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RAPID COMMUNICATION

The Use of Theory in Health Behavior Research from 2000 to 2005: A Systematic Review

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Abstract
Background Theory-based health behavior change programs are thought to be more effective than those that do not use theory. No previous reviews have assessed the extent to which theory is used (that is, operationalized and tested) in empirical research.
Purpose The purpose of this study was to describe theory use in recent health behavior literature and to assess the proportion of research that uses theory along a continuum from: informed by theory to applying, testing, or building theory.
Methods A sample of empirical research articles (n=193) published in ten leading public health, medicine, and psychology journals from 2000 to 2005 was coded to determine whether and how theory was used.
Results Of health behavior articles in the sample, 35.7% mentioned theory. The most-often-used theories were The Transtheoretical Model, Social Cognitive Theory, and Health Belief Model. Most theory use (68.1%) involved research that was *informed by* theory; 18% applied theory; 3.6% tested theory; and 9.4% sought to build theory.
Conclusions About one third of published health behavior research uses theory and a small proportion of those studies rigorously apply theory. Patterns of theory use are similar to reports from the mid-1990s. Behavioral researchers should strive to use theory more thoroughly by applying, testing, and building theories in order to move the field forward.

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Introduction

Many of the leading causes of disease and death in the USA and globally are related to health behaviors including smoking, diet, physical activity, substance use, and sexual practices [1–3]. Consequently, research and practice focusing on the role of behavior in the promotion of health and the prevention of disease is essential and holds promise for improving the health of populations.

Theories can be used to explain the structural and psychological determinants of behavior and to guide the development and refinement of health promotion and education efforts. Health behavior theories focus on multiple determinants of behavior at the individual, interpersonal, group, organizational, and/or community levels [4]. The volume of literature on health behavior theories demonstrates the enormous interest in health behavior and widespread use of health behavior theories, which seems to have increased over the past two decades [5].

Theories should evolve over time, improvements in theory should be a cyclical process, and comparative analyses of theory-based research should help drive new developments [6, 7]. Noar and Zimmerman [8] reviewed 19 articles that compared two or more health behavior theories and found that those studies had weaknesses that limited their ability to advance our understanding of health behavior theory. The majority of studies relied solely on cross-sectional data, precluding inferences about whether the theoretical constructs can be considered causal determinants of behavior [8].

Current research suggests that theoretically informed programs are more effective in changing health behavior than those that are not theoretically informed [8]. However, the processes by which these theories are selected, the methods for measuring theoretical constructs, and descriptions of how program effects test theory are not well developed in the literature [10]. Previous reports have described the most-often-used theories in published health behavior research [4, 5, 11–13]. However, these reviews did not define or describe the extent of theory use. Researchers may "use" theory to varying degrees along a continuum, ranging from studies that are simply informed by theory, to those that apply or test theory more explicitly, to those that build and/or extend theory. This article describes a systematic review of the use of health behavior theory in recently published peer-reviewed research in order to answer three questions: (1) What proportion of health behavior research articles in a sample of journals use theory? (2) Which theories are specified in those health behavior research articles that explicitly use a theoretical framework? and (3) What is the extent of theory use along a defined continuum in health behavior research articles?

Methods

This study was a four-phase, systematic review of original published research on health behavior and health promotion in ten major peer-reviewed journals from 2000 to 2005.

Selection of Journals

A preliminary list of 19 peer-reviewed journals in the fields of public health, health behavior, health promotion, medicine, and psychology was compiled based on 2005 impact factors listed on Institute for Scientific Information Web of Knowledge Journal Citation Reports and similar published literature reviews [13]. The list was sent via e-mail to 33 leading experts in academic and practice settings who were asked to rate each journal according to its importance in the field of health behavior and to suggest additional important journals for consideration. Fifteen reviewers (45.5%) completed the ratings. Journals were selected for inclusion in the study sample based on the experts' ratings, frequency of publication (to include weekly, monthly, and bi-monthly), and impact factors (range from 1.3 to 44.0). The ten journals selected were: *American Journal of Preventive Medicine*; *American Journal of Public Health*; *Annals of Behavioral Medicine*; *Health Education and Behavior*; *Health Education Research*; *Health Psychology*; *Journal of the American Medical Association*; *New England Journal of Medicine*; *Preventive Medicine*; and *Social Science and Medicine*.

