

Perceived familiarity with and importance of family health history among a medically underserved population

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Abstract Inadequate knowledge of family health history (FHH) continues to be a major obstacle limiting its usefulness in public health and clinical practice; strategies to facilitate FHH dissemination are needed. Data ($N=1,334$) were obtained through waiting-room surveys completed by a diverse sample of patients attending three community health centers. Perceptions about the importance of genetic information ($\beta=0.13$, $p<0.001$; $\beta=0.11$, $p<0.001$) and higher genetic self-efficacy ($\beta=0.14$, $p<0.001$; $\beta=0.23$, $p<0.001$) were significantly associated with higher levels of perceived familiarity with and importance of FHH, respectively. Furthermore, beliefs about genetic causation of illnesses ($\beta=0.12$, $p<0.001$) and a wider reach of health communication within one's family ($\beta=0.15$, $p<0.001$) were associated with higher levels of perceived familiarity with one's FHH. Participants in the oldest group (>50 years) reported higher familiarity than those in the youngest (18–25 years). Those with higher familiarity were significantly less likely to answer “don't know” when reporting diabetes and heart disease diagnoses among immediate (OR=0.35 and OR=0.29, respectively) and extended (OR=0.50 and

OR=0.46, respectively) family members. Having a wider health communication reach within a family may be beneficial in increasing familiarity with FHH; however, the reported levels of communication reach were limited among most participants. Women, older-generation family members, and those who believe in the importance of genetics in health or feel confident about using genetic information may be particularly important as targets of public health interventions to facilitate FHH dissemination within families.

Keywords Community-based · Family communication · Genetic self-efficacy · Causal belief · Family health history

Introduction

Assessment of family health history (FHH) allows determination of an individual's inherited disease risks and is gaining recognition as an important tool in disease prevention and health promotion (Valdez et al. 2010; Yoon et al. 2003). Chronic health conditions (e.g., cancer, heart disease, diabetes) are influenced by both genetic and environmental factors (Scheuner et al. 1997). Having family members with these chronic conditions significantly increases the odds of individuals developing the conditions themselves (Flossmann and Rothwell 2005; Li et al. 2000; Lloyd-Jones et al. 2004; Meigs et al. 2000; Pharoah et al. 1997); thus, recommendations on screening and lifestyle can be made to those at increased risk based on their FHH (Rich et al. 2004; Trotter and Martin 2007). Awareness about FHH of diabetes has been associated with health behaviors such as trying to lose weight, engaging in physical activity, consuming more fruits and vegetables, and participating in screenings (Baptiste-Roberts et al. 2007). Furthermore, provision of FHH-based risk assessment for heart disease and diabetes was associated with

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individuals' motivation to improve diet, whereas provision of behavioral recommendations without the risk assessment was not significantly associated with this outcome (Ashida et al. 2012). Recognizing the usefulness of FHH, CDC launched a Family History Public Health Initiative in 2002 to increase awareness of its importance and promote its use in public health efforts (Yoon et al. 2003). However, insufficient knowledge of FHH among the public continues to limit its usefulness in public health practice (Qureshi et al. 2009). Centers for Disease Control (CDC) reported that most Americans acknowledge the importance of knowing family history, but only 29% have actively collected this information (Yoon et al. 2004). These reports highlight the need to facilitate communication about FHH within families in order to increase such knowledge among the public.

From the public health perspective, it is important to identify individuals who could be the focus of targeted family-based interventions designed to facilitate the dissemination of FHH within a family. It is likely that individuals who feel that FHH information is important in health and/or are familiar with their own FHH would be motivated to participate in such interventions and to disseminate the information within their families as they may see the benefits and feel more comfortable collecting this information (Yoon et al. 2004). Therefore, identifying individual characteristics associated with such perceptions about FHH (familiarity with and importance of) can guide public health practice that aims to facilitate FHH dissemination.

At the conclusion of the National Institutes of Health (NIH) State-of-the-Science Conference on Family History in 2009, the panel stated that we need more insights into "which informant characteristics are associated with more accurate reporting" of FHH and that future studies should "consider factors such as sex, age, and cultural backgrounds" (Qureshi et al. 2009) as predictors of FHH informants. Previous studies have shown that older generation family members have more knowledge about cancer history within their family (Foster et al. 2002), thus, it may be that older individuals will report higher familiarity with FHH in general compared with younger individuals. Based on another report indicating that women, Whites, and those with higher educational attainment were more likely to collect FHH information than their counterparts (Yoon et al. 2004), those who are older, female, White, and have higher educational attainment would have higher levels of familiarity with FHH. Furthermore, as the panel at the NIH State-of-the-Science Conference on Family History stated, it is important to explore the role of cultural background (e.g., race/ethnicity, country of birth) in determining perceptions about FHH. Additionally, because having a personal or a family history of disease has been found to be associated with the collection of FHH (Yoon et al. 2004), it is expected that self-reported personal and family history of chronic diseases

would be associated with higher perceived importance of and familiarity with FHH.

