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FATALISM AND HEALTH BEHAVIOR: A META-ANALYTIC REVIEW

Universidad Autónoma de Ciudad Juárez

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Cohn, Lawrence D.
Esparza del Villar, Óscar Armando

Experimental psychology; health clinic

LISBEILY DOMÍNGUEZ RUVALCABA

COORDINADORA DE LA COLECCIÓN

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Av. Plutarco Elías Calles 1210
Fovissste Chamizal, C.P. 32310
Ciudad Juárez, Chihuahua, México
Tel. +52 (656) 688 2260

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Abstract

The association between fatalism and health behavior was assessed in a meta-analytic review of 46 studies comprising 51 independent samples and 25,167 participants. Effect sizes (Hedges gu) ranged from -0.54 to 1.49; positive values indicated that higher levels of fatalism were associated with higher levels of health threatening behavior and non-compliance with health promoting activities. A random effects analysis yielded a weighted average gu of 0.26 (95% CI: 0.14 to 0.38) indicating that participants who did not engage in health promoting behaviors held significantly more fatalistic beliefs than participants who engaged in health promoting behaviors. The strongest relationship between fatalism and health behavior was found in studies of preventive screening such as breast cancer screening and prostate cancer screening. Adults who did not engage in preventive screening held more fatalistic beliefs than did adults who engaged in screening (weighted average gu = 0.28; 95% CI: 0.01 to 0.55). Several moderating variables were also investigated including the type of fatalistic belief assessed in each study. The findings suggest that some fatalistic beliefs are associated with increased levels of non-compliance but the direction of causality remains undetermined. The findings also suggest that the fatalism-health behavior relationship may be smaller than previously suggested. Implications for future research and designing health interventions are discussed.

Keywords: fatalistic beliefs, health behavior, screening, interventions, meta-analysis.

Potential users:

Health psychologists, primary health carers.

Fatalism and health behavior: a meta-analytic review

The failure of large segments of the U. S. population to engage in seemingly simple health promoting behaviors has puzzled researchers and public health officials for decades. Approximately 17,751 cancer fatalities could be eliminated annually if all eligible men participated in recommended prostate cancer screening and all eligible women participated in recommended breast cancer screening and cervical cancer screening (cdcp, 2010a). Similarly 5,024 motor vehicle (mv) fatalities and more than 22,000 serious injuries could be eliminated each year if mv occupants consistently used seat belts (National Highway Traffic Safety Administration, 2009). Health promoting behaviors are often simple to execute, inexpensive to implement, and universally endorsed by medical experts and public health officials. Yet many individuals resist adopting these behaviors.

Several potential barriers to behavior change have been investigated including the belief that one's health is a product of luck, destiny or divine intervention, beliefs that fall under the general rubric of fatalism. The construct of fatalism has attracted considerable attention during the past several decades resulting in a five-fold increase in the number of papers addressing the topic (Figure 1). Among behavioral scientists, investigations have mainly examined the association between fatalistic beliefs and the failure to adopt health promoting behaviors such as cancer screening, seat belt use, adherence to prescribed medical regimens, and increased fruit and vegetable consumption. Individuals who hold fatalistic beliefs may attribute their health or illness to destiny or divine intervention rather than their own self-initiated actions. Such fatalistic attributions may serve as barriers to behavior change while also facilitating involvement in health damaging behaviors. Unger et al. (2002), for example, proposed that adolescents who are highly fatalistic may ignore health warnings regarding substance use believing that "... if they are destined to develop health problems, there is nothing they can do to prevent these problems from occurring" (p. 260). Powe (1997) offered a related hypothesis proposing that individuals who delay cancer screening may do so because they believe that the development of cancer reflects God's will and nothing can be done to avoid it.

Health disparities between minority and non-minority populations in the United States have also been partially attributed to population differences in fatalistic beliefs (Green et al., 2004; Shen, Condit & Wright, 2009). Several findings suggest that fatalistic beliefs may be more common among minority populations. Interviews conducted with 1,273 randomly sampled adults from Nashville, Tennessee, for exam-

ple, revealed that African-American respondents were significantly more likely than non-Hispanic white respondents to endorse survey items depicting fatalistic beliefs (sample item: "I can control a small health issue but only God can control a big health issue") (Franklin et al., 2007). Many investigators suggest that such beliefs may partially explain why African-American women are less likely than non-Hispanic white women to have mammograms and Pap smears (cdcp, 2010b). Women who delay seeking treatment for breast cancer by only three months have a lower survival rate than women who do not delay seeking treatment (Facione et al., 2002). For this reason, the Centers for Disease Control and Prevention recommend increasing cancer screening among African-American women as one strategy for eliminating the disparity in cancer fatality rates between African-American Women and non-Hispanic white women. Fatalistic beliefs may also contribute to low rates of mammography screening and Pap tests among Hispanic women. Numerous investigators propose that the concept of fatalismo (fatalism) is an integral part of Latino culture and may encourage Latinos to regard cancer, chronic diseases, and other health threats as expressions of God's will (Antshel, 2002). A study of more than 1,300 Latino and Anglo health plan participants, for example, revealed that Latino participants were more likely than non-Hispanic white participants to view cancer as a death sentence and punishment from God (cited in Springer, 1998).

Several investigators suggest that behavioral interventions will only be successful if they modify the fatalistic beliefs of participants. Powe (1997; 2001), for example, suggests that programs that are designed to increase cancer screening among African-Americans may need to consider and modify the fatalistic perceptions of participants. Similarly Lange and Piette (2006) suggest that some diabetic patients may attribute their poor glycemic control to fate rather than their own disease management and thus successful interventions must address the fatalistic attributions of participants. Hispanics are more than twice as likely as non-Hispanic whites to develop diabetes, a health disparity that could be reduced by increasing early detection and treatment (cdcp, 2010c). Yet here, too, successful behavioral interventions may need to address the fatalistic attributions of participants. Similarly McClure, Allen & Walkey (2001) suggest that "...fatalism about earthquake damage hinders preparation" (p. 110) and thus injury control interventions should target the fatalistic beliefs of community residents. Finally, Colón (1992) suggests that interventions which seek to increase seat belt use among minority populations may be more effective if they take into account their belief in destiny.

Such speculations have far reaching implications for designing interventions that encourage health promoting behavior. Yet the evidence supporting an association between fatalism and health behavior has been equivocal. Franklin et al. (2007), for example, found no association between fatalistic attitudes and health care utilization in the random sample of 1,273 Nashville adults cited above. In contrast, a random digit dial telephone survey of 6,369 U. S. adults revealed a significant association

between fatalistic beliefs and self-reported involvement in several health behaviors including smoking and exercising (Niederdeppe & Levy, 2007). The presence of equivocal findings may be due to the range of fatalism measures employed across studies, the range of health behaviors assessed across studies, variability in statistical power across studies, or the absence of genuine population effects. No systematic review of the research has been conducted to confirm the presence of a relationship between fatalism and health behavior, assess the magnitude of association (if one exists), or identify potential moderating variables. The current review addresses this gap in knowledge by conducting a meta-analysis of 46 studies that assessed the relationship between fatalism and five classes of behavior: 1) Disease screening behavior (e.g., Pap smears), 2) Health promoting behavior (e.g., exercise), 3) Safety promoting behavior (e.g., smoke detector installation), 4) Safe sexual practices (e.g., condom use), and 5) Legal drug use (e.g., tobacco use).

The meaning and measurement of fatalism

More than 50 scales have been developed to assess fatalistic beliefs, reflecting a wide range of definitions (Esparza, 2005; Esparza & Wiebe, 2009). Common to most definitions of fatalism is the belief that personal outcomes are controlled by external forces such as luck, destiny, powerful people, or divine intervention (Esparza, 2008; Shen, Condit & Wright, 2009). Webster's dictionary defines fatalism as the belief that "… events are fixed in advance so that human beings are powerless to change them" (Merriam-Webster's Collegiate Dictionary, 1993). Cuéllar, Arnold & González (1995) defines fatalism as "…the extent to which people feel their destinies are beyond their control" (pp. 135; 341). Comas-Díaz (1989) defines fatalism as "… the belief that some things are meant to happen regardless of the individual's intervention (Qué será, será — what will be, will be) (pp. 41-19). The latter definitions serve as the basis for many fatalism scales such as Colón's (1992) single item measure assessing reasons for not using seat belts: "There is no point in using seat belts since you can't change your destiny." In addition to assessing destiny beliefs many fatalism scales also assess feelings of pessimism, helplessness, or fear. The latter emotions are also regarded as expressions of fatalism. For example, Powe (1997) defines cancer fatalism as "… the belief that death is inevitable when cancer is present" (p. 135). Her fifteen item fatalism scale assesses several aspects of this belief including pessimism and fear as well as the perceived inevitability of death following a cancer diagnosis. Esparza and Wiebe (2009) factor analyzed 239 items contained in 29 fatalism scales. Five factors were identified: ineluctable destiny, luck, pessimism, helplessness, and externality. Similar factors were identified by Shen, Condit & Wright (2009) suggesting that the association between fatalism and health behavior may be influenced by the type of scale employed in a study. The current review also examines the latter hypothesis.