Selection of Articles for Review

The sampling frame of articles from 2000 to 2005 included 1,138 issues of the ten journals. A random number generator was used to assign each issue a unique identifier, and 80 issues were randomly selected for examination.

In *phase 1* of this review, each issue was examined to determine the total number of articles eligible for inclusion and to determine whether they focused on health behavior. Eligible articles included original research articles, reviews, policy papers, brief reports, and meta-analyses. Commentaries, historical articles, book reviews, images, artwork, poems, letters to the editor, clinical cases, announcements, and meeting summaries were excluded. Eligible articles were reviewed to determine if they addressed any aspect of health behavior or its correlates. *Health behavior* was defined broadly as: "the actions of individuals, groups, and organizations, as well as the determinants, correlates, and consequences, of these actions—which include social change, policy development and implementation, improved coping skills, and enhanced quality of life…" related to health [14]. Non-health behavior articles included drug trials and therapeutic trials without a behavioral component, basic science, and animal research.

Classification of Articles and Theory Reviews

In *phase 2*, the health behavior articles were classified as original health behavior research or other. Original research was defined as empirical data analysis seeking to describe, predict, explain, or change a health behavior. "Other" categories included meta-analyses, policy analyses, and review articles.

Phase 3 of the review involved coding original health behavior research articles for the type of research (intervention or non-intervention), type of health behaviors studied, and the use of theory. "Use of theory" was a dichotomous variable in phase 3, determined by whether a theory or key theoretical constructs were mentioned in the article. An inclusive approach was taken: for example, if a study included a "stand-alone construct" that is well known, such as self-efficacy, it was coded as using theory.

Phase 4 involved assessing the type and extent of theory use. For articles that employed health behavior theory, the review determined whether they used single or multiple theories, which theories, and the number of key constructs included from each theory. The extent, or degree, of theory use was coded along a continuum: informed by theory, applied theory, testing theory, or building theory. The categories were developed based on the authors' preliminary analyses of how theory has been

used in key texts and articles [5, 8, 15] and were defined as follows:

- *Informed by theory*: Theoretical framework or construct identified but no or limited/partial application of theoretical framework in study components and measures. For example, one study stated that the Health Belief Model (HBM) was used to develop intervention materials, but no applications of HBM constructs were explicitly described, and no HBM constructs were measured.
- *Applied theory*: Theoretical framework specified and between one and half of the constructs applied in components of the study. An example was a study that described intervention materials as based on the HBM and addressed cues to action and perceived threat.
- *Testing theory*: Theoretical framework specified; more than half of the theoretical constructs in intervention or descriptive/explanatory research were measured and explicitly tested, or two or more theories were explicitly compared to one another in the study. For example, a study stated that the HBM was used to develop intervention materials. The study used and measured five key constructs in the intervention and evaluation: perceived benefits and barriers, perceived susceptibility and severity, and cues to action. Mediation analyses were conducted with indicators of these constructs.
- *Building or creating theory*: Developing new or revised/expanded theory using constructs specified, measured, and analyzed in a study. For example, a study stated that a new hybrid theory was created to develop intervention materials. The new theory integrated HBM constructs, such as perceived benefits and barriers with other constructs such as group involvement and social norms. The study tested the intervention effects and the hypothesized theoretical constructs' mediating effects and examined each construct's contribution to the new extended theoretical framework.