Health communication among family members, especially among first- and second-degree relatives, is a critical element that gives rise to the knowledge of FHH. Previous studies in family communication of genomic information have focused on relatively rare, high penetrant conditions such as hereditary breast and ovarian cancers (Hughes et al. 2002, 1999; Tercyak et al. 2001) and cystic fibrosis (Denayer et al. 1992) and have reported poor communication of such information among family members (Ayme et al. 1993; Denayer et al. 1992). Because health information about family members can be obtained from multiple sources within a family and not only by affected individuals, wider reach of health communication within family, or the extent to which individuals talk about health with family members of different relational categories (e.g., parents, siblings, children, grandparents, aunts/uncles), is likely to be very important to individuals' FHH knowledge. Thus, in addition to the individual characteristics discussed above, it is important to examine whether a wider reach of health communication within the family is associated with higher levels of perceived familiarity with and perceived importance of FHH within the context of common complex diseases such as heart disease and diabetes. Understanding such associations will provide a basis for FHH dissemination interventions through facilitating family communication.

Beliefs and perceptions about genetics have implications for the extent to which genetic and genomic information is potentially used by the public (McBride et al. 2009). Higher levels of knowledge about genetics have been shown to be associated with greater endorsement for genomic studies and technologies (Human Genetics Commission 2001). It is likely that individuals' perceptions about the importance of genetic information in health determine the extent to which individuals are interested in obtaining genomic information (e.g., family health history) and feel that FHH information is important for their health. Higher levels of knowledge are also associated with individuals' genetic self-efficacy, or their confidence in their ability to assess the impact of genes on health (Parrott et al. 2004). Therefore, those with higher genetic self-efficacy are likely to recognize the importance of FHH information and may be more motivated to become familiar with their own FHH. In addition, health beliefs such as causal attributions also impact the way individuals react to health information (Diefenbach and Leventhal 1996). It is possible that the extent to which individuals attribute the causes of disease to genetics gives rise to their perceived importance of and familiarity with FHH. Therefore, in addition to demographic characteristics and family communication reach, the role of individuals' beliefs about genetics (importance of genes in health, genetic causation of illnesses, genetic self-efficacy) in

determining perceived familiarity with and importance of FHH needs be considered. It can be expected that stronger beliefs about the importance of genes in health, genetics as causes of illnesses, and genetic self-efficacy would be associated with higher perceived familiarity with and importance of FHH.

Therefore, informed by previous reports, this study examines the associations between the factors discussed above (demographics, family communication reach, beliefs about genetics, personal and family history of chronic conditions) and the levels of perceived familiarity with and importance of FHH using the data obtained from a large community health center population sample in Suffolk County, NY. In order to evaluate the extent to which perceived familiarity corresponds with detailed knowledge of FHH, we further evaluate the associations between perceived levels of familiarity with FHH and one's knowledge of diagnoses of health conditions among first- and second-degree relatives. Understanding such associations will help us identify intervention strategies to facilitate FHH dissemination within families.

Methods

Design and setting

Waiting room surveys were administered at three community health centers managed by the Suffolk County Department of Health Services, Division of Patient Care Services. These centers provide comprehensive health care services to all residents in Suffolk County, accepting Medicaid and Medicare as well as other forms of insurance. Uninsured and underinsured residents are billed on a sliding scale based on ability to pay. Visitors aged 18 years and older who could speak and write English were eligible to participate. Trained data collectors approached all adult visitors in the waiting room while they were at the health center. Data were collected between November 2009 and April 2010, on different days of the week and at different times of the day. This study was approved by the Stony Brook University Committee on Research Involving Human Subjects, the Suffolk County Department of Health Services Institutional Review Board, and the National Institutes of Health Office of Human Subjects Research.

Measures

Knowledge of, perceived familiarity with, and importance of family health history Perceived familiarity with one's own FHH was measured using one item adopted from a previous study (McBride et al. 2009): "How familiar are you with your family's health history?" (not at all familiar, a little bit familiar, somewhat familiar, mostly familiar, very familiar).