Method

Literature search

A preliminary database was generated from a computer search of Psychinfo, Web of Science, and ProQuest Dissertations and Theses. The abstract and topic fields of the databases were searched for the term fatalism. Within Psychinfo and ProQuest, the search period ranged from January, 1970 through July, 2007; within Web of Science the search period ranged from January, 1975 (the earliest date available within the database) through July, 2007. This search procedure yielded 826 non-overlapping citations. Each citation was evaluated by two independent raters who determined if the citation should be included or excluded from the review. Raters displayed 90.6% agreement; rating disagreements were resolved through discussion.

Inclusion and exclusion criteria

Citations were initially excluded from review if the abstract or title indicated that the report was not empirical (n = 351), empirical but unrelated to the study of fatalism and health behavior (n = 123), or empirical and health related but the study employed a qualitative research design (n = 49). Studies were also excluded if they were empirical but used the Mental Adjustment to Cancer Scale or related instrument to assess fatalistic coping strategies following a cancer diagnosis or related health threat (n = 46). Studies were also excluded if they were empirical and health related but comprised of participants who were recruited outside of the U. S. or Canada (n = 60). The latter criterion was adopted to minimize potential confounds arising from cross-cultural differences in fatalism and health behavior. Dissertations were excluded if they were not electronically accessible (n = 5); reports were excluded if they did not assess fatalism or the report could not be coded (n = 5). Studies were also excluded if authors employed fatalism measures based on Rotter's Locus of Control Scale or Wallston's Multidimensional Locus of Control Scale (n = 24); neither measure assesses a respondent's belief in destiny, divine control or predetermination — constructs that appear central to the definition of fatalism.

One hundred and sixty-three articles, dissertations, and theses met the criteria for further analysis; 152 of the latter reports were located, retrieved and read in their entirety. Forty-six of the latter reports met the criteria for inclusion in the meta-analytic review.

Measures

Fatalism scales. Each study administered one of the following 23 fatalism scales or scale adaptations (additional information about each scale is provided in the supplemental materials available on-line).

Arlikatti Fatalism Assessment (Arlikatti, 2006). The Arlikatti assessment was comprised of two items assessing the perception of 1) luck or chance, and 2) God's will determining their safety in an earthquake.

Barriers Questionnaire ii-Fatalism Subscale (Gunnarsdottir et al., 2002). The Fatalism Subscale was comprised of three items assessing fatalistic beliefs regarding the inevitability of cancer pain.

Colon's Fatalism Assessment was comprised of a single item assessing belief in destiny.

Diabetes Self-Efficacy Scale for Latinos (dsel): Fatalism Subscale (Contreras-Tadych, 2007). The Fatalism Subscale is comprised of nine items that assess the belief that "events are pre-determined, by fate, and therefore people have no ability to change and consequently no control over their destiny" (p. 82).

Facione's Fatalism Assessment (Facione et al., 2002). The Facione assessment was comprised of six items assessing breast cancer fatalism.

Faith or Fatalism Scale (Kupperman et al., 2006). The Fatalism Scale was comprised of four items "measuring cultural, religious, and fatalistic attitudes toward prenatal testing and birth outcomes" (p. 1088).

Finlayson's Fatalism Assessment (Finlayson et al., 2005). The Finlayson assessment was comprised of a single item assessing oral health fatalism and the inevitability of developing dental caries.

Harrell's Fatalism Assessment (Harrell, 1995). The Harrell assessment was comprised of twelve items assessing accident farm safety attitudes and fatalism.

Heimberg Future Time Perspective Inventory-Rejection of Fatalism Subscale (Heimberg, 1963). The Heimberg assessment was comprised of ten items assessing fatalistic views regarding the future.

Hoyo's Fatalism Assessment (Hoyo et al., 2005). The Hoyo assessment was comprised of three items assessing the degree to which respondents "perceived a lack of social support networks in case of illness" (p. 440).

Lange's Fatalism Assessment (Lange & Piette, 2006). The Lange assessment was comprised of two items assessing the degree to which diabetic respondents believed that "their illness is largely dependent on chance or fate and that there is little they can do to personally improve their diabetes-related health status."

Michielutte's Fatalism Assessment (Michielutte et al., 1996). The Michielutte assessment was comprised of a single item assessing fatalism regarding the chances of curing cancer.

Multiphasic Assessment of Cultural Constructs Short Form-Fatalism Subscale (macc- sf; Cuéllar, Arnold & González, 1995). The Fatalism Subscale was comprised of eight items assessing inevitability and mastery.

Neff's Fatalism Assessment (Neff, 1994). The Neff assessment was comprised of seven items assessing respondents' perceived ability to control events affecting their lives.

Niederdeppe's Fatalism Assessment (Niederdeppe & Levy, 2007). The Niederdeppe assessment was comprised of three items assessing pessimism, helplessness, and confusion.

Olmstead Fatalism's Assessment (Olmstead et al., 1991). The Olmstead assessment was comprised of four items assessing personal control over the events in one's life.

Parra's Fatalism Assessment (Parra et al., 2001). The Parra assessment was comprised of a single item assessing why pregnant women would not seek out hiv testing.

Powe Fatalism Inventory (Powe, 1995). The Powe inventory is comprised of fifteen items that assess four components of cancer fatalism: predetermination, pessimism, fear, and inevitability of death.

Ramírez's Fatalism Assessment (Ramírez et al., 2002). The Ramírez assessment was comprised of nine items assessing the degree to which respondents "felt HIV infection was the result of fate rather than volitional behavior."

Reid and Ware Internal-External Control Scale-Fatalism Subscale (Reid & Ware, 1974). The Reid and Ware assessment was comprised of twelve items assessing the perceived role of luck, fate, and fortune in determining a person's outcome.

Schnoll Fatalism's Assessment (Schnoll et al., 2002). The Schnoll assessment was comprised of five items assessing fatalistic beliefs about health and quitting smoking.

Springer's Fatalism Assessment (Springer, 1998). The Springer assessment was comprised of three items assessing fatalistic attitudes about cancer.

Zimbardo Time Perspective Inventory-Present Fatalism Subscale (Zimbardo & Boyd, 1999). The Zimbardo inventory is comprised of ten items that assess attitudes towards the future that are fatalistic, helpless, and hopeless.

Coding

Several pieces of information were retrieved from each study including sample size, targeted health behavior (e.g., seat belt use, breast cancer screening), Fatalism Scale administered to participants, mean fatalism score, and standard deviation by behavioral status (e.g., women who reported having a mammogram in the year preceding the study versus women who reported not having a mammogram during the year preceding the study), statistical test, test value, and p-value.

Twenty-three fatalism scales and sub-scales were used in the current set of studies. Each measure was assigned to one of seven categories based on the focus of the fatalism scale: 1) Predetermination, 2) Luck, 3) Helplessness including pessimism, resignation, or perceived inevitability of death associated with a medical diagnosis, 4) Externality, 5) Fear, 6) Time perspective, and 7) Others. Each Fatalism Scale was assigned to one of the latter categories based on item content. Many studies reported associations between fatalism scores and multiple outcome measures (e.g., alcohol use, marijuana use, cocaine use). Effect size information was recorded for every analysis in a study that addressed the fatalism-health behavior association. Some authors reported analyzing the relationship between fatalism scores and health behavior but then omitted the study's finding from the manuscript. In such cases we assumed the relationship was non-significant and we set the effect size to zero. The latter strategy avoids potential biases associated with authors only reporting significant findings.

Effect size calculation

The effect size index that was used in the current review was Hedges' (1983) unbiased g (gu) where g represents the mean difference in fatalism scores between two groups of participants divided by their pooled within-groups standard deviation. Participants in a study, for example, might include women who sought breast cancer screening versus women who did not seek screening, or adults who used seat belts versus adults who did not use seat belts. Hedges demonstrated that g provides a slightly biased estimate of the population effect size which can be corrected by multiplying g by a constant, a procedure that we employed in the current review. Effect sizes reported as odds ratios or Pearson correlations were converted to standardized

mean differences (g's) using formulas provided by Lipsey and Wilson (2001; pp. 198-201). When authors only reported the results of chi-square tests, t-tests, or F-tests then the latter results were also converted to standardized mean differences using formulas provided by Lipsey and Wilson. When authors only reported the p-values associated with statistical tests then the p-values were converted to effect size estimates using standard procedures. Several studies did not report descriptive statistics or test statistics but did report that the fatalism-health behavior association was significant. In these cases we adopted the convention of setting t to the smallest value that would yield a significant finding for the reported sample size and an alpha level of 0.05. When authors reported that an effect size was non-significant (n = 29) but failed to report relevant statistics then the effect size was set to zero. The latter procedure provides a conservative strategy for estimating the population effect size.

Each gu was weighted by the inverse of its variance giving greater weight in the meta-analysis to sample effect sizes that provided the most precise estimates of the population effect size. Cochran's Q was computed to determine if the sample effect sizes were heterogeneous. When sample g's were heterogeneous we used a random effects analysis for estimating the average population effect size and the associated 95% confidence interval (Hedges, 1983; Lipsey & Wilson, 2001).

