
SECONDARY AND TERTIARY PREVENTION: PSYCHOPHYSIOLOGICAL COMPARISON THEORY AND ITS ROLE IN UNDERSTANDING PATIENT DELAY

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Much of cancer incidence and premature death can be prevented through changes in behavior. In fact, the National Cancer Institute has set a goal of 50% reduction in cancer mortality by the year 2000 through prevention and control efforts focused, in large part, on lifestyle (Greenwald & Cullin, 1985; Greenwald & Sondik, 1986). In line with this agenda, this paper has two goals. The first is to briefly review the behavioral efforts in secondary prevention and highlight research directions. The second is to emphasize the need for behavioral research in tertiary prevention, shortening the period of delay for cancer diagnosis and treatment.

SECONDARY PREVENTION

Secondary prevention efforts have been defined as those which identify the disease at the earliest stages (i.e., when it is preinvasive or localized and asymptomatic) so that effective treatment can be administered sooner and mortality reduced. The chances of successful early cancer detection and treatment depend upon the clinical characteristics of the disease and the screening strategy. It is unlikely that secondary prevention can proceed effectively unless certain conditions for both are met.

Table 1 provides the clinical (i.e., tumor) characteristics necessary for secondary prevention. The incidence in the target population must be sufficiently high to enable a screen to identify a significant number of tumors. If a test performs perfectly but only one person in 10,000 screened develops the disease in a given year, 9,999 individuals will/undergo the expense, bother, and potential danger of the screen. The disease/tumor must significantly reduce the quality or quantity of life of the indi-

vidual. Basal cell carcinoma of the skin is slow growing and easily removable with minor surgery and minimal risk; thus, these tumors are not viable candidates for secondary prevention. There must also be a sufficiently long asymptomatic period in which localized stages can be diagnosed and treated. Cervical cancer can remain localized in an asymptomatic form for upwards of 20 years. In contrast, endometrial cancer can also remain localized, but it often presents in women as postmenopausal bleeding. Hence, over three quarters of endometrial tumors are diagnosed at a localized stage because symptoms develop early. Screening, therefore, might be expected to have a greater impact on cervical rather than on uterine cancer because the former remains both localized and asymptomatic for an extended time. Finally, there must be an effective treatment for tumors diagnosed at an early stage. For treatment to be effective, it must (a) produce a better outcome in asymptomatic screened patients than in those who become symptomatic and seek medical care; and (b) be widely available and acceptable to patients.

At present, it has been suggested (e.g., Battista & Grover, 1988) that the effectiveness of current secondary prevention efforts can be classified into three categories:

1. Cancers for which there is general agreement that early detection has been effective in reducing mortality. These tumors would fulfill the disease criteria noted above (i.e., high incidence, significant mortality/morbidity risk, long asymptomatic period, effective treatment). The two sites currently meeting these criteria and against which secondary prevention efforts have been waged are cervical and breast cancer.

2. Cancers for which early detection does not appreciably reduce mortality. Lung cancer falls into this category, and it is not surprising that efforts have focused on primary prevention to reduce risk (i.e., smoking prevention and cessation).

3. Cancers for which early detection remains to be achieved and/or current data is not sufficiently supportive to warrant wide-scale usage. Cancer of the colon and rectum, ovarian cancer, and endometrial cancer would be in this category.

Considering this classification, behavioral scientists have focused on the early detection of breast cancer. Of the three approaches: mammography, clinical breast examination, and breast self-examination [BSE], BSE has received the greatest study. As noted (Christenson, 1989), variables difficult or impossible to change (e.g., age, lower SES, less familiarity with the health care system, and less positive attitudes toward medical care) account for significant variance among women who are not reached, were contacted too late, or who decline to participate in screening programs. Incidentally, such variables are predictive of tertiary preventive behaviors (e.g., delay to seek treatment) as well (Grady, Kegeles, Lund, Wolk, & Farber, 1983). Any remaining effects to be predicted are proportionately smaller and potentially more subtle. Theory within social psychology, specifically attitude change models (Fishbein & Ajzen's [1975] Theory of Reasoned Action and Petty and Cacioppo's [1986] Elaboration Likelihood Model) and applications to health (the Health Belief Model, Maiman & Becker, 1974) have been used to understand and change attitudes and prompt secondary prevention behaviors. The validity of the attitude change

Table 1.
Tumor/Disease Characteristics Necessary for Secondary Prevention.