Knowledge about one's own FHH was assessed using four items regarding heart disease and diabetes diagnoses among first-degree (immediate) and second-degree (extended) relatives: "Have any members of your [immediate/extended] family who are related to you by blood been diagnosed with [heart disease/diabetes]?" Four dummy variables were created to indicate whether the participant answered "don't know" to each of these questions. Perceived importance of FHH for one's own health (Yoon et al. 2004) was measured by asking the degree of agreement (strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree) with the statement: "It is important for my own health to know if diseases like cancer, diabetes, stroke, or heart disease run in my family." In addition, an indicator variable was created for those who reported both high familiarity and importance ("mostly/very familiar" and "strongly agree") as these individuals may be an ideal target for interventions to facilitate FHH dissemination.

Perceptions regarding genetics One item assessed participants' perceptions regarding the importance of genes in health: "How important is it to you to learn more about how your genes, that is, the characteristics that are passed from one generation to the next, affect your chance of getting certain health conditions?" (not at all important, a little bit important, somewhat important, pretty important, very important) (McBride et al. 2009). To assess beliefs about the genetic causation of illnesses participants were asked: "How much do you think that the diseases that run in your family are due to your family's genes?" (not at all, a little, somewhat, mostly, completely) (McBride et al. 2009). These items were considered independently in the models. Genetic self-efficacy was measured using three items from a previous study (Parrott et al. 2004), and a mean score was computed (Cronbach's $\alpha=0.75$). Participants indicated the extent to which they agreed with the following statements (strongly disagree to strongly agree): "I understand how to assess the role of genes for health," "I know how to assess my genetic risk for disease," and "I can explain genetic issues to people."

Reach of family health communication The reach of health communication within families was assessed by looking at the extent to which participants may exchange health information with family members of different relational categories. Participants were asked "who in your family would you be most likely to talk to about your health?" and indicated whether they would talk to family members in the following categories: parent(s), grandparent(s), sibling(s), child(ren), and aunt(s)/uncle(s). If a participant indicated that he/she would talk to someone from a particular category, a value of 1 was given for that category as opposed to 0. The numbers were summed (ranging from 0 to 5) to assess the extent to

which participants may reach different relational categories of the family with health information. We used sum scores rather than proportions (number of relational categories with which participants would communicate out of number in which they had at least one relational member) because such missingness of family information reflects situations often faced when evaluating individuals' disease risks based on FHH in clinical practice. However, we examined the number of categories in which respondents had at least one family member in order to assess the extent of potential problems.

Personal and family history of chronic conditions Personal history of chronic conditions was measured by counting the number of times respondents answered 'yes' to the following seven questions: "Has a doctor (or other health professional) ever told you that you have [diabetes/heart disease/hypertension/arthritis/stroke/emphysema/asthma]? Four indicator variables were created for family history of chronic conditions: whether respondents had immediate/extended family members who are related by blood who had been diagnosed with heart disease/diabetes.

Other respondent characteristics Respondent characteristics considered in the analyses included age, level of education, race/ethnicity, gender, and country of birth. Age was categorized into four groups based on the distribution of the sample—18–25 years, 26–35 years, 36–49 years, and 50 years or older (referent). Educational levels were categorized into: less than high school (referent), high school degree or GED, some college, and college degree or higher. Indicator variables were created for three racial/ethnic groups (Black, Hispanic, or Other), female, and being born in the US.

Data analysis

Descriptive statistics were obtained to evaluate the characteristics of the respondents as well as the dependent and independent variables. Two multivariable linear regression models were fit to evaluate the associations between each of the two outcomes (perceived familiarity with FHH, perceived importance of FHH) and independent variables (i.e., reach of family health communication, perceptions about genetics). For the combined outcome of "high familiarity and importance," a multivariable logistic regression analysis was conducted. The sociodemographic variables (gender, race, educational attainment, and country of birth) were added first and retained in all models. Next, the reach of family health communication variable was entered followed by the variables for perceptions about genetics, and personal and family history of chronic conditions; variables that were not significant were removed from the final models. Additionally, we examined whether participants who

reported high levels of perceived familiarity with FHH (very/mostly familiar) were less likely to answer "don't know" to the four FHH knowledge questions by fitting separate multiple logistic regression models for each of the four outcomes (knowledge about immediate/extended family members regarding diabetes/heart disease). These models controlled for age, gender, race, educational attainment, and country of birth. All tests were conducted at the $\alpha=0.05$ level using SPSS 20. The power of this study was calculated using Power Analysis and Sample Size (PASS 11) software, and was determined to have 94% power to detect a change in slope (beta coefficient) from 0.00 under the null hypothesis to 0.10 under the alternative hypothesis based on a linear regression model.