Results

Forty-six studies met the eligibility criteria for inclusion in the meta-analysis. Sixty-five percent of the studies reported at least one significant relationship in the predicted direction between fatalism and health behavior; notably, however, 72 percent of the studies also reported at least one non-significant relationship between fatalism and health behavior. In total, these studies reported 136 statistical tests of the relationship between fatalism and health behavior (Table 1). Thirty-four percent of the tests yielded significant ($p \leq 0.05$) relations in the predicted direction; that is, higher fatalism scores were associated with higher levels of health threatening behavior and non-compliance with health promoting activities. Effect sizes ranged from -0.54 to 1.49. Positive values indicated that fatalism scores were higher among participants who were non-compliant and engaging in health threatening behaviors. Because many studies assessed multiple health behaviors and reported more than one test of the fatalism-health behavior relationship, we selected a single effect size from each sample to include in the initial meta-analytic computations. Priority was given to effect sizes that assessed the association between fatalism and screening behavior (e.g., breast cancer screening) followed by effect sizes that assessed the association between fatalism and legal drug use, followed by effect sizes that assessed the association between fatalism and se-

xual behavior, and effect sizes that assessed the association between fatalism and safety related behavior.

We recovered 51 independent effect sizes derived from studies involving 25,167 participants. A fixed effects analysis yielded a weighted average gu of 0.21 (95% CI: 0.18 to 0.24). As expected, there was significant heterogeneity among the 51 sample gu's ($Q = 922.56$; $p < 0.05$); thus we recomputed the mean gu and 95% CI using random effects analyses (Table 2). The weighted average gu was 0.26 (95% CI: 0.14 to 0.38) indicating that adults who did not engage in health promoting behaviors had significantly higher fatalism scores than adults who engaged in health promoting behaviors.

Health behaviors

The heterogeneity among the 51 sample effect sizes suggested the presence of at least one moderator variable. A likely candidate was the type of health behavior investigated within each study.

Disease screening behavior. Breast cancer screening, prostate cancer screening, and related screening behaviors were the most frequently assessed health behaviors. Twenty-one independent samples tested the association between fatalistic beliefs and participation in health related screening (Table 1). The samples were derived from 20 studies comprising 7,954 participants. Sample effect sizes were heterogeneous ($Q = 593.14$; $p < 0.05$) and ranged from -.49 to 1.49; a random effects analysis revealed that adults who did not engage in preventive screening had higher fatalism scores than adults who engaged in preventive screening (weighted average gu = 0.28; 95% CI: 0.01 to 0.55).

The remaining thirty effect sizes were distributed across multiple health behaviors; no single behavioral category contained a sufficient number of effect sizes to justify estimating a population value by computing a weighted average. Thus for each behavioral category below we selected a single effect size from a sample to include in the analysis. The following analyses do not represent independent analyses since a single sample may contribute effect size data to multiple behavioral categories.

Health promoting behaviors. Ten samples examined the association between fatalism scores and participation in health promoting activities such as fruit and vegetable consumption or exercising regularly. Sample effect sizes were heterogeneous ($Q = 24.78$; $p < 0.05$) and ranged from 0.00 to 0.41; a random effects analysis revealed that adults who did not engage in health promoting activities had higher fatalism scores than adults who engaged in health promoting behaviors (weighted average gu = 0.15; 95% CI: 0.08 to 0.23). Five additional samples assessed the association

between fatalism scores and participation in safety promoting activities (e.g., smoke detector installation) or safe sexual practices (e.g., condom use). Effect sizes from the latter studies were combined with the ten effect sizes derived from health promoting activities. Not surprisingly, the fifteen sample effect sizes were heterogeneous ($Q = 56.46$; $p < 0.05$); a random effects analysis revealed that adults who did not engage in these activities had higher fatalism scores than adults who engaged in these health related activities (weighted average gu = 0.15; 95% CI: 0.07 to 0.23).

Health threatening behaviors. Seven samples assessed the association between fatalism scores and use of alcohol and tobacco. Here, again, sample effect sizes were heterogeneous ($Q = 53.3$; $p < 0.05$) and ranged from -0.54 to 0.63; a random effects analysis did not reveal a significant association between fatalism scores and legal drug use (weighted average gu = 0.11; 95% CI: -0.05 to 0.27).

Health knowledge. Eight samples assessed the association between fatalism scores and health related knowledge. Sample effect sizes were heterogeneous ($Q = 52.08$; $p < 0.05$) and ranged from 0.00 to 0.74; a random effects analysis revealed that adults who were less knowledgeable about health related issues were also less likely to reject fatalistic beliefs (weighted average gu = 0.38; 95% CI: 0.15 to 0.61).

Fatalism scales and scale content

The current studies used 23 scales to assess fatalistic beliefs in respondents' (Table 1). The most frequently used scale was Powe's Fatalism Inventory (pfi). Seventeen studies examined the association between pfi scores and self-reported frequency of mammography screening, Pap smears, prostate cancer screening, and related screening activities. Nineteen independent effect sizes were retrieved from these studies. Sample effect sizes were heterogeneous ($Q = 291.31$; $p < 0.05$) and ranged from -0.21 to 1.49. A random effects analysis revealed that adults who did not engage in health promoting activities had higher pfi scores than did adults who engaged in health promoting behaviors (weighted average gu = 0.30; 95% CI: 0.02 to 0.59).

The pfi assesses several components of fatalism including belief in divine control and predetermination, pessimism, resignation, and the perceived inevitability of death associated with a cancer diagnosis. To determine which aspect of fatalism may be associated with participation in health related behaviors, we assigned the remaining 22 fatalism scales to one of seven categories, depending upon the main focus of the scale: destiny, luck, helplessness (including resignation, pessimism, and the perceived inevitability of death following a cancer diagnosis), externality, fear, time perspective, or "others". A scale was assigned to one of the latter categories if sixty percent of the scale's items were assigned to the category. Two coders (ldc and

oe) independently assigned each item in a scale to one of the latter categories. Rating disagreements were resolved through discussion.

Helplessness, pessimism, resignation, and luck. Ten samples assessed the association between health behavior and a respondent's expression of helplessness, pessimism, resignation, luck or perceived inevitability of death following a cancer diagnosis (Table 1). The samples were derived from nine studies comprising 11,602 participants. Sample effect sizes were heterogeneous ($Q = 404.36$; $p < 0.05$) and ranged from 0.00 to 1.30; a random effects analysis revealed that adults who expressed helplessness regarding their health were more likely to engage in health threatening behaviors (weighted average gu = 0.34; 95% CI: 0.19 to 0.49).

Predetermination and divine control. Six samples assessed the association between health behavior and a respondent's belief in destiny, predetermination, or divine control (Table 1). The samples were derived from four studies comprising 2,415 participants. Sample effect sizes were heterogeneous ($Q = 54.25$; $p < 0.05$) and ranged from -0.26 to 1.12; a random effects analysis revealed that adults who endorsed a belief in predetermination and divine control were not significantly more likely to engage in health threatening behaviors (weighted average gu = 0.24; 95% CI: -0.06 to 0.55).

Discussion

The current findings address several gaps in our understanding of the relationship between fatalism and health behavior. First, the results provide tentative support for the frequently proposed association between fatalistic beliefs and health related behaviors. Individuals who endorsed a variety of fatalistic statements were more likely than their peers to report lower rates of medical screening, lower rates of health promoting behavior, and lower scores on measures of health related knowledge. These findings were derived from 46 studies employing a wide range of fatalism scales administered to more than 25,000 participants. Notably the association between fatalism and health behavior was not restricted to studies investigating a particular type of behavior (e.g., cancer screening); nor was the relationship restricted to studies that used a particular fatalism scale.

Second, the average population effect size was small ($d = 0.26$) equivalent to a point-biserial correlation of approximately 0.13. Although small in magnitude, the latter value is similar to effect sizes reported in related meta-analyses. For example, a review of 12 studies assessing the relationship between breast cancer screening and self-reported level of worry yielded a weighted mean ($r = 0.12$) (Hay, McCaul & Magnan, 2006), a review of 27 studies assessing the relationship between patient

adherence and perceived disease threat yielded a weighed mean (r = 0.16) (DiMatteo, Haskard & Williams, 2007), and a review of 32 studies assessing the relationship between adult vaccination and perceived severity of illness yielded a weighted mean (r = 0.16) (Brewer, Chapman, Bibbons, Gerrard & McCaul, 2007). Similarly a review of fifteen studies assessing the relationship between the adoption of health promoting behaviors and perceived control yielded a weighted mean (r = 0.22) (Rodgers, Conner & Murray, 2008), and a review of six studies assessing the relationship between the adoption of several health promoting behaviors and general self-efficacy yielded a weighted mean (r = 0.14) (Luszczynska, Scholz & Schwarzer, 2005).

