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Fatalism Moderates the Relationship Between Family History of Cardiovascular Disease and Engagement in Health-Promoting Behaviors Among At-Risk Rural Kentuckians

Gia Mudd-Martin, PhD;[1] Mary Kay Rayens, PhD;[1] Terry A. Lennie, PhD;[1] Misook L. Chung, PhD;[1] Yevgeniya Gokun, MS;[1] Amanda T. Wiggins, PhD;[1] Martha J. Biddle, PhD;[1] Alison L. Bailey, MD;[2] M. J. Novak, PhD;[3] Baretta R. Casey, MD, MPH;[4] & Debra K. Moser, DNSc[1]

1 College of Nursing, University of Kentucky, Lexington, Kentucky
2 Division of Cardiovascular Medicine, Gill Heart Institute, University of Kentucky, Lexington, Kentucky
3 College of Dentistry, University of Kentucky, Lexington, Kentucky
4 College of Public Health, University of Kentucky, Lexington, Kentucky

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For further information, contact: Gia Mudd-Martin, PhD, MPH, RN, University of Kentucky College of Nursing; 533 College of Nursing Building, 760 Rose Street, Lexington, KY 40536-0232; e-mail: Gia.Mudd@uky.edu.

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Abstract

Purpose: In rural communities that experience high rates of cardiovascular disease (CVD) morbidity and mortality, family history education may enhance risk awareness and support engagement in healthy behaviors but could also engender fatalism. This study was conducted to assess if the relationship between family history and adherence to healthy lifestyle behaviors is moderated by fatalism.

Methods: Baseline data were obtained from 1,027 adult participants in the HeartHealth in Rural Kentucky study. Multiple linear regression was used to determine whether fatalism moderated the relationship between high-risk family history of CVD and adherence to healthy lifestyle behaviors, controlling for sociodemographic variables and CVD risk factors. The relationship between family history and healthy behaviors was assessed for subgroups of participants divided according to the upper and lower quartiles of fatalism score.

Findings: The relationship between high-risk family history of CVD and adherence to healthy behaviors was moderated by fatalism. Among those with the highest quartile of fatalism scores, high-risk family history predicted greater adherence to healthy behaviors, while among those in the lowest quartile, and among those with the middle 50% of fatalism scores, there was no association between family history and healthy behavior scores.

Conclusions: Family history education can provide people at increased risk for CVD important information to guide health practices. This may be particularly relevant for those with a high degree of fatalistic thinking. In rural communities with limited health resources, family history education, combined with assessment of fatalism, may support better targeted interventions to enhance engagement in healthy behaviors.

Key words cardiovascular disease, family history, fatalism, health behaviors, rural health.

Kentucky has the sixth highest rate of cardiovascular disease (CVD)-related mortality among US states and the highest prevalence of CVD risk factors, with 46.2% of the population having 2 or more risk factors.[1] Reflecting national trends,[2,3] rural Kentuckians experience a greater burden of CVD risk as well as higher rates of CVD morbidity and mortality than urban residents of the state.[4] Recent results from the Kentucky

Behavioral Risk Factor Surveillance System[5] exemplify these disparities, with 4.5% of US adults and 6.6% of adults in Kentucky reporting ever having had a heart attack compared to 7.8% of adults in the 9-county Pennyrile region of rural western Kentucky and 10.5% in the 8-county Cumberland Valley region of rural southeastern Kentucky. The percentage of adults who report ever having had a stroke is also significantly higher in Kentucky (5.5%) than in the United States (2.9%), with the highest rates in rural counties of the state (ie, 5.1% in the Pennyrile region and 5.7% in Cumberland Valley).

The etiology of many cardiovascular diseases is multifactorial, stemming from complex interactions among lifestyle behaviors, health factors, environmental factors, and genes. There is consistent evidence that unhealthy lifestyle behaviors including poor dietary patterns, physical inactivity and smoking,[6,7] along with health factors including hypertension, dyslipidemia, and hyperglycemia[8] are major contributors to CVD risk. Risk factor prevalence is higher in Kentucky than in the United States, with the highest rates in rural communities. For example, compared to 27.6% of adults nationally, 31.3% of Kentucky adults report being obese (body mass index [BMI] $\geq$30.0); in rural Western and Southeastern Kentucky counties, more than 34% of adults report being obese. Similarly, higher rates are reported for smoking and participation in leisure-time physical activity among rural Kentuckians.[5] As in many US rural populations,[3] rates of CVD among rural Kentuckians are also influenced by socioeconomic disparities including low levels of income, lack of insurance, and limited health care access.[9]