1. The incidence of the tumor in the target population must be sufficiently high.
2. The tumor must significantly reduce the quality or quantity of life of the individual.
3. There must be a sufficiently long asymptomatic period during which localized stages can be diagnosed and treated.
4. There must be an effective treatment for tumors diagnosed in early stage. For treatment to be effective, it must (a) produce a better outcome in asymptomatic screened patients than in those who become symptomatic and seek medical care; and (b) the treatment must be widely available and acceptable to patients.

models, such as those of Fishbein and Ajzen or Petty and Cacioppo, for understanding and predicting secondary preventive behaviors as well as attitudes and behaviors that have little or nothing to do with cancer, have generally been demonstrated. Thus, there may be little need for yet another study on the Health Belief Model predicting, for example, BSE performance.

Instead, clarification of variables in the models (e.g., central themes underlying risk behavior, normative beliefs) which are uniquely relevant for cancer would be important, as we would then find more effective protocols for changing attitudes toward cancer risk reduction behaviors. For example, one anti-smoking campaign utilizes celebrity endorsements for the Great American Smokeout (a peripheral cue, a la the Petty and Cacioppo Model). This theoretically driven strategy, however, may be less compelling and motivating than an ad based on the other arm of the model, strategies aimed at basic values or norms which prompt central processing (e.g., an ad depicting a parent who is a smoker finding his/her 5-year-old imitating their own smoking behavior). In either case, prevention may be facilitated; however, demonstrating that the models are useful to the context of cancer is no longer sufficient. Now, specific components of the models, and, importantly, their relevance to cancer, need study. By invidious comparison, tobacco companies appear most effective at tailoring advertising (e.g., the targeting of new markets—women, minorities, etc.)

Regarding other sites/diseases for secondary prevention study, it is somewhat surprising that parallel energies have not been expended on cervix cancer, for example. In a 1986 ACS publication there was an estimated 62% de-

cline in age-adjusted uterine death rates from 1965 to 1980. The majority of this change is due to declining cervical rather than endometrial cancer rates, and central to this dramatic turnaround is the presumed success of the pap test. However, during the same period, the incidence (or detection of) *in situ* disease has increased. The downward trend in cervical cancer incidence may have been the critical factor in the dearth of research on behavioral/psychological factors in secondary prevention. Regardless, there are several reasons which would urge a vigorous effort toward secondary prevention for this site. First, there are an estimated 13,000 new cases each year, or about 3% of all the women diagnosed annually. Second, the disease is distributed unevenly among blacks and lower SES groups. Further, the latter groups come to the physician with more advanced disease and thus have lower survival rates. Third, with these important data on the distribution of the disease, there is reason for concern in generalizing from our current knowledge base (i.e., primarily white women seeking clinical examination or mammography for breast cancer) to secondary prevention for women at risk for cervical cancer. Attitudes between potential breast and cervix patients may, in fact, be similar, but it is likely that the other important predictors for health care behaviors (e.g., linkage to the health care system, financial resources) may exert overwhelming influence for pap test screening. Fourth, study of this group may also provide the context for discovering general principles of secondary prevention to reduce the higher mortality and morbidity of cancer for minorities and low SES groups. As a final note, a primary prevention strategy for this site would be addressing sexual behavior patterns