From a practical standpoint almost any association between fatalism and health behavior has important implications for designing health related interventions. Yet the small relationship between fatalism and health behavior is unexpected from a conceptual standpoint and inconsistent with the magnitude of attention that the fatalism construct has attracted during the past decade (Figure 1). Two factors may have increased expectations for large effect sizes. First, our literature search revealed that much of the published and unpublished material is theoretical or speculative rather than empirical. Despite the presence of hundreds of articles and unpublished reports fewer than 7% of these papers empirically evaluated the relationship between fatalism and health behavior in North American samples. Approximately 400 of the 823 citations that we identified in our initial literature search represented theoretical discussions, anecdotal reports, focus group findings, or qualitative research designs involving content analysis of in-depth interviews. An additional 229 studies investigated aspects of fatalism that were unrelated to health behavior. This massive literature increased the salience of the fatalism construct without empirically evaluating its impact on health related behaviors. Moreover, almost two-thirds of the empirical investigations that met our inclusion criteria reported at least one significant finding between fatalism and health behavior. Thus a cursory review of the evidence would leave investigators with the impression of a large and robust relationship between fatalism and health behavior. Ironically, more than two-thirds of the studies also reported at least one non-significant relationship between fatalism and health behavior, and the latter findings probably appeared less salient to investigators when informally assessing the fatalism-health behavior relationship.

The frequently proposed association between fatalism and health behavior rests on a common proposition: individuals believe that they are unable to influence the course of their own health or medical condition. This fatalistic orientation can arise for several reasons: 1) Individuals may believe that health and disease are largely products of luck; 2) Individuals may believe that specific diseases (e.g., cancer) are untreatable regardless of why they were initially contracted, resulting in a form of quiet resignation and pessimism; and 3) Individuals may belief that health and disease are products of divine control or predetermination. It is the latter belief that characterizes many recent speculations regarding the impact of fatalism on health

behavior. Numerous articles, for example, refer to the potential impact of cultural beliefs such as fatalismo on rates of cancer screening and related activities among Hispanics. Yet several investigators have recently cautioned against the uncritical acceptance of this proposition (e.g., Abraido-Lanza et al., 2007). The current findings contribute to this debate. We identified only four studies that explicitly investigated the relationship between a respondent's health behavior and their belief in destiny or divine control. Notably, the weighted average effect size was non-significant although the small number of studies precludes a rigorous test of the hypothesized relation between health behavior and destiny beliefs. However, the current findings question the wisdom of designing public health interventions that focus on changing beliefs in destiny or divine control. Such interventions are not supported by the current literature. Future research will need to determine when, if at all, such interventions would be effective.

Nine studies (comprising eleven samples and 11,602 participants) assessed the relation between health behavior and at least one of the following components of fatalism: pessimism, resignation, or belief in luck. The latter studies revealed a significant relationship between these three aspects of fatalism and health related behaviors. Here, too, however, the research is limited and additional studies are needed to identify which of the latter components of fatalism should be addressed in interventions.

The current review provides the largest summary to date of studies employing the pfi, and the findings contribute to the growing body of literature assessing the relation between cancer fatalism and cancer screening (Powe & Finnie, 2003). As predicted, higher pfi scores were associated with lower cancer screening rates. However, the studies do not reveal which aspects of cancer fatalism are associated with low screening rates. The pfi assesses several aspects of fatalism including predetermination, pessimism, fear, and perceived inevitability of death following a cancer diagnosis. Which of these aspects of cancer fatalism are associated with reduced cancer screening? Individuals, for example, may believe that a cancer diagnosis is a death sentence resulting from destiny or divine intervention. Alternatively, individuals may believe that a cancer diagnosis is a death sentence without also believing that the diagnosis is a result of destiny or divine intervention. Yet these two beliefs may be responsive to very different types of interventions. Future research needs to identify the components of fatalism are associated with health behavior. The latter knowledge should improve the efficacy of interventions that are designed to reduce fatalism and increase health promoting behavior.

Two questions remain unanswered by this review. First, the findings do not address the question of causality. Although our results reveal a small but significant relationship between fatalism and health behavior, the current findings do not indicate if fatalistic beliefs contribute to a reduction in health promoting behavior. Fatalistic

beliefs could accompany health threatening behaviors without contributing to them. Future research will need to identify the path by which fatalistic beliefs influence health related behaviors. Research addressing the latter issue should improve public health interventions that seek to reduce fatalistic beliefs and increase health promoting behavior.

Second, the review does not identify the components of fatalism that influence health behavior. Few studies, for example, explicitly investigated the impact of destiny beliefs on cancer screening, dietary choices, seat belt use, or related health behaviors; nor do most studies explicitly compare the impact of each component of fatalism (e.g., belief in destiny, belief in luck) on health related behavior. The absence of such research stems from the use of fatalism scales that either 1) include items that assess a single aspect of fatalism such as destiny beliefs, or 2) include items that assess multiple aspects of fatalism (e.g., belief in destiny, belief in luck) but yield a single summary score. The latter scales have helped to make important contributions to the field but neither type of scale permits a refined analysis of the link between health behavior and specific aspects of fatalism. Two new fatalism scales may address this gap in knowledge. Esparza and Wiebe (2009) and Shen, Condit & Wright (2009) developed measures of fatalism that yield sub-scores for several dimensions of fatalism, including ineluctable destiny, divine control, luck, and helplessness. Esparza and Wiebe's fatalism scale was developed simultaneously in English and Spanish in a sample of 862 participants; thus the scale may be particularly useful when investigating the impact of fatalistic beliefs on health behavior in Spanish and English speaking communities. More generally, such research should contribute to the development of effective interventions that seek to increase health promoting behavior.

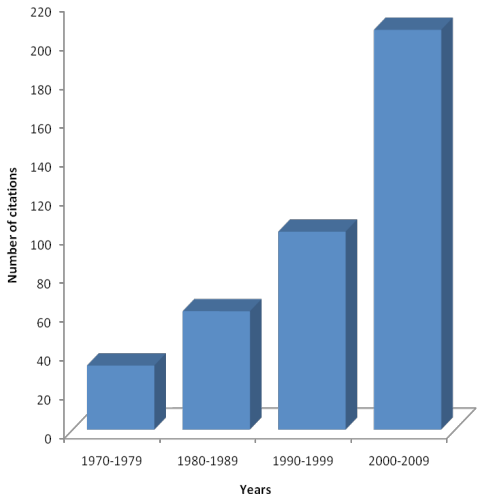

Figure 1. Citation count in Psychinfo for the term fatalism.

Table 1. Effect sizes and study characteristics.

Authors	N	Fatalism scale	Effect size	Health behavior	Effect size
Farmer et al. (2007)	193	pfi	.17	Mammogram: past year	.17
Greiner et al. (2005)	279	pfi	.90	Colorectal cancer screening	.90
Gorin (2005)	950	pfi	1.49	Colorectal cancer screening	1.49
Pines (2002)	90	pfi	-.21	Mammogram: past year	-.21
Lawsin et al. (2006)	111	pfi	.16	Adherence to fs screening guidelines	.16
	111	pfi	.03	Adherence to fobt screening guidelines	.03
Davis et al. (2002)	61a	pfi	.32	Adherence to acs guidelines for mammography	.32
	61a	pfi	.12	Adherence to acs guidelines for Pap test	.12
Russell et al. (2006)	175	pfi	-.01	Mammogram: prior year	-.01
Magai et al. (2004)	1364	pfi	-.01	Mammogram screening (10 years)	-.01
Powe (1995)	192	pfi	.14	Colorectal cancer screening	.14
Talbert (2007)	120	pfi	.52	Prior mammogram (yes/no)	.52
González (2007)	144	pfi	.74	Breast cancer knowledge score	.74
	139	pfi	.02	Breast self-exam: past month	.02
	137	pfi	.03	Breast self-exam: past year	.03
	138	pfi	.02	Time since last mammogram	.02
	136	pfi	-.02	Future mammogram intentions	-.02
	138	pfi	.01	Time since last Pap exam	.01
Dettenborn et al. (2004)	162	pfi	.00	Breast self-exam: past month	.00
	162	pfi	.00	Clinical breast exam: past year	.00
	162	pfi	.00	Mammogram: past year	.00
	162	pfi	.00	Pap smear: past year	.00
Bakos (2000)	75	pfi	.64	Diagnostic follow-up after inconclusive mammogram	.64
Mayo, Ureda & Parker (2001)	135a	pfi	.43	Mammogram: past 2 years	.43
	85a	pfi	-.20	Mammogram: past 2 years	-.20
Benjamin (1998)	43	pfi	.19	Genetic counseling (accept vs. decline)	.19
Powe (2001)	204	pfi	.62	Knowledge of colorectal cancer	.62
Powe, Hamilton & Brooks (2006)	361a	pfi	.49	Breast cancer knowledge	.49
	361	pfi	.28	Cervical cancer knowledge	.28