More recently, genetic contributions to CVD have been identified including polymorphisms that act independently of[10-13] and interdependently with lifestyle behaviors and health factors.[14-16] Genetic susceptibility and interactions with these factors are reflected in family history.[17,18] People with high-risk family history of CVD, defined as premature disease occurrence in 1 or more first-degree relatives, have significantly higher personal risk for CVD independent of other conventional risk factors.[18-21] In clinical practice, screening for family history risk can complement other risk factor screenings. The use of CVD family history to guide preventive treatment is recommended in national guidelines.[22-25] In rural communities with limited health care resources, family history may be of particular value, providing an inexpensive, accessible tool to identify risk and guide preventive intervention.[26]

Although family history information can potentially improve health outcomes of rural populations, there is concern that people who attribute disease risk to family history may interpret susceptibility as nonmodifiable, engendering fatalism that can lessen adherence to healthy lifestyle behaviors.[27,28] Fatalism has been conceptualized as a sense of lack of control and powerlessness over health and illness[29-32] or, specific to cancer, as a belief in the inevitability of death in the presence of cancer.[33] Studies in which disease-specific fatalism has been measured have shown fatalistic thinking to be negatively correlated with adherence to health behaviors related to both cancer[34,35] and diabetes.[36,37] Congruent with prominent models of behavior change,[38-41] these findings indicate fatalism is a significant barrier to adherence.

In accord with the Health Belief Model (HBM), people will engage in healthy behavior if they perceive themselves to be susceptible to a disease and the consequences of the disease to be severe; if they perceive that benefits of the behavior are greater than barriers; and if they are confident in their ability to engage in the behavior (perceived self-efficacy).[41] Having high-risk family history enhances perceived susceptibility to disease[42-44] while fatalism has been associated with higher perceived barriers.[45,46] It could be hypothesized that although having a high-risk family history increases perceived susceptibility and therefore healthy behavior adherence, fatalism may moderate this relationship.

Better understanding of associations among family history, healthy lifestyle behaviors, and potential psychosocial moderators such as fatalism can facilitate development of effective CVD risk reduction interventions and strategies to improve the health of at-risk rural populations. In this study, we examined these associations in a large community-based sample in rural Kentucky. Specifically, the purpose of this study was to assess whether fatalism moderates the relationship between family history and adherence to healthy lifestyle behaviors.

Methods

Design and Sample

The data were from self-reported and clinical measurements collected at baseline during the HeartHealth in Rural Kentucky intervention study, heretofore referred to as the HeartHealth study. The study was conducted to test effectiveness among rural Kentuckians of a CVD risk-reduction intervention through the promotion of self-care. This was a 2-phase study. Phase 1 was a wait-list crossover randomized controlled trial conducted in rural counties in southeastern Kentucky from 2009 to 2010. In phase 2, conducted from 2010 to 2012, a single-group pretest–posttest design was used to examine effectiveness of the intervention in a larger sample that included participants from rural counties across the state. Rural counties were defined as those that met all definitions of rural as outlined by Coburn and colleagues[47] and by

the US Department of Agriculture (USDA) Economic Research Service.[48] Specifically, they were counties located outside the Census Places and Census Urban Areas, met the Office of Management and Budget definition of rural (ie, nonmetropolitan) counties, and were designated as rural in accord with USDA Economic Research Service rural-urban commuting area codes 4-10.[48] In each phase, socioculturally responsive educational sessions presented to participants addressed nutrition, physical activity, appropriate medication management, and stress reduction. Following principles of community-based participatory research, feedback from lay and health professional community members obtained during preliminary work was used to guide development of an intervention responsive to prevalent barriers to cardiovascular health in rural Kentucky as well as to integrate common strengths.[49] For example, to address the common barrier of inaccessibility to fresh, low-cost fruits and vegetables, nutritional education integrated preparation of healthy meals using readily available local food items. The intervention was also provided in small group settings, building on strong social networks in the communities.