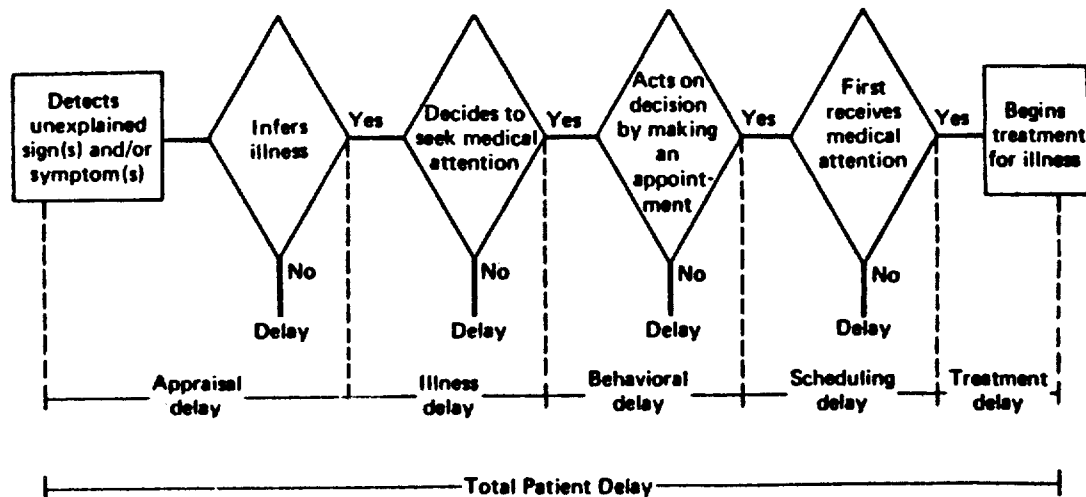
among adolescents and young women. A positive outcome of the AIDS crisis is that it may, in fact, be the instigator for change. The emphasis on fewer sexual partners and barrier methods directly impacts the known risk factors for cervical disease.

Studies for other disease sites, such as testicular cancer and colo-rectal cancer, are rare. The majority reinvent the wheel (e.g., the Health Belief Model can predict testicular self-examination, too). Recent investigations provide notable exceptions and exemplars of future directions. For example, one study on testicular self-exam examined the effectiveness of a subtle, but common, prompt procedure (posting signs about how to do a self-exam in dormitory bathrooms) weeks after a group intervention (e.g., Brubaker & Wickersham, 1990). Another study on colorectal cancer examined a cancer-relevant individual difference variable (i.e., family history of colon cancer) and, importantly, the outcome variable was participation in screening (i.e., actual target behavior) rather than attitudes alone (DeVellis, Blalock, and Sandler, in press). These are examples of theoretically driven studies with relevant target populations and outcomes, and which clarify cancer-specific variables (e.g., family history) that we cannot change.

TERTIARY PREVENTION

Tertiary prevention, shortening delay to seek a diagnosis once symptom/sign awareness has occurred, directly impacts morbidity; however, mortality may also be improved. Tertiary prevention is appropriate for a cancer conference focused on prevention. For some sites this is the only type of prevention that is currently available and/or feasible. For example, ovary disease typically presents with regional spread. However, the symptom picture for a woman to interpret is complex (Smith & Anderson, 1985). With extended patient delay the disease spreads for example, from one ovary to the other, or from the ovary to the lymphatics. To the extent that spread of major or microscopic disease is limited, morbidity and mortality will be reduced (Berek, 1989).

Unlike many medical problems, the



development of malignancy and the appearance of symptoms is usually protracted, and a complex and changing symptom picture can be typical. The psychological and behavioral aspects of illness, representative (Leventhal, Meyer, & Nerenz, 1980) and symptom interpretation (Cacioppo, Andersen, Turnquist, & Petty, 1986) have been offered as theoretical frameworks for understanding illness interpretations and patient delay. Recent studies indicate that the lion's share of cancer delay (i.e., symptom/sign awareness to appearing before a physician for consultation) is accounted for by the time necessary for the patient to decide that the symptoms indicate "illness" rather than a normal and/or nonserious health condition (e.g., a 45-year-old perimenopausal woman eventually decides that her irregular vaginal bleeding may indicate cancer rather than menopause) (Cacioppo, Andersen, Turnquist, & Petty, 1986). Such data directly counter popular notions that individuals deny cancer symptomatology and/or delay because of fears of the disease or treatment. Interestingly, the delayed "serious" judgment also appears in the few studies of physician delay in making cancer diagnoses for their patients (Howson, 1950; Mommsen, Aagaard, & Sell, 1983). Although patient and physician delay is a behavioral problem outside the purview of the medical sciences, it is amenable to a psychological analysis.