Results

Respondent characteristics

Sixty-two percent of the people approached agreed to complete the survey. Of the 1,970 individuals that agreed to participate, 1,519 (77.1%) completed all components of the survey, and 1,328 provided the information needed for the analyses conducted in this study. Respondent characteristics are presented in Table 1. The majority of the participants were female (70%) and born in the US (72%). About half (44%) had completed high school or obtained a GED,

Table 1 Demographic characteristics of respondents ($N=1,328$)

	<i>N</i>	%
Age, years		
18–25	313	23.6%
26–35	339	25.5%
36–49	367	27.6%
50+	309	23.3%
Gender		
Male	392	29.6%
Female	933	70.4%
Race/ethnicity ^a		
White (non-Hispanic)	419	31.6%
Black (non-Hispanic)	384	28.9%
Hispanic	309	23.3%
Other race	136	10.2%
Education level ^b		
Less than high school	129	9.7%
High school degree/GED	584	44.0%
Some college	377	28.4%
College degree or higher	190	14.3%
Born in the US	961	72.4%

^a Race information missing for 80 participants

^b Education information missing for 48 participants

28% had some college education, 14% had at least a college degree, and 10% had less than high school education. The sample was diverse in terms of race and ethnicity; 32% were white, 29% were black, 23% were Hispanic, and 10% identified as some other race or ethnicity. The majority of the participants reported making no more than \$50,000 annually (85%), and only 7% reported making more than \$75,000. The average age of the respondents was 38.2 years (SD=14.0), with age ranging from 18 to 88 years.

Characteristics of dependent and independent variables

Descriptive characteristics of the dependent and independent variables are presented in Table 2. The average perceived familiarity with FHH among all participants was 3.73 (SD=1.14), falling between the response options of “somewhat familiar” and “mostly familiar,” and the mode or most frequently reported response was 5 (very familiar). The average perceived importance of FHH was high, 4.17 (SD=1.46), falling between the responses of “somewhat” and “strongly” agree, and the mode was 5 (strongly agree).

However, for both familiarity and importance measures, the scores ranged between 1 and 5, indicating that some participants reported very low levels of familiarity or importance. Forty-two percent of the participants indicated high levels of both perceived familiarity with and importance of FHH.

On average, participants were likely to talk to family members from 1.8 (SD=1.04) out of the five relationship categories (i.e., parents, grandparents, sibling, children, aunts/uncles). The response ranged between 0 and 5, and 1 category was the most frequent response. The highest proportion of participants stated that they would likely talk about their health with their parents (68%) followed by siblings (51%), aunts and uncles (30%), grandparents (17%), and children (12%). About 7% did not select anyone that they would talk to about health. The vast majority of the participants reported having at least one sibling (96%), aunt/uncle (93%), and child (79%). About 57% reported having at least one family member in all five relationship categories followed by 34% in four, 9% in three, and 0.4% in two of the categories.

The average perceived importance of genes for health among all participants was 4.43 (SD=0.89) indicating an

Table 2 Descriptive statistics for independent and dependent variables (N=1,328)

	Mean (SD)	Mode	N (%)
Perceived familiarity with family health history (FHH) ^a	3.73 (1.14)	5	
Perceived importance of FHH ^a	4.17 (1.46)	5	
High familiarity with and importance of FHH ^b			553 (41.6)
Reach of family health communication ^c	1.79 (1.04)	1	
Beliefs about genetics			
Importance of genetic information on health	4.43 (0.89)	5	
Genetic causation of illnesses	3.38 (1.15)	3	
Genetic self-efficacy	3.28 (1.02)		
Personal history of chronic illness ^d	0.72 (1.02)	0	
Don't know whether			
Immediate family have diabetes			49 (3.7)
Extended family have diabetes			193 (14.5)
Immediate family have heart disease			121 (9.1)
Extended family have heart disease			270 (20.3)
Family history of chronic illness			
Immediate family have diabetes			543 (40.9)
Extended family have diabetes			543 (40.9)
Immediate family have heart disease			347 (26.1)
Extended family have heart disease			312 (23.5)

^a “Perceived familiarity with FHH” and “perceived importance of FHH” were measured with one item each using scales ranging from 1 to 5