	353a	pfi	.00	Breast cancer knowledge	.00
	353	pfi	.00	Cervical cancer knowledge	.00
Henson et al. (2006)	1360	ztpi	.19	Smoking status (regular vs. non-smoker)	.19
	1107	ztpi	.55	Birth control: past three months	.55
	1093	ztpi	.05	Condom use: past three months	.05
	1568	ztpi	.42	Seat belt use: frequency	.42
	1568	ztpi	-.06	Drug use: past month	-.06
Davis (2000)	159	ztpi	.90	Safe sexual practices: past year	.90
	159	ztpi	.00	Pap smear during past year	.00
	159	ztpi	.00	Smoke detectors: past year	.00
	159	ztpi	.00	Monthly breast self-exams: past year	.00
	159	ztpi	.00	Clinical breast exam during past year	.00
	159	ztpi	.00	Exercise on a regular basis past year	.00
	159	ztpi	.00	Regularly modify diet: past year	.00
	159	ztpi	.00	Blood pressure check: past year	.00
	159	ztpi	.00	Cholesterol check: past year	.00
	159	ztpi	.00	Flu shot: past year	.00
	159	ztpi	.00	Regular safety belt use: past year	.00
	159	ztpi	.00	Annual physical: past year	.00
	159	ztpi	.00	Health behaviors composite: past year	.00
Flournoy (2002)	179	ztpi	.00	Prostate cancer diagnosed before symptoms	.00
	153	ztpi	.00	Cancer diagnosed due to yearlytest-ing	.00
	179	ztpi	.00	Cancer information seeking post diagnosis	.00
	176	ztpi	.00	Physical exam: past 3 years	.00
Kalichman et al. (1997)	117a	hftpi	-.17	Anal intercourse without condom: past six months	-.17
	238a	hftpi	.28	Anal intercourse without condom: past 6 months	.28
Somlai et al. (2000)	158	hftpi	.38	High risk behavior for hiv infection: past 3 months	.38
	158	hftpi	-.54	Problem drinking severity	-.54
	158	hftpi	.32	Marijuana use: frequency past 3 months	.32

	158	hftpi	.22	Crack/cocaine: frequency past 3 months	.22
Herold, Goodwin & Lero (1979)	486	rwfs	.00	Contraceptive use: last intercourse	.00
	486	rwfs	.00	Consistent use of birth control	.00
	486	rwfs	.00	Birth control pills: attitude	.00
	136	rwfs	.00	Ineffective vs. effective contraceptors	.00
Schlegel & Crawford	461	rwfs	.37	Hard liquor consumption: past year	.37
(1978)	461	rwfs	.36	Beer consumption: past year (yes/no)	.36
	461	rwfs	.52	Cigarette smoking: past year (yes/no)	.52
	461	rwfs	.36	Marijuana use: past year (yes/no)	.36
	461	rwfs	.07	Wine consumption: past year (yes/no)	.07
	461	rwfs	-.08	Barbiturate use: past year (yes/no)	-.08
	461	rwfs	.34	Heroin use: past year (yes/no)	.34
	461	rwfs	.12	Tranquilizers use: past year (yes/no)	.12
	461	rwfs	.09	Glue use: past year (yes/no)	.09
	461	rwfs	.18	Hallucinogens use: past year (yes/no)	.18
	461	rwfs	.17	Amphetamines use: past year (yes/no)	.17
Rothstein (1986)	54	rwfs	.70	Weight loss maintenance (yes/no)	.70
Randolph, Freeman & Freeman (2002)	406	macc-sf	.14	Pap smear: past 3 years	.14
Unger et al. (2002)	211	macc-sf	.12	Lifetime cigarettes use: frequency	.12
	211	macc-sf	.06	Lifetime alcohol use: frequency	.06
	211	macc-sf	.31	Lifetime heavy alcohol use: frequency	.31
	211	macc-sf	.23	Lifetime marijuana use: frequency	.23
	211	macc-sf	.11	Lifetime use 17 drugs: frequency	.11
Leal (1998)	80	macc-sf	.09	Regular exercise: frequency	.09
	80	macc-sf	.03	Healthy food choices: frequency	.03
	80	macc-sf	.67	Attending to basic health issues:frequency	.67
Bello (2000)	51	cpsi	-.49	Mammogram compliance recommended by doctor (at least once per year)	-.49
	51	cpsi	-.08	Delay seeking treatment: breast cancer symptoms	-.08
Springer (1998)	977	psi	.12	Pap test within past 3 years	.12

	977	psi	.06	Mammography: past 2 years	.06
	977	psi	.12	Preventive health exam (yes/no)	.12
	977	psi	.30	Knowledge: cervical cancer screening	.30
	977	psi	.20	Knowledge of breast cancer screening	.20
Byrd et al. (1999)	312	cfi	.32	Seatbelt use: self-reported frequency	.32
	312	cfi	.00	Observed seat belt use (one occasion)	.00
Gunnarsdottir et al. (2002)	169	bq ii	.42	Analgesic use (inadequate vs. adequate)	.42
Lange & Piette (2006)	452	bq ii	.00	HbA1c values	.00
Kupperman et al. (2006)	475a	ffs	.25	Prenatal genetic testing (yes/no)	.25
	203a	ffs	1.12	Prenatal genetic testing (yes/no)	1.12
Niederdeppe & Levy (2007)	5970	Unique	.19	Regular exercise: at least once per week	.19
	6045	Unique	.02	Smoking status (current vs. non-smoker)	.02
	5946	Unique	.13	Adherence to national five a day guidelines (consumes 5 daily servings of fruit and vegetable)	.13
Facione et al. (2002)	699	Unique	.95	Likelihood of seeking help: breast cancer symptoms (delay/non-delay)	.95
Schnoll et al. (2002)	74	Unique	.63	Smoking status (smokers vs. abstainers)	.63
	74	Unique	.46	Readiness to quit smoking (contemplation vs. action)	.46
Olmstead et al. (1991)	781	Unique	.10	Drug use: frequency past 12 months	.10
Ramírez et al. (2002)	1022	Unique	.66	hiv knowledge: transmission	.66
	1022	Unique	.41	Degree of family health communication	.41
Finlayson et al. (2005)	719a	Unique	.19	Children's tooth brushing: frequency past week (reported by mothers)	.19
	719	Unique	.23	Knowledge: child's oral hygiene	.23
	719	Unique	.19	Knowledge of appropriate bottle use for children ages 1-5	.19
	719a	Unique	.00	Oral health self-efficacy	.00
Hoyo et al. (2005)	128	Unique	1.04	Pap test: past 3 years	1.04

	135	Unique	.75	Pap test: past 3 years	.75
Michielutte et al. (1996)	1286	Unique	.18	Sunscreen use: past spring/summer	.18
	1286	Unique	1.30	Clinical skin exam past year	1.30
	1286	Unique	.34	Skin self-exam past year	.34
Parra et al. (2001)	413	Unique	-.26	Willingness for aids testing prior to pregnancy	-.26
	413	Unique	.06	aids testing during pregnancy	.06
Contreras-Tadych (2007)	195	Unique	.22	Exercise during a “normal week”	.22
	200	Unique	.40	Dietary behavior	.40
	81	Unique	-.22	Checked blood sugar levels: 1 per day vs. 3 per day	-.22
	197	Unique	.16	HbA1c scores	.16
	196	Unique	-.02	Fasting glucose levels	-.02
	189	Unique	-.16	Cholesterol score	-.16
Arlikatti (2006)	553	Unique	.00	Adoption: 16 earthquake prepared-ness actions	.00
	553	Unique	-.14	Adoption: 16 earthquake prepared-ness actions	-.14
Green et al. (2004)	892	Unique	.35	Breast exam (ever)	.35
	892	Unique	-.44	Pap smear (ever)	-.44
	892	Unique	- .03	Mammogram (ever)	-.03
	1249	Unique	.34	Blood pressure check: past 2 years	.34
	1249	Unique	.10	Cholesterol check (in past 5 years)	.10
	1249	Unique	.08	Drinking and driving	.08
	1249	Unique	.05	Eat high fiber foods	.05
	1249	Unique	.07	Eat high cholesterol foods	.07
	1249	Unique	-.08	Alcohol use	-.08
	1249	Unique	-.09	Physical activity	-.09
	1249	Unique	-.04	Smoking	-.04

Effect size = Hedges unbiased standardized mean difference; fs = flexible sigmoidoscopy; fobt = fecal occult blood testing; pfi = Powe Fatalism Inventory; ztpi = Zimbardo Time Perspective Inventory; hftpi = Heimberg Future Time Perspective Inventory; rwfs = Reid and Ware Fatalism Subscale; macc-sf = Cuéllar Multiphasic Assessment of Cultural Constructs Short Form-Fatalism Subscale; cpsi = Cuéllar and Pérez-Stable fatalism items; psi = Pérez-Stable fatalism items; cfi = Colón’s Fatalism Item; bq ii = Barriers Questionnaire ii; ffs = Faith or Fatalism Scale; Unique = author’s own unique fatalism assessment; a = independent samples within a single study. An expanded version of Table 1 is provided in the supplemental materials that are available on-line.

Table 2. Fatalism-health behavior effect sizes.

Health behavior	No. of es	n	FE Analysis	Q	RE Analysis
All behaviors	51a	25,167	0.21*	922.56	0.26*
Health screening	21a	7,954	0.39*	593.14	0.28*
Health promoting	10b	11,833	0.17*	24.78	0.15*
Health promoting & safety	12b	13,713	0.20*	47.76	0.17*
Health promoting, safety, & safe sexual	15b	14,554	0.19*	56.46	0.15*

practices					
Legal drugs	7b	6,045	0.06*	53.3	.11
Health knowledge	8b	3,548	0.40*	52.08	0.38*

No. of es = number of sample effect sizes in the analysis; n = total sample size; fe = fixed effects; re = random effects; * = $p < 0.05$; a = independent effect sizes; b = non-independent effect sizes.