Recently there has been renewed in-

terest in studying patient delay, as the prior literature primarily comes from physician surveys of their patients conducted in the 1950s and 60s. One important focus of the research has been to investigate the duration and interrelationships among the stages of a model of total patient delay. In 1979, Safer, Tharps, Jackson, & Leventhal proposed a model of patient delay, which has subsequently been revised (Cacioppo et al., 1986; Cacioppo, Andersen, Turnquist, & Tassinavy 1989), and is presented in Figure 1. Empirical support for the model indicates that delay from symptom awareness to seeking medical consultation is a series of independent stages. The stages include the following:

Appraisal delay: Days from the detection of a symptom to the individual's decision that she is ill;

Illness delay: Days from the above illness inference and a decision to seek medical attention.

Behavioral delay: Days from the decision to seek medical attention and the person acting on this decision by making an appointment.

Scheduling delay: Days elapsed between the person making an appointment and first receiving medical attention.

Our analysis of delay has also focused on the delay processes of symptom interpretation—that is, appraisal delay—because this interval accounts for the majority (e.g., 75%) of the delay

in seeking a cancer diagnosis. We have examined the possible role of specific psychophysiological comparison processes (so named to emphasize the inferences and attributions patients draw when relating their symptoms to their prior expectations and knowledge about physiological aspects of bodily events) in symptom appraisal and delay. Theory and research for more than a quarter century in social psychology have highlighted the processes believed to be central to illness appraisals and inferences. We drew on these literatures to develop a general attribution framework regarding how detected physiological reactions might be translated into illness inferences and appraisal delay.

The principles of psychophysiological comparison theory are presented in Table 2. Regarding the assumptions about symptom interpretations, individuals are assumed to be motivated to maintain an understanding of their bodily (i.e., physiological) condition. When unexplained symptoms of any variety occur, this motivation is tapped and individuals begin the process to evaluate the symptom. We do not presume that individuals need to be "accurate" in their symptom perceptions, only that once the perception occurs they are motivated to understand from whence it comes. We posit that the strength of this motivation to evaluate symptoms is a function of both symptom attributes and personal consequences of the symptoms. Symptom attributes, for example, can include

Table 2
Principles of Psychophysiological Comparison Theory.

Assumptions:

1. People are motivated to maintain an explicable physiological condition.
2. Symptom perception need not be accurate in terms of physiological etiology.

Antecedents:

3. The strength of the motivation to understand and evaluate one's symptoms is a function of their unexpectedness, salience, personal relevance, and perceived consequences.

Psychophysiological comparisons:

4. Symptom interpretation involves a comparison of the symptoms with the known consequences of salient situational stimuli (e.g., exposure to pathogens, recent medications) and physiological conditions (e.g., allergies, diseases-i.e., illness prototypes).
5. Symptom interpretation is governed in part by logical consistency. For example, the probability of a specific illness inference is a direct function of its accessibility (familiarity) and an inverse function of the discrepancy between the symptoms and the illness prototype.
6. Symptom interpretation is governed in part by hedonic consistency. For example, innocuous explanations (e.g., prototypes which suggest the symptoms are transient or self-correcting) diminish an individual's motivation to obtain additional information or explanations for the condition to a greater degree, *ceteris paribus*, than do threatening explanations.
7. The more diffuse the symptoms, the greater the number of potential comparisons and, consequently, the greater the likelihood of erroneous interpretations.

Effects of failing to find a comparison:

8. If a situational stimulus or illness prototype cannot be initially identified to account for the symptoms, then the stimuli or prototype(s) which maximizes the logical and hedonic principles above will be considered. This will influence the subsequent symptom interpretation process in at least two ways:
 - a. The implicit theories people have about stimuli or prototypes will influence the attention to and detection of symptoms and the production of symptoms for interpretation.
 - b. The particular symptoms chosen will influence people's implicit theories about stimuli or prototypes.

such aspects as how salient (noticeable) they are, how unexpected they are, or how relevant they are to prior health status. Personal consequences of the symptoms include how disruptive they are to one's life or how difficult it is to tolerate the symptom.