Participants were community-dwelling residents 18 years of age or older who had 2 or more risk factors for CVD. Risk factors included sedentary lifestyle; unhealthy diet; overweight or obese; current smoker or tobacco user; age 45 years or older for males and 55 years or older for females; self-reported depression, anxiety, or chronic stress; hypertension; abnormal lipids; diabetes; or personal history of a cardiovascular event. Persons were excluded who were taking prescribed medications that interfered with lipid metabolism, had cognitive impairment, were non-English speaking, were chronic drug abusers, had end-stage renal, liver, or pulmonary disease, had current active cancer, had a gastrointestinal disease requiring a special diet, or had a condition that prohibited physical activity. A total of 1,181 participants completed the HeartHealth study including 425 participants in phase 1 and 756 in phase 2. Of these, 1,027 participants without a personal history of a cardiovascular event who completed a family history questionnaire were included in this analysis.

Approval for the study was obtained from the University of Kentucky Institutional Review Board and all participants provided written informed consent. Purposive sampling was used to recruit community-dwelling members at risk for CVD from 4 rural Kentucky areas. Participants were recruited through flyers distributed by local health care and community organizations. Following consent and enrollment into the study, individuals completed a sociodemographic survey; a general health questionnaire that included dietary patterns and smoking habits; the Charlson comorbidity index; a CVD family history questionnaire; a fatalism scale; and a modified version of the Medical Outcomes Study Specific Adherence Scale (MOS SAS). Research nurses trained in the study protocol then conducted a physical examination that included measurements of blood pressure, lipid profile, weight, and height.

Measures

Sociodemographics

Sociodemographic information obtained from participants by self-report included age in years, sex, race/ethnicity, education, and financial status. Race/ethnicity was assessed by self-identification as "black or African American (not Hispanic or Latino)," "white or Caucasian (not Hispanic or Latino)," "Asian," "Hispanic or Latino," "American Indian or Alaskan Native," "Native Hawaiian or other Pacific Islander," or "other." Consistent with the rural Kentucky population, few respondents self-identified as being other than "white or Caucasian" race/ethnicity. For this reason, all minorities were combined into a single group, "other." Education was assessed by participant response to the number of years of education completed; responses were dichotomized to: "At most high school" and "At least some postsecondary education." Financial status was assessed by asking if participants had more than enough to make ends meet, had enough to make ends meet, or did not have enough to make ends meet. This measure more accurately reflects economic status and resource affordability than absolute income and has been significantly correlated with CVD[50] and health behaviors.[51-53] To contrast those with sufficient resources to those without, a financial security indicator was created by dichotomizing this variable to "Do not have enough to make ends meet" and "Have enough to make ends meet," with the latter representing participants who responded that they had more than enough or enough to make ends meet. All sociodemographic variables were either continuous or binary.

CVD Risk Factors

Having a diagnosis of diabetes was assessed using an individual yes/no question on the Charlson comorbidity index.[54] BMI was calculated as weight in kilograms divided by the height in meters squared. Participants were weighed using a professional grade, digital body weight scale with shoes and overgarments removed; height was measured with shoes removed using a professional grade stadiometer. Systolic blood pressure was measured according to AHA standards[55] using a calibrated aneroid sphygmomanometer. Point-of-care testing was conducted to measure

nonfasting lipids using the Cholestech LDX® (Alere Inc., Waltham, MA) that has been validated for use in clinical practice.[56,57]

Family History

Participants completed a family history questionnaire indicating whether a first-degree relative (mother, father, siblings, and children) had a heart attack or stroke/TIA at or before 60 years (premature) or after age 60 (late onset). Response options were "yes," "no," and "don't know." For a response of "yes" for siblings and children, participants were asked to indicate the number affected. Participants with 1 or more first-degree relatives who had a heart attack or stroke/TIA before 60 years of age were classified as having high-risk family history of CVD; all other responses, including "don't know," were categorized as average-risk family history. Although premature onset of CVD has been variably defined, there is substantial evidence that history of a heart attack or stroke/TIA in 1 or more first-degree relatives at or before age 60 is significantly associated with higher personal risk for a future cardiovascular event.[19-21]

Fatalism

Fatalism was assessed using a recently published measure of "health fatalism,"[30] conceptualized as a set of health beliefs that includes predetermination, pessimism, and luck. Of particular relevance for this study, validity testing of the fatalism scale demonstrated significant positive correlation with genetic determinism and negative correlation with perceived benefits of lifestyle change.[30] The scale consists of 20 items, with 4 response options for each item: 1 = "Never," 2 = "Sometimes," 3 = "Often," and 4 = "Routinely." The total score for the instrument has potential ranges of 20-80 with a higher score indicating a greater degree of fatalism. The original scale was not disease-specific and several items were revised to explicitly address heart disease. For example, an item from the original scale, "If someone is meant to get a serious disease, they will get it no matter what they do," was modified to "If someone is meant to get heart disease, they will get it no matter what they do." Global items from the original scale such as "My health is a matter of luck" and "I often feel helpless when dealing with the problems of life" were retained. The scale has been shown to have a Cronbach's alpha of 0.88[30]; reliability for this study was 0.91.