It is worth noting that our determination of theory use along the continuum relied on analysis of the article as published rather than the article's stated intent, title, or abstract. For example, if the authors of a given article claimed that they were applying a theory but only measured one construct, it would have been included in the "informed" by theory category. Stages of change are one core construct of the Transtheoretical Model (TTM), so if an article *only* used the stages of change construct from TTM, then it was "informed" by TTM.

Procedures

The journal issues and articles included in the study were coded using a structured coding instrument and code book (available on request from the corresponding author). Theories, models, and key constructs were defined based on two major textbook sources [5, 16], supplemented as necessary for theories that were not covered in either book. The coding definitions were discussed in a training/practice session with the first four authors, and reliability analyses were conducted on a small sample of articles prior to coding the entire sample. Initially, inter-rater reliability for some variables in phases 3 and 4 was less than 0.70, and in these instances, discrepancies were discussed and coding procedures refined accordingly. For final coding, percent agreement ranged from 82% to 100% across all four phases of the study. All kappa statistics indicated substantial agreement or higher (range 0.61 to 1.00) [17].

Results

Phases 1 and 2

The initial sample of 80 journal issues included in phases 1 and 2 included 988 articles. Of these articles, 467 (47.3%) were non-health behavior and 521 (52.7%) were health behavior articles. Four hundred and eighty-five (49.1% of the total) were identified as health behavior research. Of the 80 issues in the original sample, 46 issues containing 483 eligible articles were subjected to full review in phases 3 and 4. Of these articles, 275 (56.9%) were non-health behavior, 208 (43.1%) were health behavior articles, and 193 (40.0%) were identified as health behavior research. Neither the journal titles, year of publication, nor distribution of health behavior/non-health behavior articles in the initial sample of 80 issues and the final sample of 46 issues were significantly different, as determined by chi-square and Fisher's exact tests. Therefore, the team concluded that further analysis of the entire sample of issues was not required to answer the main research questions.

Phase 3

Out of the 193 health behavior research articles coded in phase 3, 52 (26.9%) were intervention studies, and 141 (73.1%) were non-intervention studies (Table 1). Nearly two-thirds of the articles (66.3%) focused on a single health behavior, while the remaining third addressed multiple health behaviors. The most frequently studied health behaviors were tobacco use (33.2%), physical activity (23.3%), alcohol use (18.7%), nutrition (16.1%), and disease testing/screening (14.5%).

Phase 4 of the review focused on the use of theory in health behavior research articles. Of the health behavior research articles, 35.7% (n=69) used theory. Intervention studies were significantly more likely to explicitly identify at

Table 1 Characteristics of original behavioral research articles in the sample

Characteristics of Articles	Number (%) of articles in sample
All health behavior articles in the sample	n=193
Intervention studies	n=52
Randomized controlled trial	37 (71.1%)
Quasi-experimental	8 (15.4%)
Non-experimental	7 (13.5%)
Non-intervention studies	n=141
Descriptive/explanatory	131 (92.9%)
Methods/measurement	7 (5.0%)
Policy	3 (2.1%)
Articles that used at least one theory[a]	n=69
Informed by theory	41 (59.4%)
Applied theory	15 (21.7%)
Testing theory	5 (7.2%)
Building theory	8 (11.6%)

[a] If an article contained more than one theory, it was counted as using the highest level of theory on the continuum.

least one theoretical framework (61.5%, n=32) than were non-intervention studies (26.2%, n=37; χ^2=20.60, p<0.001). Of the articles that specified a theoretical framework, 44.9% used one theory, 26.1% used two theories, 17.4% used three theories, and 13.0% used four or more theories. The most frequently identified theories were: The Transtheoretical Model/Stages of Change (27.5%), Social Cognitive Theory (27.5%), Health Belief Model (20.0%), Theory of Reasoned Action/Theory of Planned Behavior (15.9%), and Social Networks/Social Support (15.9%). Most of the articles that specified a theoretical framework used individual-level theories (33.3%) or interpersonal-level theories (42.0%). A smaller proportion of articles in this sample (24.7%) used community-level theories, multi-level theories (such as the ecological model), and hybrid models that included community-level theories (such as the PRECEDE–PROCEED Model).