^b “High familiarity with and importance of FHH” is an indicator variable for participants who reported both high levels of familiarity (very/mostly familiar vs. somewhat/a little bit/not at all) and importance (strongly agree vs. somewhat agree/neither agree or disagree/somewhat disagree/strongly disagree)

^c “Reach of family health communication” indicates the number of relationship categories respondents reported as willing to communicate about health within family ranging from 0 to 5

^d “Personal history of chronic illness” indicates the number of chronic conditions with which participants had ever been diagnosed ranging from 0 to 7 (diabetes, heart disease, hypertension, arthritis, stroke, emphysema, asthma)

average response of “pretty” to “very” important, with the mode being 5 (very important). Participants, in general, indicated that they “somewhat” or “mostly” think the diseases that run in their family are due to their family’s genes ($M=3.38$, $SD=1.15$) with the mode of 3 (somewhat). The average level of genetic self-efficacy was 3.28 ($SD=1.02$), with scores ranging from 1 to 5.

Participants, on average, reported that they had been diagnosed with 0.7 ($SD=1.02$) conditions out of the seven chronic conditions assessed (diabetes/heart disease/hypertension/arthritis/stroke/emphysema/asthma), with number of diagnoses ranging from 0 to 6. The majority of the participants (46%) reported not having any of the conditions, followed by 21% having one, 9% having two, and 6% having three or more conditions. In terms of family health history, 41% of the participants indicated having immediate as well as extended family with diabetes, 25% indicated having immediate family with heart disease, and 23% indicated having extended family with heart disease.

Factors associated with perceived familiarity with FHH

The results from the multivariable model (Table 3) indicated that the participants in the oldest age group (50+ years) reported significantly higher perceived familiarity with

FHH than those in the youngest group (18–25 years: $p=0.02$), and there was a trend for those in the oldest group to report higher perceived familiarity than those in the 26–35 age group ($p=0.09$). Participants who had at least a college degree reported significantly higher perceived familiarity with FHH compared with those with less than high school education ($\beta=0.15$, $p<0.001$). Higher levels of family health communication reach ($\beta=0.15$, $p<0.001$), perceived importance of genetics ($\beta=0.13$, $p<0.001$), belief about genetic causation of illness ($\beta=0.12$, $p<0.001$), and higher genetic self-efficacy ($\beta=0.14$, $p<0.001$) were also associated with higher perceived familiarity with FHH. In addition, those who had a family history of heart disease among their immediate family members reported higher perceived familiarity ($\beta=0.07$, $p=0.02$), however, having a family history of diabetes and heart disease among extended family as well as personal history of these chronic conditions were not significantly associated with the outcome. There were no statistically significant differences by gender, race, and country of birth. We conducted a subgroup analysis using a sample that only included participants who had relatives in at least four relational categories to assess the sensitivity of the family health communication reach variable to missingness among family members in relational categories. There is only a slight change in the magnitude of the coefficient for

Table 3 Associations between respondent characteristics and perceived familiarity with and importance of FHH

	Familiarity with FHH ($N=1,240$)			Importance of FHH ($N=1,254$)			High familiarity and importance ($N=1,240$)	
	β	t	P value	β	t	p value	OR	95% CI
Age 18–25 years	−0.089*	−2.434	0.015	0.036	1.004	0.316	0.779	(0.523, 1.159)
Age 26–35 years	−0.059	−1.676	0.094	−0.027	−0.775	0.439	0.784	(0.535, 1.148)
Age 36–49 years	−0.028	−0.827	0.408	0.000	−0.010	0.992	0.897	(0.618, 1.303)
Female	0.014	0.530	0.596	0.044	1.606	0.109	1.436*	(1.081, 1.908)
Black	−0.029	−0.920	0.358	−0.118***	−3.672	<0.001	0.593**	(0.429, 0.820)
Hispanic	−0.017	−0.484	0.628	−0.046	−1.322	0.186	0.773	(0.531, 1.125)
Other race	−0.014	−0.465	0.642	−0.056	−1.802	0.072	0.699	(0.443, 1.102)
High school or GED	0.050	1.101	0.271	−0.034	−0.730	0.465	1.201	(0.762, 1.893)
Some college	0.078	1.782	0.075	−0.004	−0.083	0.933	1.495	(0.935, 2.391)
College degree	0.153***	3.918	<0.001	−0.004	−0.089	0.929	1.997**	(1.168, 3.414)
Born in USA	0.015	0.504	0.615	0.016	0.541	0.589	1.156	(0.838, 1.594)
Reach of family health communication	0.153***	5.674	<0.001	–	–	–	–	–
Importance of genetic information	0.128***	4.608	<0.001	0.106***	3.861	<0.001	1.432 ***	(1.216, 1.686)
Belief about genetic causation	0.116***	4.117	<0.001	–	–	–	1.254***	(1.115, 1.411)
Genetic self-efficacy	0.140***	5.116	<0.001	0.233***	8.402	<0.001	1.676***	(1.463, 1.920)
FHH heart disease (immediate family)	0.067*	2.297	0.022	–	–	–	–	–

