emotions one would anticipate experiencing if one were screened (e.g., embarrassment; 44). Although both of these are potentially important influences on decision making about screening, neither captures the conceptual definition of the attitudes **construct** (42,45). In a related vein, the commonly included construct of salience and coherence of screening (46-47) mixes multiple conceptual constructs in a single scale factor. The measure includes questions which tap into benefits, social norms, perceived behavioral control, and attitudes.

A second issue emerged even among studies which qualified for inclusion in the review. Within studies assessing a given construct, there was substantial variability in how authors chose to operationalize the constructs. For example, for the construct of perceived susceptibility, some studies assessed absolute risk (e.g., one's rating of one's own chances of experiencing cancer), some assessed comparative risk (e.g., one's chances relative to others), and some studies included both. Although both absolute and comparative risk are important constructs, they are separate and distinct and can have different influences on decision making (48). Similar heterogeneity in operational definitions was observed for many of the other constructs assessed. Thus, conclusions about when and how a given construct influences behavior may be, in part, influenced by how the construct was operationalized. Recent attempts to develop standardized measurement tools for assessing constructs for colorectal cancer screening (e.g., 49) and for measures of screening behavior (e.g., 50) may attenuate this problem over time, but such measures do not include all of the constructs assessed in this review and are not yet widely used in the literature. This problem of lack of standardization at both the conceptual and the operational level is an important one to address. To the extent that we lack standard conceptual definitions of constructs, it may be the case that different researchers are really examining different constructs and that interventionists trying to address the relevant health behavior issues may be intervening on different constructs. Use of standardized conceptual definitions for constructs (for example, using definitions of constructs in standard health behavior theory texts(28) or web resources(51)) would be of benefit for advancing the field.

Limitations

Limitations to the review must, of course, be taken into consideration. First we elected a somewhat constrained focus on concepts related to a set of well-established individual-level health behavior models. This choice was both conceptual and practical. Conceptually, given our focus on individual behavior, such selection provided and captures the state of our understanding of constructs related to colorectal cancer screening. Practically, these models often guide both research on screening and interventions to change screening behavior, and thus the inclusion strategy effectively captures the state of the literature. The downside of this choice, of course, is that such a strategy fails to capture more "piecemeal" constructs, which might be part of individuals' behavioral choices but are not captured in a full-fledged theoretical model. The strategy also excludes some constructs (like salience and coherence) that map across constructs in a particular theoretical model (see discussion above about salience and coherence).

Second, the review is naturally limited by the number of studies available. Although at the broadest aggregate level there are a number of studies examining the relation of these

constructs to colorectal cancer screening, there is a paucity of studies when one narrows down to the level of particular tests and particular constructs. This relatively small number of studies should be considered when interpreting the reported results (e.g., the findings of no relation between design features and study outcomes might be influenced by the relatively small number of studies). It is also the case that, as with all reviews of the published literature, the number of studies involved also relates to the possibility of publication bias. Because studies which find effects are more likely to be published, this bias should be considered when interpreting the findings.

Third, the review took a narrative, descriptive approach to summarizing research findings rather than a quantitative, meta-analytic approach. This decision was largely driven by the state of the research literature; we conducted data coding in a way that would have allowed for a meta-analysis, but found that only a small subset of the relevant studies reported sufficient statistical information to allow for inclusion in a meta-analysis. Given this, we elected to use an approach which allowed for a broader inclusion of studies. However, it should be acknowledged that there would be information available in a meta-analytic approach not available in this descriptive review.

Finally, although we coded and analyzed a number of methodological and participant factors for each study and examined their effect on study findings, there are other potential study features (e.g., other aspects of study populations; specific measurement operationalizations of constructs) which were not consistently reported in articles but which might help to explain some of the heterogeneity in study findings.

Conclusion

Colorectal cancer is a serious contributor to disease morbidity and mortality. Multiple screening tests are available for early detection of colorectal cancer, but population adherence to screening recommendations for these tests is limited. Our review of the literature of studies examining individual-level decision factors related to engagement in these tests revealed that, for the most part studies supported the utility of existing, formal health behavior models as account for colorectal cancer screening behavior. However, the evidence base for decisions about many of these tests is quite limited, especially when one moves past the health belief model to examine other theoretical frameworks for understanding health related behaviors, including screening. Future research should seek to broaden the evidence base for the factors which influence compliance with colorectal cancer screening, should consider use of common measurement tools to enable better comparisons across studies, should examine the consistencies and differences in factors which influence decisions and behaviors for each of the variety of screening tests available for colorectal cancer, and should consider the extent to which findings of colorectal cancer screening tests are consistent across populations. Given the substantial public health costs of colorectal cancer and the availability of tests for early detection and prevention, such examination of health behaviors could be a substantial contributor to better understanding noncompliance to screening recommendations, therefore addressing the population burden of colorectal cancer.