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References contributing data to the meta-analysis are available as supplemental materials.

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Supplemental material 1

Fatalism scales: sample items and internal consistency

Fatalism scales. Twenty-three fatalism scales were used in studies that contributed data to the meta-analysis. Below is a description of each scale, sample items, and Cronbach alpha information.

Arlikatti Fatalism Assessment (Arlikatti, 2006). The Arlikatti assessment was comprised of two items assessing the perception of 1) luck or chance, and 2) God's will determining their safety in an earthquake. Sample items were not provided. Response options were based on a five point Likert format ("Not at all" to "Very great extent"). Each item was administered as a separate index of fatalism.

Barriers Questionnaire ii-Fatalism Subscale (Gunnarsdottir et al., 2002). The Fatalism Subscale was comprised of three items assessing fatalistic beliefs regarding the inevitability of cancer pain. Sample items were not provided. Response options were based on a six point Likert format ("Do not agree at all" to "Agree very much"). The internal consistency of the scale was 0.79 in the study sample.

The Colón assessment was comprised of a single item assessing belief in destiny. Item: "There is no point in using seat belts since you can't change your destiny." Response options were based on a seven point Likert scale ("Strongly disagree" to "Strongly agree").

Diabetes Self-Efficacy Scale for Latinos (dsel): Fatalism Subscale (Contreras-Tadych, 2007). The Fatalism Subscale is comprised of nine items that assess the

belief that "events are pre-determined, by fate, and therefore people have no ability to change and consequently no control over their destiny" (p. 82). Sample items: "I believe that I do not have much control over the important things in my life" and "I believe God has control over my life (and my diabetes) and what will happen to me is whatever God wants." Response options were based on a seven point Likert format ("Strongly agree" to "Strongly disagree"). The internal consistency of the scale was 0.48 in the study sample.

Facione's Fatalism Assessment (Facione et al., 2002). The Facione assessment was comprised of six items assessing breast cancer fatalism. Sample items: "If anyone is going to get breast cancer, it will probably be me" and "If I found a lump, I'd think to myself… well, I have to die of something." Response options were based on a five point Likert scale ranging from "Definitely true" to "Definitely false". The internal consistency of the scale was 0.74 in the study sample.

Faith or Fatalism Scale (Kupperman et al., 2006). The Fatalism Scale was comprised of four items "measuring cultural, religious, and fatalistic attitudes toward prenatal testing and birth outcomes" (p. 1088). Sample item: "There is no point in having prenatal screening because you can't change your destiny" and "God would not more than I can handle." Response options were based on a five point Likert format ("Strongly agree" to "Strongly disagree"). The internal consistency of the items was not reported.

Finlayson's Fatalism Assessment (Finlayson et al., 2005). The Finlayson assessment was comprised of a single item assessing oral health fatalism and the inevitability of developing dental caries. Item: "Most children eventually develop dental cavities." Response options were based on a five point Likert format ("Strongly agree" to "Strongly disagree").

Harrell's Fatalism Assessment (Harrell, 1995). The Harrell assessment was comprised of twelve items assessing accident farm safety attitudes and fatalism. Sample item: "Farmers who are actively involved in their operations will invariably have an accident." Response options were based on a seven point Likert scale ranging from "Strongly disagree" to "Strongly agree". The internal consistency of the scale was not reported.

Heimberg Future Time Perspective Inventory-Rejection of Fatalism Subscale (Heimberg, 1963). The Heimberg assessment was comprised of ten items assessing fatalistic views regarding the future. Sample items: "I feel there is a kind of fate or destiny in my life" and "Sometimes I feel there is nothing new to look forward in the future." Response options were based on a seven point Likert scale ("Completely disagree" to "Completely agree"). The internal consistency of the scale was 0.70 in the study sample. The internal consistency of the scale was 0.65 in the study sample.

Hoyo's Fatalism Assessment (Hoyo et al., 2005). The Hoyo assessment was comprised of three items assessing the degree to which respondents "perceived a lack of social support networks in case of illness" (p. 440). Sample item: "Afraid, I do not know what they will find during the screening" and "No family support, and can't get sick". Response options were dichotomous ("No", "Yes"). The internal consistency of the items was not reported.

Lange's Fatalism Assessment (Lange & Piette, 2006). The Lange assessment was comprised of two items assessing the degree to which diabetic respondents believed that "their illness is largely dependent on chance or fate and that there is little they can do to personally improve their diabetes-related health status." Sample item: Not available. Response options were based on a five point Likert format ("Strongly disagree" to "Strongly agree"). The internal consistency of the scale was 0.77 in the current sample.

Michielutte's Fatalism Assessment (Michielutte et al., 1996). The Michielutte assessment was comprised of a single item assessing fatalism regarding the chances of curing cancer. Item: "If I have cancer, it can't be cured anyway, so why bother to check." Response options were not provided in the report.

Multiphasic Assessment of Cultural Constructs Short Form-Fatalism Subscale (macc-sf; Cuéllar, Arnold & González, 1995). The Fatalism Subscale was comprised of eight items assessing inevitability and mastery. Sample items: "It is not always wise to plan too far ahead because many things turn out to be a matter of good and bad fortune anyway" and "It doesn't do any good to try to change the future because the future is in the hands of God." Response options were dichotomized ("True", "False"). The internal consistency of the scale was 0.63 in the study sample.

Neff's Fatalism Assessment (1994). The Neff assessment was comprised of seven items assessing a respondent's perceived ability to control events affecting their lives. Items were originally developed by Chandler (1979) and Pearlin and Schooler (1978). Sample items and response options were not provided. Internal consistency ranged from .71 to .74 in the study samples.

Niederdeppe's Fatalism Assessment (Niederdeppe & Levy, 2007). The Niederdeppe assessment was comprised of three items assessing pessimism, helplessness, and confusion. Sample items: "There's not much people can do to lower their chances of getting cancer" and "It seems like almost everything causes cancer." Response options were based on a five point Likert scale ("Strongly disagree" to "Strongly agree"). Inter-correlations among the item scores was less than 0.22.

Olmstead Fatalism's Assessment (Olmstead et al., 1991). The Olmstead assessment was comprised of four items assessing personal control over the events in one's life. Sample items: "Good luck is more important than hard work for success"

and "People who accept their condition in life are happier than those who try to change things." Response options were based on a five point scale (verbal anchors were not reported). The internal consistency of the scale was not reported.

Parra's Fatalism Assessment (Parra et al., 2001). The Parra assessment was comprised of a single item assessing why pregnant women would not seek out hiv testing. Sample item: "I believe that my health is entirely in God's hands." Response options were dichotomized ("Agree", "Disagree").

Powe Fatalism Inventory (Powe, 1995). The Powe inventory is comprised of fifteen items that assess four components of cancer fatalism: predetermination, pessimism, fear, and inevitability of death. Sample items: "I believe if someone gets cancer, it was meant to be" and "I believe if someone gets cancer, their time to die is near." Response options were dichotomized ("No", "Yes"). The internal consistency of the scale was 0.84 in the study sample.

Ramírez's Fatalism Assessment (Ramírez et al., 2002). The Ramírez assessment was comprised of nine items assessing the degree to which respondents "felt HIV infection was the result of fate rather than volitional behavior." Sample item: "aids is a punishment from God." Response options were based on a five point Likert format. The internal consistency of the scale was 0.73 for the study sample.

Reid and Ware Internal-External Control Scale-Fatalism Subscale (Reid & Ware, 1974). The Reid and Ware assessment was comprised of twelve items assessing the perceived role of luck, fate, and fortune in determining a person's outcome. Sample item: a) "I often realize that despite my best efforts some outcomes seem to happen as if fate planned it that way" versus b) "The misfortunes and successes I have had were the direct result of my own behavior." Response options were presented in a forced choice format as indicate above. The internal consistency of the scale was 0.76 in the study sample.

Schnoll Fatalism's Assessment (Schnoll et al., 2002). The Schnoll assessment was comprised of five items assessing fatalistic beliefs about health and quitting smoking. Sample item: "Nothing that I do will make a difference with regard to my current health." Response options were based on a five point Likert scale ranging from "Definitely true" to "Definitely false". The internal consistency of the scale was 0.70 in the study sample.

Springer's Fatalism Assessment (Springer, 1998). The Springer assessment was comprised of three items assessing fatalistic attitudes about cancer. Sample items: "Is there very little one can do to prevent cancer?" and "Is cancer like getting a death sentence?" Response options were dichotomized ("No", "Yes"). The internal consistency of the measure was 0.56 in the current sample.

Zimbardo Time Perspective Inventory-Present Fatalism Subscale (Zimbardo & Boyd, 1999). The Zimbardo inventory is comprised of ten items that assess attitudes towards the future that are fatalistic, helpless, and hopeless. Sample items: "Since whatever will be will be, it doesn't really matter what I do" and "You can't really plan for the future because things change so much." Response options were based on a five point Likert scale ("Very uncharacteristic" to "Very characteristic"). The internal consistency of the subscale was 0.74 in the study sample.