Reference categories: less than high school, White, Age 50+years

Standard coefficients are reported; high familiarity=very/mostly familiar vs. somewhat/a little bit/not at all; high importance=strongly agree vs. somewhat agree/neither agree or disagree/somewhat disagree/strongly disagree

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

family health communication reach variable between models (no change in the level of significance or direction of association), thus, the association between family health communication reach and perceived familiarity with FHH is not sensitive to the number of relational categories respondents have family members in ($\beta=0.12, p<0.001$).

Factors associated with perceived importance of FHH

Findings from the multivariable model (Table 3) showed that participants who identified themselves as “Black” reported significantly lower levels of perceived importance of FHH than those who identified themselves as “White” ($\beta=-0.12, p<0.001$). Similar to the findings from the perceived familiarity model, perceived importance of genetics ($\beta=0.11, p<0.001$) and higher genetic self-efficacy ($\beta=0.23, p<0.001$) were also associated with higher perceived importance of FHH. However, reach of family health communication, genetic causation beliefs, family history of heart disease/diabetes, personal history of chronic conditions, as well as other sociodemographic characteristics, were not significantly associated with participants’ perceived importance of FHH.

Factors associated with high levels of perceived familiarity with and importance of FHH

Participants indicating both high levels of perceived familiarity with and importance of FHH were more likely to be female (OR=1.44), have at least a college degree compared with less than a high school education (OR=2.00), perceive greater importance of genetic information (OR=1.43), have stronger beliefs about genetic causation of illness (OR=1.25), and higher genetic self-efficacy (OR=1.68). Furthermore, participants identifying themselves as “Black” as opposed to “White” were less likely to report high levels of both perceived familiarity and importance (OR=0.59). Reach of family health communication, family history of heart disease/diabetes, personal history of chronic conditions, and other sociodemographic variables were not significantly associated with this outcome.

FHH knowledge and perceived familiarity

The associations between perceived levels of familiarity with FHH and one’s knowledge of diagnoses of health conditions among first- and second-degree relatives were examined to evaluate the potential utility of this perception measure in identifying those who are knowledgeable about their own FHH. In terms of FHH knowledge, 3.7% and 9.1% of all participants answered “don’t know” to items asking whether their immediate family members (first-degree relatives) have been diagnosed with diabetes and heart

disease, respectively. For the extended family (second-degree relatives), 14.5% and 20.3% of all participants answered “don’t know” for diabetes and heart disease, respectively. The results of four logistic regression models (Table 4) indicated that participants with high perceived familiarity with FHH (very/mostly familiar) were significantly less likely to report that they did not know whether any of their immediate family had been diagnosed with diabetes (OR=0.35; 95% CI=0.18, 0.68) or heart disease (OR=0.29; 95% CI=0.19, 0.45) and whether any of their extended family had been diagnosed with diabetes (OR=0.50; 95% CI=0.36, 0.71) or heart disease (OR=0.46; 95% CI=0.34, 0.62) controlling for age, gender, country of birth, education, and race.

Discussion

This study explored individual characteristics associated with perceived familiarity with and importance of FHH, factors that are important in identifying individuals who can be targeted in public health interventions to facilitate the dissemination of FHH within families. It should be noted that these measures are different from measures of accuracy of FHH knowledge, which have been reviewed in other studies (Berg et al. 2009). However, our results showed that the level of perceived familiarity with FHH was strongly associated with whether participants answered “don’t know” to the FHH assessment questions regarding heart disease and diabetes. This suggests that this one-item perceived familiarity measure may be used as a quick assessment tool to identify those who may actually be more familiar with their FHH.