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Appendix: Articles Included In Review

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Table 1**Theoretical Models and Constructs Included in the Review**

Theoretical Model	Construct
Health Belief Model ¹	Severity
	Susceptibility
	Benefits
	Barriers
	Self-efficacy ²
Theory of Reasoned Action/Theory of Planned Behavior ³	Attitude
	Social norm
	Perceived behavioral control
Social Cognitive Theory	Self-efficacy
	Response efficacy
Transtheoretical Model ⁴	Decisional Balance
Processes of Change	

¹ The original formulation of the health belief model included severity, susceptibility, benefits, and barriers. Cues to action are also included in some formulations of the model; they are not included in this review because they are a feature of the situation rather than a feature of the individual person's decision-making process.

² Self-efficacy (belief in ability to successfully engage in a behavior) is included in some later formulations of the health belief model

³ The theory of reasoned action includes only attitudes and social norms; perceived behavioral control was added in the theory of planned behavior

⁴ Because the transtheoretical model explicitly draws constructs from the other included models, only the decision making construct uniquely labeled by it is included here

Table 2

Screening behavior, construct, and theoretical model keywords used in literature searches.

Screening behavior keywords	Construct and model keywords
Screening	Benefit
Colonoscopy	Barrier
(Flexible) Sigmoidoscopy	Decisional balance
Fecal Occult Blood Test, FOBT	Advantage
Barium Enema	Disadvantage
Adherence	Cost
Compliance	Severity
Behavior	Attitude
Intention	Efficacy
	Norm
	Susceptibility
	Control
	Fear
	Risk
	Pro
	Con
	Process of Change (also Processes of Change)
	Health belief model
	Theory of reasoned action
	Theory of planned behavior
	Transtheoretical model
	Social cognitive theory

Table 3

Summary of Characteristics of the Reviewed Studies

Design Feature	Number of Studies
Data Collection Strategy	
Telephone	30
Mail	25
In person	26
Design	
Cross-sectional	63
Prospective/Longitudinal	13
Retrospective	5
Sample Size	
Less than 100	2
100-299	26
300-499	16
500-699	11
700 or greater	22
Gender of Participants	
Both genders	64
Males only	3
Females Only	9
Country	
United States	59
Other Country	20
Behavior measure	
Intentions	15
Actual Behavior	66
Behavior Assessment Method	
Self-report	47
Chart review	15

TABLE 4

Coverage of constructs by test type.

	Total Articles	Benefits	Barriers	Susceptibility	Severity	Attitudes	Norms	PBC
FOBT	64	35 (55%)	33 (52%)	38 (59%)	12 (19%)	1 (2%)	10 (16%)	9 (14%)
SIG	57	34 (60%)	34 (60%)	34 (60%)	10 (18%)	1 (2%)	11 (19%)	8 (14%)
COL	44	26 (59%)	27 (47%)	25 (44%)	9 (20%)	1 (2%)	7 (16%)	4 (9%)
Barium Enema	14	9 (64%)	9 (64%)	11 (79%)	4 (29%)	0 (0%)	3 (21%)	2 (14%)
Other	9	4 (44%)	6 (67%)	6 (67%)	2 (22%)	0 (0%)	2 (22%)	3 (33%)

Note: numbers in cells indicate the number of published studies which assess the relation of each construct to screening behavior; numbers in parentheses are the percentage of the articles addressing a particular test which include the construct. Test-specific and construct specific numbers add up to more than the total number of articles because many studies address more than one screening test and more than one construct. **Tests included under “other” were digital rectal exam (8 studies), Fecal DNA (1 study), and virtual colonoscopy (1 study).**

Table 5

Relation of Constructs to Behavior

Construct	Test	Number of Studies	Relation		
			Predicted	Opposite of Predicted	No Relation
Perceived Benefits	FOBT	35	22	0	13
	SIG	34	23	0	11
	COL	26	18	0	8
	DCBE	9	6	0	3
	Other	4	4	0	0
Perceived Barriers	FOBT	33	25	0	8
	SIG	34	26	1	7
	COL	27	19	0	8
	DCBE	9	6	0	3
	Other	6	4	0	2
Perceived Susceptibility	FOBT	38	22	0	16
	SIG	34	22	0	12
	COL	25	16	0	9
	DCBE	11	8	0	3
	Other	6	5	0	1
Perceived Severity	FOBT	12	4	2	6
	SIG	10	1	3	6
	COL	9	1	2	6
	DCBE	4	0	2	2
	Other	2	0	2	0
Attitudes	FOBT	1	1	0	0
	SIG	1	1	0	0

Construct	Test	Number of Studies	Relation		
			Predicted	Opposite of Predicted	No Relation
	COL	1	1	0	0
	DCBE	0	0	0	0
	Other	0	0	0	0
Social Norms	FOBT	12	10	0	2
	SIG	11	11	0	0
	COL	7	7	0	0
	DCBE	3	3	0	0
	Other	2	2	0	0
Perceived Behavioral Control	FOBT	14	9	0	5
	SIG	10	8	0	2
	COL	6	4	0	2
	DCBE	3	2	0	1
	Other	3	3	0	0