The extent of theory use along the continuum described above was analyzed across articles that mentioned at least one theory. Because many articles included more than one theory, we used theory as the unit of analysis. Of all theories used, 69.1% were used to inform a study; 17.9% of theories were applied; 3.6% were tested; and 9.4% involved building/creating theory. The proportions were similar when the analysis was completed using article (n=69) as the unit of analysis (see Table 1). No studies that reported using theory were found in the sample of health behavior research articles from *JAMA* or *NEJM*. Thus, the results did not change when these two high-impact medical journals were excluded.

There was a slightly different pattern in how theory was used in intervention versus non-intervention research, though both types of research were mainly informed by theory. Of intervention studies, 65.6% were informed by theory compared to 54.1% of non-intervention studies, and the proportion of studies that applied theory was lower for intervention (15.6%) than for non-intervention studies (27.0%). A higher proportion of intervention studies tested theory (12.5% vs 2.7% non-intervention), and non-intervention studies more often built or created theory than did intervention studies (16.2% vs 6.3%).

Discussion

This study sought to identify the proportion of recently published health behavior research articles that use theory and to further identify the extent of theory use along a defined continuum. Compared with previous studies that reviewed the use of health behavior theory in journal publications [4, 5, 11], a lower proportion of the health behavior articles in this study used a theoretical framework.

The most frequently utilized theories in this study were the most established theories in health behavior research: The Transtheoretical Model/Stages of Change, Social Cognitive Theory, and the Health Belief Model, followed by the Theory of Reasoned Action/Theory of Planned Behavior, and Social Networks/Social Support. These findings are consistent with other recent reviews [4, 5].

A relatively small proportion of community-level and multi-level theories were used in the empirical research articles reviewed. Given the evidence supporting the effectiveness and recommended use of community-level interventions [18] and the frequent calls for more community-wide and environmental interventions [5, 12, 13], the relative absence of applied community-level theory in the literature is surprising. This finding may be attributed in part to persistent challenges to operationalizing these theories in empirical research [5].

The most striking new finding of this study relates to the extent of theory use defined along the continuum of "informed" to "applied," "tested," and "building theory." Nearly 70% of all theories mentioned were classified as *informing* the research. This suggests that many researchers are either giving lip service to behavioral theory or providing very limited descriptions of how theories were operationalized in measurement, analysis, and/or the design of interventions. The length limitations in journal articles may contribute to the limited information, or the way theory is used may be superficial, or both. This pattern of theory use suggests that the field is not advancing in sophistication, as researchers are not taking full advantage of the rich potential of behavioral theory to help solve pressing health problems.

Limitations

A significant limitation of this research is the relatively small sample of articles that was thoroughly analyzed with

respect to how theory was used. However, given the high proportion of articles only "informed" by theory and the systematic sampling strategy, the sample size appears sufficient to draw the main conclusions of this study. This sample was too small to assess trends in theory use over the 6 years that were studied and to compare subgroups of studies. We realize that the ten journals included in the sample may not be representative of the larger body of health behavior research and, in particular, the two highest-impact journals recommended by the experts did not contribute any theory-based articles. The journals' publication requirements may have biased the sample toward research considered to be rigorous by traditional biomedical standards and may have limited authors' opportunities to clearly explain the role of theory in the research.

Another limitation of the study is that this review did not ascertain whether the theories were used correctly. It should be noted that theories may have been used incorrectly. For example, constructs may be misinterpreted or poorly measured, and analyses may have been inappropriate. This type of analysis was not feasible in the present review but should be done.