Participants reported rather high levels of perceived familiarity with FHH, indicating that they were on average, “somewhat” to “mostly familiar.” The reported perceived importance of FHH was also high as well. On average,

Table 4 Multivariable models to assess associations between “don’t know” responses to FHH questions and high perceived familiarity with FHH (very/mostly familiar)

	Perceived familiarity	
	OR	95% interval
Don’t know if		
Immediate family with diabetes	0.349**	(0.180, 0.676)
Extended family with diabetes	0.504***	(0.358, 0.711)
Immediate family with heart disease	0.289***	(0.187, 0.446)
Extended family with heart disease	0.457***	(0.339, 0.615)

Each line contains results from one model. Covariates are age, gender, nativity, education, and race

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

participants “somewhat” to “strongly” agreed that FHH is important in one’s health. This finding is similar to the previous report by CDC that showed 96% of a US population sample indicated that family history is “very” to “somewhat” important for their own health (Yoon et al. 2004). Additionally, in our study, a large proportion of the participants (41%) reported high levels of both perceived familiarity and importance. However, notable portions (16% and 22%) of the respondents reported not knowing whether their extended family members have been diagnosed with diabetes or heart disease, respectively. This finding is consistent with previous studies showing that individuals know more health information about immediate family members than about extended members (Qureshi et al. 2009) and highlights the need to facilitate the obtainment of health information regarding their extended family members to improve the accuracy of FHH-based disease risk assessments.

Participants, on average, had family members in about 4.4 categories but indicated that they would communicate about health with members from only 1.8 categories. Close to 70% of the participants reported that they would talk to their parents about health, however, only about half indicated that they would talk to siblings and only about one third indicated that they would talk to aunts and uncles. Among those who had at least one child ($N=954$), only 10% indicated that they would talk to their child(ren) about health. The reach of health communication within family was associated with higher perceived familiarity with FHH. It cannot be concluded that a wider reach of family health communication would lead to increased familiarity with FHH using our cross-sectional data. However, behavioral intentions have been documented to be strongly predicted by individuals’ past behaviors (Myers et al. 1994; O’Connor and Perrault 1995), thus, it may be that participants’ willingness to talk about health reflects their past behaviors to some extent. Therefore, it is possible that facilitating communication among family members of different familial relationships may help increase FHH familiarity among the population.

Consistent with previous reports (Foster et al. 2002; Goergen et al. 2010), our results showed that older participants (50 years and older) reported higher levels of familiarity with FHH than those in the youngest age group (18–25 years). Older generations not only play critical roles in disseminating FHH information but also tend to have more emotional (Giarrusso et al. 1995) and social resources (Baker et al. 2008; Bengtson 2001; Ward et al. 1992) that they can provide to their younger family members. Prior research has shown that encouragement from older family members was most important in motivating individuals to undergo screening for heart disease and diabetes (Ashida et al. 2010a, b). These reports, combined with our data, suggest the benefit of considering older individuals as potential targets for FHH-based public health interventions that aim

to facilitate not only FHH dissemination but also desirable health behaviors among all family members. Furthermore, our results showed that perceived importance of genetic information in health and genetic self-efficacy were also associated with both FHH familiarity and importance, and that stronger beliefs about the genetic causation of illnesses were associated with higher familiarity with FHH. Previous research has shown that older individuals are more likely to endorse genetics as a cause of a person’s body weight than younger counterparts (Ashida et al. 2010a, b). It could be that older individuals are more familiar with FHH because they have genetics-related beliefs that may prompt them to learn more about their own FHH. These findings suggest that educating individuals about the role of genetics or FHH in disease prevention or health promotion may help motivate the attainment of more family health information and facilitate FHH knowledge.

Participants who reported a family history of diabetes among immediate family members reported significantly higher familiarity with FHH than those who did not have such family history. Knowledge about FHH of heart disease and of diabetes among extended family members was not significantly associated with perceived familiarity with FHH. It may be that individuals feel that having immediate family members with diabetes is particularly relevant to their own health. In contrast to prior findings that diagnosis with type 2 diabetes was associated with the collection of FHH (Yoon et al. 2004), the extent to which participants were diagnosed with multiple chronic conditions was not significantly associated with perceived importance of and familiarity with FHH in our data. Although this could be due to the generally low numbers of diagnoses among the participants, it is also possible that these associations are observed only within disease-specific contexts.

Implications for public health practice

Our findings suggest that public health efforts to increase FHH knowledge may benefit from facilitating communication among first- and second-degree relatives, especially to encourage the flow of the information to younger generations from older generations who are likely to know more about FHH (Foster et al. 2002; Goergen et al. 2010). To facilitate such communication, it may prove beneficial to better understand the relationship between having communication with more family members of different relationship categories and familiarity with FHH. Although our results suggest a likely benefit of older family members disseminating FHH information to younger members within a family, past reports indicate that older individuals may feel uncomfortable sharing a family history of illnesses like cancer with younger family members (Foster et al. 2002) or fear that sharing information may create unnecessary

anxiety within the family (Bates 2005). It may also be that they do not feel confident that they can communicate accurate FHH (Ford et al. 2002). Efforts to facilitate intergenerational FHH communication may need to help older generation family members become aware of their important role as information providers for younger family members and assist them in knowing how to communicate such information effectively.