Adherence to Healthy Lifestyle Behaviors

A modified version of the MOS SAS[58] was used to measure adherence to 12 health behaviors. Participants were asked to indicate how often they had engaged in each of the following behaviors during the past 4 weeks: (1) regular exercise, (2) taking medication as prescribed, (3) reducing stress, (4) stopping or cutting down on smoking, (5) following a weight loss diet, (6) eating 5 or more servings of fruits and vegetables per day, (7) eating beans, seeds, or nuts 4 to 5 times per week, (8) following a diet low in fat, (9) following a diet low in saturated and trans-fats, (10) eating low fat or fat-free dairy products instead of whole milk products, (11) limiting salt consumption, and (12) eating primarily whole grain rather than processed foods. Response options for each item ranged from none of the time (0) to all of the time (5). For any item that was not applicable, participants were instructed to respond "all of the time." The total possible scores ranged from 0 to 60; a higher score indicated greater engagement in healthy lifestyle practices. Cronbach's alpha for this sample was 0.84.

Data Analysis

Descriptive analysis, including means and SD or frequency distributions, was used to summarize the study variables and to check for missing or out-of-range values. Following the method outlined by Baron and Kenny,[59] multiple linear regression was used to determine whether fatalism moderated the relationship between high-risk family history of CVD and adherence to healthy lifestyle behaviors, controlling for sociodemographic variables and CVD risk factors. Consistent with prior studies,[60,61] the moderation effect was evaluated using subsets of the participants with cutoffs based on the 75th and 25th percentiles of fatalism score; these upper and lower quartile cutoffs were used to define "high fatalism" including those above the 75th percentile for this measure, "moderate fatalism" or those between the 75th and 25th percentile cutoffs, and "low fatalism" including participants below the 25th percentile. Stratified multivariate linear regressions were conducted with these subsets. Variance inflation factors (VIF) were used to assess whether multicollinearity was present in the regressions. Data analysis was conducted using SAS, v. 9.3 (SAS Institute Inc., Cary, NC); an alpha level of 0.05 was used throughout.

Results

Table 1 displays the summaries for each of the demographic and risk variables. More than one-third of participants had a high-risk family history of CVD (35.5%). The participants were predominantly female and Caucasian. More than half had at least some education and the majority had enough income to make ends meet. The majority of participants did not have diabetes. The

Table 1 Frequency Distributions of Demographic and Personal Characteristics (N = 1,027)

Variable	Full Sample (N = 1,027) Mean (SD); range or n (%)	Family History Status	
		High-risk (n = 365) Mean (SD); range or n (%)	Average-risk (n = 662) Mean (SD); range or n (%)
Age	51.1 (14.5); 19-90	54.3 (13.2); 21-87	49.4 (14.8); 19-90
Sexs			
Male	239 (23.3%)	70 (19.2%)	169 (25.5%)
Female	788 (76.7%)	295 (80.8%)	493 (74.5%)
Race/Ethnicity			
Caucasian	983 (95.7%)	353 (96.7%)	630 (95.2%)
Other	44 (4.3%)	12 (3.3%)	32 (4.8%)
Education			
High school diploma or less	378 (36.9%)	152 (41.8%)	226 (34.2%)
Postsecondary education	647 (63.1%)	212 (58.2%)	435 (65.8%)
Financial Status			
Have enough to make ends meet	938 (91.3%)	335 (91.8%)	603 (91.1%)
Do not have enough to make ends meet	89 (8.7%)	30 (8.2%)	59 (8.9%)
Diabetes			
Yes	139 (13.5%)	54 (14.8%)	85 (12.8%)
No	888 (86.5%)	311 (85.2%)	577 (87.2%)
Body mass index, kg/m^2	32.4 (7.6); 17.4-67.5	32.6 (7.7); 18.1-60.7	32.2 (7.5); 17.4-67.5
Systolic blood pressure, mmHg	129.1 (16.4); 90-208	130.1 (17.2); 90-208	128.5 (16.0); 90-190
Total cholesterol, mg/dL	194.1 (40.0); 72-378	198.2 (42.2); 112-378	191.8 (38.6); 72-363
Fatalism	43.7 (11.4); 20-80	43.2 (11.4); 20-80	44.0 (11.4); 20-79
Healthy lifestyle behaviors	29.4 (10.8); 2-60	30.3 (11.0); 2-60	29.0 (10.8); 3-57