The process of cancer symptom/sign appraisal is conceptualized as one of psychophysiological comparison—a comparison of bodily symptoms with at least two types of circumstances: salient situational events and/or circumstances (e.g., rash after walking in the woods) and/or those of known illness prototypes. Our knowledge base about illness prototypes comes from a variety of routes: first-hand experience (evaluate current symptoms on the basis of past afflictions); self-education (e.g., one reads newspaper articles about cancer); or observation (e.g., one learns about

breast cancer from seeing the mother's experience).

The process of comparison making is governed by both logical and illogical (hedonic) tendencies. For the logical aspects, individuals choose those comparisons (i.e., hypotheses for their symptoms) with which they are most familiar (e.g., prior experience or heavy knowledge base) and which are the best "fit" to their notion/understanding of the illness prototype. To the extent that symptoms and information/experience about any particular prototype are discrepant—that prototype hypothesis will wane in favor and the person will continue the search for more viable ones.

The illogical side of this process is not really so illogical—but it is a hedonic path. That is, all things being equal, individuals will opt for the innocuous rather than the more serious or more

threatening hypotheses for symptoms. Individuals will be more inclined to choose illness prototypes which suggest a transient, self-correcting, and/or less serious condition than those which do not. For example, the 45-year-old woman will hypothesize "menopause" for her irregular bleeding symptoms rather than cervix cancer; the 60-year-old male will hypothesize "hemorrhoids" for his rectal bleeding rather than colorectal cancer; the young man with nagging fatigue and malaise will hypothesize the "flu, lack of sleep, stress or all of the above" rather than lymphoma. The more diffuse or confusing the symptoms, the more likely individuals will make errors in this process (e.g., "menopause" vs. "stress"). Obviously this bias does something good—it keeps us from a chronic state of somatic worry over every symptom. A possible problematic side of this hedonic bias is that to the extent that individuals are skilled at generating benign hypotheses, albeit plausible rival ones, the motivation to continue to obtain information and to "self-study" one's symptoms will decline. When wrong, this benign hypothesizing results in delay.

What are the effects of failing to find a comparison, when neither situational explanations nor available illness prototypes seem to capture the experience? First, the guiding principles of logical consistency and hedonic bias operate and hypotheses which maximize these principles are chosen. When a "good fit" hypothesis has still not been found, a second stage of the symptom interpretation process is begun. In it, individuals' implicit theories about situational events or illness prototypes will increase their attention to and detection of symptoms which "fit" the illness. And the particular symptoms experienced will also influence an individual's implicit theories about situational events or illness prototypes. Thus, a feedback loop from comparison of bodily condition with illness prototypes is proposed. If nothing changes, this process could perpetuate false beliefs about illnesses as well as selective attention to symptoms. However, it is usually the case that as times passes, additional symptom information accrues. This additional information will provide new bases for choosing and

modifying hypotheses. The psychophysiological comparison process will continue to be guided by logical and hedonic principles, and new circumstances or illness prototypes will arise.

In sum, conceptualizations such as the above have been useful in understanding the psychological and behavioral factors involved in tertiary prevention (Cacioppo et al., 1986). The applications of data from such a model include tailoring information programs which alert individuals about the warning signs/symptoms of cancer or defining groups at greatest risk for misinterpreting cancer symptomatology and delaying.

SUMMARY

1. Theoretically driven attitude and behavior change research has been useful to secondary prevention of cancer. However, specific components of the models and their relevance to cancer and cancer risk groups need specification and testing.

2. Primary and secondary prevention efforts for a disease site such as cervix cancer may provide useful information about behavior change in the context of important predictors of disease incidence and severity which are difficult or impossible to change (e.g., lack of prior

involvement with the health care system, family history of cancer, race).

3. Advances in 1 and 2 above may be more important than more of the same attitude and behavior change research with other sites of disease.

4. Tertiary prevention, shortening the delay once symptom/sign awareness has occurred, needs a committed effort. Important directions include understanding the stages of delay and psychological processes of decision-making, from symptom detection to physician contact. Also, study of physician diagnostic delay may be important, particularly for difficult to diagnose tumors/conditions.

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