Conclusions

The results of this review lead to a number of conclusions about the use of theory in health behavior research. First, there were few studies that used theories beyond those that are the most prominent in the field, such as Transtheoretical Model/Stages of Change, Health Belief Model, Theory of Planned Behavior, and Social Cognitive Theory. The use of these theories appears to have remained consistent in the health behavior literature over the past two decades, apart from the more recent introduction and increasing use of The Transtheoretical Model [4]. Second, the health behavior research articles that used theory were, by and large, informed by theory, and comparatively few applied, tested, or built new theories. Last, there appears to be a dearth of community-level theories being used in health behavior research.

Based on these conclusions and in light of the limitations of this review, we have several recommendations for advancing the use of theory in health behavior research. First, theory should be used more thoroughly in research. This can be done by measuring and testing the full set of key constructs in a theory, by applying and testing existing theories, and building new theories. This will lead scientists to better examine the complex, multi-faceted health issues that are influenced by health behaviors. Second, researchers need to use common theories more thoroughly, to apply and test theories beyond those which are best known, and to apply theories that reach beyond the level of individuals and small groups to impact health behavior problems in organizations and communities. Without these renewed efforts, theory use in the field of health behavior and health education may remain stagnant.

References

1. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004; 291: 1238–1245.
2. Solomon S, Kington R. National efforts to promote behavior-change research: views from the Office of Behavioral and Social Sciences Research. *Health Educ Res*. 2002; 17: 495–499.
3. Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJ. Selected major risk factors and global and regional burden of disease. *Lancet*. 2002; 360: 1347–1360.
4. Glanz K, Lewis FM, Rimer BK, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. 2nd ed. San Francisco: Jossey-Bass; 1996.
5. Glanz K, Rimer BK, Lewis FM, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. 3rd ed. San Francisco: Jossey-Bass; 2002.
6. Rothman AJ. "Is there nothing more practical than a good theory?": Why innovations and advances in health behavior change will arise if interventions are used to test and refine theory. *Int J Behav Nutr Phys Act*. 2004; 1: 11.
7. Suls J, Rothman A. Evolution of the biopsychosocial model: prospects and challenges for health psychology. *Health Psychol*. 2004; 23: 119–125.
8. Noar SM, Zimmerman RS. Health Behavior Theory and cumulative knowledge regarding health behaviors: are we moving in the right direction. *Health Educ Res*. 2005; 20: 275–290.
9. Ratner PA, Bottorff JL, Johnson JL, Cook R, Lovato CY. A meta-analysis of mammography screening promotion. *Cancer Detect Prev*. 2001; 25: 147–160.
10. Baranowski T, Lin LS, Wetter DW, Resnicow K, Hearn MD. Theory as mediating variables: Why aren't community interventions working as desired. *Ann Epidemiol*. 1997; 7: S89–S95.
11. Glanz K, Lewis FM, Rimer BK, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. 1st ed. San Francisco: Jossey-Bass; 1990.
12. Oldenburg BF, Ffrench ML, Sallis JF. Health behavior research: the quality of the evidence base. *Am J Health Promot*. 2000; 14: 253–257.
13. Oldenburg BF, Sallis JF, Ffrench ML, Owen N. Health promotion research and the diffusion and institutionalization of interventions. *Health Educ Res*. 1999; 14: 121–130.
14. Parkerson GR Jr, Connis RT, Broadhead WE, et al. Disease-specific versus generic measurement of health-related quality of life in insulin-dependent diabetic patients. *Med Care*. 1993; 31: 629–639.
15. Weinstein ND. Misleading tests of health behavior theories. *Ann Behav Med*. 2007; 33: 1–10.
16. DiClemente RJ, Crosby RA, Kegler MC, eds. *Emerging Theories in Health Promotion Practice and Research*. San Francisco: Jossey-Bass; 2002.
17. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977; 33: 159–174.
18. Centers for Disease Control and Prevention. The Community Guide. Evidence-based recommendations for programs and policies to promote population health. Available at http://www.thecommunityguide.org/. Accessibility verified December 8, 2007.