subgroup summaries by family history status suggest that while the groups were similar on many indicators, inclusion of these variables as covariates in the regression analysis was warranted due to the observed group differences in control variables.

Multiple regression analysis was used to test for the presence of moderation (Table 2); the overall model was significant ($F_{12,996} = 17.4$, $P < .0001$). Controlling for demographics and risk factors, the interaction between family history status (ie, high-risk history vs average-risk history) and fatalism was significant ($P = .03$). This indicates that fatalism moderates the association between family history and healthy behaviors, given the conceptual basis for this investigation. It should be noted that while the VIF for this model were above 10 for both family history and the family history by fatalism interaction, this was anticipated due to the linear relationship between these 2 variables. The VIFs for all other regressors were less than 2. While the focus of this analysis was to determine whether fatalism moderates the association between family history and healthy behaviors, protective factors predictive of higher adherence to healthy behaviors were older age, having postsecondary education, and having sufficient income. Having higher BMI was a risk factor for lower healthy behavior adherence. The main effects of family history and fatalism in this model are not reliably interpretable given the significance of their interaction.

Table 2 Multivariate Regression Modeling to Assess Whether Fatalism Moderates the Relationship Between Family History and Healthy Lifestyle Behaviors (n = 1,009[a])

Regressor	Parameter Estimate	Standardized β (P value)
Age	0.2296	0.31 (<.0001)
Female	−1.0644	−0.041 (.17)
Caucasian	−1.1539	−0.021 (.49)
Postsecondary education	1.8817	0.084 (.006)
Have enough to make ends meet	3.2032	0.083 (.005)
Diabetes	1.7212	0.054 (.083)
Body mass index	−0.2445	−0.17 (<.0001)
Systolic blood pressure	0.0018	0.0027 (.93)
Total cholesterol	−0.0155	−0.057 (.052)
High-risk family history	−4.9607	−0.22 (.055)
Fatalism	−0.1462	−0.15 (<.0001)
Family history * Fatalism	0.1234	0.25 (.032)

[a]While there were few missing values for any variable, only participants complete on all variables in the model were included in the regression.

Table 3 Stratified Multivariate Regressions Modeling the Association Between High-Risk Family History of CVD and Healthy Lifestyle Behaviors for Varying Levels of Fatalism (n = 1,009a)

	Low Fatalism (n = 255)		Moderate Fatalism (n = 509)		High Fatalism (n = 245)	
	Parameter estimate	Standardized β (P value)	Parameter estimate	Standardized β (P value)	Parameter estimate	Standardized β (P value)
Age	0.3015	0.38 (<.0001)	0.2438	0.33 (<.0001)	0.1272	0.18 (.010)
Female	−4.6283	−0.16 (.006)	−1.0669	−0.042 (.31)	2.4928	0.11 (.10)
Caucasian	0.6259	0.012 (.84)	−0.8604	−0.016 (.70)	−4.5224	−0.079 (.19)
Post secondary education	3.6764	0.14 (.016)	1.4054	0.065 (.12)	1.2882	0.060 (.34)
Have enough to make ends	−3.2129	−0.070 (.23)	3.2081	0.083 (.047)	8.0636	0.25 (<.0001)
Diabetes	0.4948	0.014 (.82)	2.6503	0.081 (.058)	1.4818	0.052 (.42)
Body mass index	−0.3210	−0.21 (.001)	−0.2921	−0.20 (<.0001)	−0.1559	−0.12 (.069)
Systolic blood pressure	−0.0408	−0.057 (.37)	−0.0083	−0.013 (.77)	0.0432	0.070 (.29)
Total cholesterol	−0.0115	−0.038 (.51)	−0.0096	−0.037 (.37)	−0.0422	−0.16 (.009)
High-risk family history	−0.6024	−0.026 (.66)	−0.3262	−0.015 (.72)	2.7743	0.12 (.044)
	$F_{10,244} = 6.40$; $R^2 = .21$		$F_{10,498} = 10.53$; $R^2 = .17$		$F_{10,234} = 5.57$; $R^2 = .19$	

[a]While there were few missing values for any variable, only participants complete on all variables in the model were included in the regression.