Public health efforts to increase the public's knowledge of FHH may also require that we develop strategies to reach individuals who do not highly value genetic information. Upon reaching these individuals, efforts to influence their beliefs by providing more information about how genetic information can help reduce disease risks may be beneficial. In addition, higher educational attainment levels were also associated with higher perceived familiarity with FHH, and black participants reported significantly lower levels of perceived importance of FHH than white participants. Public health efforts to facilitate FHH dissemination may therefore need to consider developing family-based communication strategies that are appropriate for individuals with limited educational attainment or limited health literacy and that are culturally appropriate for families from different racial and ethnic groups. If variability in educational attainment levels is observed within the family, it will be critical to have appropriate educational strategies that can reach all family members. In addition, female participants were significantly more likely to report both high perceived familiarity and importance, suggesting that they could be targeted as FHH disseminators within families.

Implications for research

Understanding the role of family communication in enhancing FHH knowledge can provide a basis for interventions that seek to facilitate FHH communication processes within families. Future studies may obtain longitudinal data to evaluate the potential causal association between the reach of family health communication and FHH familiarity or accuracy of knowledge. Future studies should also aim to increase our understanding about the facilitators and barriers associated with obtaining and sharing FHH information, especially among older generation family members. Such knowledge is needed for the development of effective public health interventions that use FHH. Our results suggest that the perceptions about FHH may differ by disease context. Thus, studies may consider obtaining information regarding the familiarity with and importance of FHH about specific health conditions and evaluate whether they are associated with personal and family health history of the relevant conditions.

Limitations

Because this study used cross-sectional data, the directions of association between FHH familiarity and independent variables cannot be determined. Future studies should consider obtaining longitudinal information to determine such causal effects. Participants in this study were from a suburban area in the US. Findings may not be generalizable to individuals with different cultural and demographic backgrounds. However, we were able to obtain a diverse sample that is representative of the English-speaking patient population of the three community health centers in Suffolk County. The level of educational attainment was similar to the population in the Suffolk County (86% with high school diploma or higher as opposed to 89% reported in the Census). In addition, our study sample has ample representation of population subgroups that are often underrepresented in research such as Black (29% compared with 7% reported in the 2000 Suffolk County Census) and Hispanic/Latino (23% as opposed to 13% reported in the Suffolk County Census) participants. Limitations regarding the measures used in study should also be considered when interpreting the presented findings. Reach of the family health communication was determined by looking at whether participants were willing to talk to at least one family member from five relational categories (parents, grandparents, aunts/uncles, siblings, children). The information regarding participants' communication with more extended family members such as cousins was not available in this study, thus, not considered in this report. Although consideration of 3-generation pedigrees may not be critical for public health purposes, third-degree relatives may still play important roles in communicating FHH information (Murff et al. 2004; Valdez et al. 2010). Thus, future studies may consider including third-degree relatives in their assessments. Also, we did not adjust for whether participants had at least one family member in each of the communication categories. However, our data indicate that most participants (91%) had at least one member in four or five of the categories, and our subgroup analyses showed consistent effects of the family health communication reach variable in level of perceived FHH familiarity. Finally, whether participants answered "don't know" to the FHH assessment questions provides us with an idea of the extent of their self-reported FHH knowledge, however, this is not a measure of the accuracy of FHH knowledge as there may be health conditions among relatives that participants were not aware of and answered "no" rather than "don't know." This issue, however, also reflects the difficulty faced by professionals in public health and clinical practices. Through facilitating communication about FHH within families, we may be able to improve the accuracy of FHH reporting among the population.

Conclusions

In sum, although participants in general reported high levels of perceived importance of FHH in health, the reach of health communication within the family was not very extensive. Future efforts to increase familiarity with FHH information may consider facilitating intergenerational health communication with first-, second, and third-degree family members and other targeted approaches to improve and promote health information exchange in families. Women, older-generation family members, and those who believe in the importance of genetics in health or feel confident about using genetic information may be particularly suitable to be targeted in public health interventions to facilitate FHH dissemination within families.

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