Supplemental material 2

Table 1 extended. Effect sizes and study characteristics.

Authors	Sample size	Mean age (sd) and age range	Fatalism scale	Health behavior	Behavioral category	Effect size (Hedges gu)	p-value
Farmer et al. (2007)	193	42 (17.04)	Powe fi	Mammogram screening during prior year	Screening	.17	.2426
Greiner et al. (2005)	279	≥ 40	Powe fi	Colorectal cancer screening (fobt cards returned)	Screening	.90	.0500
Gorin (2005)	950	56.8 (6.12)	Powe fi	Colorectal cancer screening (fobt kit completed after recruitment)	Screening	1.49	.0100
Pines (2002)	90	≥ 40	Powe fi	Mammogram screening during prior year	Screening	-.21	.3647
Lawsin et al. (2006)	111	63 51 to 92	Powe fi	Adherence to fs screening guidelines (fs once in past 5 years)	Screening	.16	.5810
	111		Powe fi	Adherence to fobt screening guidelines (once in past year)	Screening	.03	.8760
Davis et al. (2002)	61a	42 (17.04)	Powe fi	Adherence to acs guidelines for mammography screening	Screening	.32	.0800
	61a		Powe fi	Adherence to acs guidelines for Pap test	Screening	.12	.0400
Russell et al. (2006)	175	60.2 (12.3) 40 to 97	Powe fi	Mammogram screening during prior year	Screening	-.01	.5000
Magai et al. (2004)	1364	59.3 (6.5) 50 to 70	Powe fi	Mammogram screening (5 or more during past 10 years)	Screening	-.01	.5000

Powe (1995)	192	76 (7.89) 59 to 107	Powe fi	Colorectal cancer screening (fobt kit completed after re-cruitment)	Screening	.14	.0017
Talbert (2007)	120	44.5 (7.0) ≥ 35	Powe fi	Prior mammogram (yes/no)	Screening	.52	.0010
González (2007)	144	49.5 (8.5) 40 to 76	Powe fi	Breast Cancer Knowl-edge Test scores	Knowledge scores	.74	.0001
	139		Powe fi	Breast self-exam during past month	Screening	.02	.6400
	137		Powe fi	Breast self-exam during past year	Screening	.03	.1000
	138		Powe fi	Time since last mam-mogram	Screening	.02	.4700
	136		Powe fi	Future mammogram intentions (weeks to years)	Screening	-.02	.1100
	138		Powe fi	Time since last Pap exam	Screening	.01	.6200
Dettenborn et al. (2004)	162	48 21 to 92	Powe fi	Breast self-exam during past month (yes/no)	Screening	.00	.5000
	162		Powe fi	Clinical breast exam during past year (yes/no)	Screening	.00	.5000
	162		Powe fi	Mammogram during past year (yes/no)	Screening	.00	.5000
	162		Powe fi	Pap smear during past year (yes/no)	Screening	.00	.5000
Bakos (2000)	75	52 (11.0) 29 to 85	Powe fi	Diagnostic follow-up after inconclusive mammogram (yes/no)	Other health behaviors	.64	.0050
Mayo, Ureda & Parker (2001)	135a	50 to 70+	Powe fi	Mammogram during past two years	Screening	.43	.0200
	85a	50 to 70+	Powe fi	Mammogram during past two years	Screening	-.20	.2000
Benjamin (1998)	43	na	Powe fi	Genetic counseling (accept vs. decline)	Other health behaviors	.19	.6200
Powe (2001)	204	75 (8.7) 50 to 99	Powe fi	Knowledge of colorec-tal cancer	Knowledge scores	.62	.0001
Powe, Hamilton & Brooks (2006)	361a	36.2 (13.7)	Powe fi	Breast cancer knowl-edge	Knowledge scores	.49	.0001
	361		Powe fi	Cervical cancer knowl-edge	Knowledge scores	.28	.0120
	353a	22.6 (5.2)	Powe fi	Breast cancer knowl-edge	Knowledge scores	.00	.5000
	353		Powe fi	Cervical cancer knowl-edge	Knowledge scores	.00	.5000

Henson et al. (2006)	1360	19.3 (1.0)	Zimbardo tpi	Smoking status (regular vs. non-smoker)	Legal drug use	.19	.0500
	1107		Zimbardo tpi	Birth control use during past three months	Risky sexual behavior	.55	.0500
	1093		Zimbardo tpi	Condom use during past three months	Risky sexual behavior	.05	.5000
	1568		Zimbardo tpi	Frequency of seat belt use	Seat belt use	.42	.0500
	1568		Zimbardo tpi	Drug use — past month	Unspecified drug use	-.06	.5000
Davis (2000)	159	49.8 (8.2) 35 to 64	Zimbardo tpi	Safe sexual practices on a regular basis during past year (yes/no)	Risky sexual behavior	.90	.0010
	159		Zimbardo tpi	Pap smear during past year (yes/no)	Screening	.00	.5000
	159		Zimbardo tpi	Smoke detectors in home during past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Monthly breast self-exams performed during past year (yes/no)	Screening	.00	.5000
	159		Zimbardo tpi	Clinical breast exam during past year (yes/no)	Screening	.00	.5000
	159		Zimbardo tpi	Exercise on a regular basis during the past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Attempt to modify diet on a regular basis during the past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Blood pressure check during the past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Cholesterol checked during the past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Flu shot during the past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Safety belts used on a regular basis during the past year (yes/no)	Seat belt use	.00	.5000
	159		Zimbardo tpi	Annual physical during the past year (yes/no)	Health promoting behavior	.00	.5000
	159		Zimbardo tpi	Composite of health behaviors during the past year	Other health behaviors	.00	.5000
Flournoy (2002)	179	70.4 48.1 to 95.4 (Total sample)	Zimbardo tpi	Prostate cancer diagnosed before symptoms	Screening	.00	.5000
	153	Same as above —not sub-samples	Zimbardo tpi	Cancer diagnosed due to yearly testing vs. cancer symptoms	Screening	.00	.5000

	179	Check same as above	Zimbardo tpi	Cancer information seeking after diagnosis	Knowledge scores	.00	.5000
	176	Check same as above	Zimbardo tpi	Physical exam during the past 3 years	Health promoting behavior	.00	.5000
Kalichman et al. (1997)	117a	33.2 (8.2) Total sample — not subsample	Heimberg's ftpi	Engaged in anal intercourse without using a condom during the past six months	Risky sexual behavior	-.17	.3550
	238a	Total sample — not subsample	Heimberg's ftpi	Engaged in anal intercourse without using a condom during the past six months	Risky sexual behavior	.28	.0500
Somlai et al. (2000)	158	32.5 (8.9)	Heimberg's ftpi	High risk behavior for hiv infection during the past three months (multiple partners, non-use of condoms, iv drug use, treated for std)	Risky sexual behavior	.38	.0200
	158		Heimberg's ftpi	Problem drinking severity (cage scores)	Legal drug use	-.54	.0100
	158		Heimberg's ftpi	Frequency of marijuana use during the past three months	Illicit drug use	.32	.0500
	158		Heimberg's ftpi	Frequency of crack/ cocaine use during the past three months	Illicit drug use	.22	.5000
Herold, Goodwin & Lero (1979)	486	17.4 13 to 20	Reid & Ware fs	Contraceptive use during last intercourse	Risky sexual behavior	.00	.5000
	486		Reid & Ware fs	Consistent use of birth control	Risky sexual behavior	.00	.5000
	486		Reid & Ware fs	Attitude towards using birth control pills	Risky sexual behavior	.00	.5000
	136		Reid & Ware fs	Ineffective vs. effective contraceptors (subjects who never used contraception and present for pregnancy testing vs. subjects who were present to renew birth control prescriptions)	Risky sexual behavior	.00	1.0000
Schlegel & Crawford (1978)	461	16.7 14 to 20	Reid & Ware fs	Hard liquor consumption during the past year (yes/no)	Legal drug use	.37	.0100
	461		Reid & Ware fs	Beer consumption during the past year (yes/no)	Legal drug use	.36	.0100
	461		Reid & Ware fs	Cigarette smoking during the past year (yes/no)	Legal drug use	.52	.0100