The stratified linear regressions were based on subsets of the participants according to the upper and lower quartiles of fatalism score and are shown in Table 3; the upper and lower quartiles of fatalism scores in the sample were 51 and 36, respectively. The predictors and outcome for each of the stratified models were identical to the full model described above (and in Table 2), except that the main effect for fatalism and the interaction between family history and fatalism were omitted since moderation had been established and fatalism was the stratification variable. Each of the stratified models was significant overall ($P < .0001$ for all 3). Controlling for demographic and CVD risk covariates, high-risk family history status was a significant predictor of adherence to healthy lifestyle behaviors only for the group of participants with a score of 51 or above on the fatalism scale; in this subgroup, having a family history of CVD was predictive of greater adherence to healthy behaviors. High-risk CVD family history did not predict adherence for either of the other 2 strata.

Among demographic and risk covariates, age was the only one that was significant in all 3 models; in each case, age was a protective factor predictive of greater healthy behavior adherence. Sex was only significant among those with low fatalism; females reported lower scores on adherence to healthy behaviors in this stratum of participants. Among those with high or moderate fatalism, having enough income to make ends meet was predictive of greater healthy behavior adherence, while having postsecondary education was predictive of higher adherence score among those with low fatalism scores. Body mass index was a significant risk factor for lower healthy behavior scores, but only among those with low or moderate fatalism. Finally, there was a significant effect of total cholesterol on adherence, with those with higher levels of cholesterol reporting poorer adherence to healthy behaviors, but only in the high fatalism group. The VIF for all 3 models were less than 1.5, suggesting little evidence of multicollinearity due to correlations among the predictor variables.

Discussion

There are concerns that genetic susceptibility to chronic disease determined through family history will lead to fatalism, lessening motivation to adhere to healthy behaviors,[27,28] but few studies have examined these associations. Our study serves to inform these concerns. As demonstrated, fatalism significantly moderated the relationship between CVD family history and health behaviors. Comparing predictors of behaviors in participants with high, moderate, and low levels of fatalism, we found that among those with a high level of fatalism, high-risk family history predicted greater adherence to healthy behaviors. Consistent with the HBM, this suggests that among people with high levels of fatalism, having a positive family history of CVD may motivate engagement in healthy behaviors. Distinct from this finding, among participants with low and moderate levels of fatalism, no significant differences in behaviors were found between those with high-risk and average-risk family history. It can be postulated that because people with low or moderate fatalism may have fewer barriers to adherence and thus are more likely to adopt healthy behaviors than

those with high fatalism,[34,36] rates of adherence will be high regardless of family history. In comparison, people with fatalistic thinking may not adopt healthy behaviors without sufficient motivation, such as presence of disease in family members.

These findings suggest that integration of family history education into risk-reduction interventions will not adversely impact fatalism and may, in fact, be most effective for persons with high levels of fatalism. Additionally, although previously identified as a barrier to engagement in healthy behaviors, in certain subsets of people, such as those with high-risk family history, fatalism may be protective, motivating healthy behaviors. Therefore, assessing fatalism could improve tailoring of risk-reduction interventions.

Our study is among the first to examine the moderating effect of fatalism on relationships of family history and health behaviors. To date, most behavioral research has focused on direct associations of health behaviors and family history. In the literature on CVD family history, study outcomes have generally indicated there are no associations or associations with some but not all behaviors. For example, Kip et al[62] found no significant differences in smoking behaviors, physical activity, weight management, or lowering of lipid or blood pressure levels among young adults who had a recent experience of a stroke or heart attack in a first-degree relative compared to those who did not. Findings from general population studies have been similar.[63,64] In an analysis of the Healthstyles survey data, respondents with 1 first-degree relative and those with 2 or more first-degree relatives with CVD were more likely than respondents with no history of CVD in first-degree relatives to have had their cholesterol measured within the previous 5 years and to use aspirin to reduce personal risk. However, no differences were found in the consumption of high-fat foods or fruits and vegetables, physical activity, or, among smokers, cessation efforts.[65]

Results of research to examine associations of genetic susceptibility and fatalism have also failed to demonstrate significant relationships. Collins et al[66] recently conducted a meta-analysis of the impact of personalized genetic information related to complex chronic disease on fatalism. Five randomized, controlled trial or analogue studies related to heart disease, diabetes, or obesity were identified. In the included studies, perceived control over disease prevention or treatment effectiveness was assessed, with higher perceived control indicative of lower levels of fatalism. Analysis revealed no difference in perceived control among participants who received actual or hypothetical genotype or family history risk information compared to those who did not. Two studies published since have also reported there to be no associations.[44,67]

A study by Hunt and colleagues[68] is one of few to examine fatalism in relation to CVD family history and health behaviors. In structured interviews, a single item was used to determine fatalism with respondents asked to what extent they agreed with the statement, "If heart trouble runs in someone's family it doesn't matter what they do; whether they get heart disease or not is out of their hands." The investigators examined whether agreement with the statement, defined as adherence to fatalism, moderated the relationship between respondents' perception that heart disease ran in their family (perceived family history) and current smoking. Outcomes indicated that respondents with perceived family history of CVD were more likely to perceive personal risk as high and less likely to smoke; fatalism did not modify the relationship. These findings, however, must be interpreted with caution as use of a single-item assessment of fatalism, perceived family history, and a single health behavior in the study by Hunt and colleagues may account for differences in their findings and ours.

Consistent with the literature, we found that increasing age was a significant predictor of adherence regardless of level of fatalism.[69-71] As well, although some reports indicate women more frequently engage in health-protective behaviors than do men, of the participants in our study with low levels of fatalism, women were less adherent. Of note, however, investigations of gender inequities for several behaviors included in our behavioral measure have reported healthier lifestyle patterns among men than women. For example, although men more frequently engage in such unhealthy behaviors as smoking and drinking, women are less physically active,[72,73] are less likely to adhere to prescribed medical regimens,[74,75] and, in low socioeconomic populations, have higher rates of obesity.[76,77] Supporting well-recognized associations of both socioeconomic status[78,79] and cardiovascular risk indicators[80,81] with behavior, we found that indicators of higher socioeconomic status (education in low and moderate fatalism groups and financial status in high fatalism) were positively correlated with adherence whereas higher BMI and cholesterol levels were negatively correlated.

Limitations

Generalizability of the findings may be limited for several reasons. First, the majority of participants were Caucasian. Although our sample was representative of the rural Kentucky population,[82] because health factors and behaviors differ across racial and ethnic groups,[1] greater

racial and ethnic group diversity could have reflected these differences. Generalizability may also be limited because all participants had at least 2 CVD risk factors. Additional research is needed to determine whether these relationships are found in samples of lower-risk individuals. Family history data collected through self-report may present a potential limitation as well. However, several studies have demonstrated generally high accuracy of self-reported family history. For example, a large study in which self-reported family history of CVD (n = 3,020) was compared to relatives' reported clinical history (n = 9,569) demonstrated 85% sensitivity and 93% specificity in reporting parents' coronary heart disease status and 81% sensitivity and 98% specificity in reporting siblings' status.[83] Similar rates have been reported in other population studies of family history of coronary heart disease[84] and hypertension.[85] Similarly, healthly lifestyle behavior adherence is subject to bias due to self-report. Future studies of healthy lifestyle behaviors may benefit from an extrinsic validity test of the variable used to measure this outcome. Finally, we did not explicitly measure perceived susceptibility although family history risk has been associated with perceived susceptibility.[42-44] Use of a valid measure of perceived risk would be an important addition to future research.

Conclusions

Assessment of family history to appraise risk for chronic disease and guide health promotion interventions is increasingly used in health care practice. The ready availability and low cost of family history assessment may be particularly valuable in rural communities with limited health care resources. In contrast to concerns that, influenced by fatalism, family history risk will decrease participation in health-promoting behaviors, our findings indicate that among people with high levels of fatalistic thinking, high-risk family history may motivate healthy lifestyle. Further research on fatalism and other psychosocial influences on behavior among persons with high-risk family history is needed to better understand effects of moderation. Guided by health behavior models, complex relationships among personal risk conferred by genetic susceptibility and lifestyle behaviors should be more fully examined using explicit measurements of behavioral model constructs. As preliminary evidence, however, our results suggests that for persons with high levels of fatalistic thinking, identifying family history risk may support healthy lifestyle practices, suggesting the potential benefit of integrating family history education into risk-reduction strategies.

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