	461		Reid & Ware fs	Marijuana used during the past year (yes/no)	Illicit drug use	.36	.0100
	461		Reid & Ware fs	Wine consumption during the past year (yes/no)	Legal drug use	.07	.5000
	461		Reid & Ware fs	Barbiturate use during the past year (yes/no)	Illicit drug use	-.08	.5000
	461		Reid & Ware fs	Heroin used during the past year (yes/no)	Illicit drug use	.34	.5000
	461		Reid & Ware fs	Tranquilizers used during the past year (yes/no)	Illicit drug use	.12	.5000
	461		Reid & Ware fs	Glue used during the past year (yes/no)	Legal drug use	.09	.5000
	461		Reid & Ware fs	Hallucinogens used during the past year (yes/no)	Illicit drug use	.18	.5000
	461		Reid & Ware fs	Amphetamines used during the past year (yes/no)	Illicit drug use	.17	.5000
Rothstein (1986)	54	44.8 21 to 70	Reid & Ware fs	Weight loss maintenance (yes/no)	Other health behaviors	.70	.0500
Randolph, Freeman & Freeman (2002)	406	50 to 74	Cuéllar macc-sf	Pap smear during the past 3 years	Screening	.14	.1500
Unger et al. (2002)	211	17.1 (0.7) 16 to 18	Cuéllar macc-sf	Frequency of life time cigarettes use	Legal drug use	.12	1.0000
	211		Cuéllar macc-sf	Frequency of lifetime alcohol use	Legal drug use	.06	1.0000
	211		Cuéllar macc-sf	Frequency of lifetime heavy alcohol use (5 or more drinks per day)	Legal drug use	.31	1.0000
	211		Cuéllar macc-sf	Frequency of lifetime marijuana use	Illicit drug use	.23	1.0000
	211		Cuéllar macc-sf	Frequency of lifetime of 17 drugs (excluding tobacco, alcohol & marijuana)	Unspecified drug use	.11	1.0000
Leal (1998)	80	67.9 (5.3) 60 to 85	Cuéllar macc-sf	Frequency of regular exercise	Health promoting behavior	.09	.5000
	80		Cuéllar macc-sf	Frequency of making healthy food choices	Health promoting behavior	.03	.5000
	80		Cuéllar macc-sf	Frequency of attending to basic health issues (Health Responsibility Scale)	Other health behaviors	.67	.0100
Bello (2000)	51	45 16 to 77	Cuéllar and Pérez-Stable fi	Mammogram compliance recommended by doctor (at least once per year)	Screening	-.49	.0900

	51		Cuéllar and Pérez-Stable fi	Delay (weeks) seeking treatment for breast cancer symptoms	Other health behaviors	-.08	.7600
Springer (1998)	977	20 to 74	Pérez-Stable fi	Pap test within the past 3 years	Screening	.12	.5000
	977		Pérez-Stable fi	Mammography during the past 2 years	Screening	.06	.5000
	977		Pérez-Stable fi	Preventive health exam "Do you go to the doctor for check-ups when you are well?" (yes/no)	Health promoting behavior	.12	.5000
	977		Pérez-Stable fi	Knowledge of cervical cancer screening	Knowledge scores	.30	.0010
	977		Pérez-Stable fi	Knowledge of breast cancer screening	Knowledge scores	.20	.0100
Byrd et al. (1999)	312	35 (median) 13 to 83	Colón's fi	Self-reported frequency of seat belt use	Seat belt use	.32	.0070
	312		Colón's fi	Observed seat belt use (single occasion)	Seat belt use	.00	1.0000
Gunnarsdottir et al. (2002)	169	55.1 (11.6)	Barriers Question-naire ii	Analgesic use (inadequate vs. adequate) assessed by the Pain Management Index (Zelman et al., 1987)	Other health behaviors	.42	.0100
Lange & Piette (2006)	452	60.3 (11.0)	Barriers Question-naire ii	HbA1c values	Other health behaviors	.00	1.0000
Kupperman et al. (2006)	475a	28 (0.2) < 35	Faith or Fatalism Scale	Prenatal genetic testing (yes/no)	Other health behaviors	.25	.0460
	203a	38.3 (0.14) ≥ 35	Faith or Fatalism Scale	Prenatal genetic testing (yes/no)	Other health behaviors	1.12	.0001
Niederdeppe & Levy (2007)	5970	45.2 (17.4)	Unique fatalism item	Engages in regular sweat producing exercise at least once per week	Health promoting behavior	.19	.0010
	6045		Unique fatalism item	Smoking status (current smoker vs. non-smoker)	Legal drug use	.02	.5000
	5946		Unique fatalism item	Adherence to national five a day guidelines (Consumes 5 daily servings of fruit and vegetable)	Health promoting behavior	.13	.0500

Facione et al. (2002)	699	47.0 (15.0) 19 to 99	Unique fatalism items	Likelihood of seeking help if found breast cancer symptoms (delay/non-delay)	Other health behaviors	.95	.0010
Schnoll et al. (2002)	74	5 7 (12.0)	Unique fatalism items	Smoking status (smokers vs. abstainers)	Legal drug use	.63	.0100
	74		Unique fatalism items	Stage of change (contemplation vs. action) regarding readiness to quit smoking	Legal drug use	.46	.0500
Olmstead et al. (1991)	781	Last year of high school	Unique fatalism items	Frequency of drug use during the past 12 months (tobacco, alcohol, cannabis, cocaine, lsd, amphetamines, other hard drugs)	Unspecified drug use	.10	1.0000
Ramírez et al. (2002)	1022	35.48	Unique fatalism items	hiv knowledge regarding transmission and related issues	Knowledge scores	.66	.0100
	1022		Unique fatalism items	Degree of family health communication	Other health behaviors	.41	.0100
Finlayson et al. (2005)	719a	na (adult parents)	Unique fatalism item	Frequency of children's tooth brushing (reported by mothers) during the past week	Other health behaviors	.19	.0100
	719		Unique fatalism item	Knowledge of children's oral hygiene	Knowledge scores	.23	.0001
	719		Unique fatalism item	Knowledge of appropriate bottle use for children ages 1-5	Knowledge scores	.19	.0100
	719a		Unique fatalism item	Oral health self-efficacy	Other health behaviors	.00	1.0000
36a Hoyo et al. (2005)	128	45 to 65	Unique fatalism item	Cervical cancer screening adherence (Pap test within 3 years preceding the study)	Screening	1.04	.0010
	135		Unique fatalism item	Cervical cancer screening adherence (Pap test within 3 years preceding the study)	Other health behaviors	.75	.0060
Michielutte et al. (1996)	1286	20 to 60+	Unique fatalism item	Sunscreen use during previous spring/summer (yes/no)	Health promoting behavior	.18	.2700

	1286		Unique fatalism item	Clinical skin exam during the past year (yes/no)	Screening	1.30	.0200
	1286		Unique fatalism item	Skin self-exam during the past year (yes/no)	Screening	.34	.0800
Parra et al. (2001)	413	23.5 (6.1)	Unique fatalism item	Willingness to take and aids test prior to pregnancy	Other health behaviors	-.26	.5000
	413		Unique fatalism item	aids testing during pregnancy	Other health behaviors	.06	.5000
Contreras-Tadych (2007)	195	52.6 (12.5) 23 to 80 Total sample	Unique fatalism items	Exercise during a "normal week" (days per week for 20 minutes per day)	Health promoting behavior	.22	.5000
	200	ibid	Unique fatalism items	Dietary behavior ("I eat whatever I want")	Health promoting behavior	.40	.0200
	81		Unique fatalism items	Checked blood sugar levels once per day vs. 3 times per day	Other health behaviors	-.22	.3500
	197		Unique fatalism items	HbA1c scores	Other health behaviors	.16	.5000
	196		Unique fatalism items	Fasting glucose levels	Other health behaviors	-.02	.5000
	189		Unique fatalism items	Cholesterol score	Other health behaviors	-.16	.5000
Arlikatti (2006)	553	50.2	Unique fatalism item	Adoption of 16 earthquake emergency preparedness actions	Other health behaviors	.00	.5000
	553		Unique fatalism item	Adoption of 16 earthquake emergency preparedness actions	Other health behaviors	-.14	.5000
Green et al. (2004)	892.0	18 to 65+	Unique fatalism item	Breast exam (ever)	Screening	.35	.0500
	892.0		Unique fatalism item	Pap smear (ever)	Screening	-.44	.0500
	892.0		Unique fatalism item	Mammogram (ever)	Screening	-.03	.5000
	1249		Unique fatalism item	Blood pressure check (in past 2 years)	Health promoting behavior	.34	.0500
	1249		Unique fatalism item	Cholesterol check (in past 5 years)	Health promoting behavior	.10	.5000

	1249		Unique fatalism item	Drinking and driving	Other health behaviors	.08	.5000
	1249		Unique fatalism item	Eat high fiber foods	Health promoting behavior	.05	.5000
	1249		Unique fatalism item	Eat high cholesterol foods	Health promoting behavior	.07	.5000
	1249		Unique fatalism item	Alcohol use	Legal drug use	-.08	.5000
	1249		Unique fatalism item	Physical activity	Health promoting behavior	-.09	.5000
	1249		Unique fatalism item	Smoking	Legal drug use	-.04	.5000

fs = flexible sigmoidoscopy; fobt = fecal occult blood testing; Powe fi = Powe Fatalism Inventory; Zimbardo tpi = Zimbardo Time Perspective Inventory; Heimberg's ftpi = Heimberg's Future Time Perspective Inventory; Reid & Ware fs = Reid & Ware Fatalism Subscale; Cuéllar macc-sf = Cuéllar Multiphasic Assessment of Cultural Constructs Short Form- Fatalism Subscale; Cuéllar and Pérez-Stable fi = Cuéllar and Pérez-Stable fatalism items; Colón's fi = Colón's fatalism item; Pérez-Stable fi = Pérez-Stable fatalism items; a = independent samples within a single study.

Supplemental material 3

Meta-analysis references

Citations without an asterisk provided effect size data for the meta-analysis. Citations with a single asterisk served as the original source for several fatalism scales.

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