

Family health information sharing among older adults: reaching more family members

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Abstract Although family health history (FHH) information has tremendous potential in the prevention of common complex diseases such as heart disease and cancer, lack of knowledge about one's own FHH among the public hinders its utility. Older individuals often desire to contribute to the well-being of younger generations and also play critical roles in disseminating this information. This study evaluated psychosocial factors associated with the extent of FHH communication within families. Older adults ($N=110$) were interviewed at three senior centers in an urban community. Multivariate Poisson regression analysis showed that respondents who received FHH from a parent reported 41 % more family members with whom they shared FHH ($b=0.34$, $p<0.001$) controlling for the family network size. Furthermore, one unit increase in the number of family members with whom respondents exchange reciprocal emotional support ($b=0.04$, $p<0.01$), perceived familiarity with own FHH ($b=0.14$, $p=0.01$), and self-efficacy to share FHH ($b=0.18$, $p=0.02$) were associated with 4, 15, and 20 % increases in the number of family members with whom respondents shared FHH, respectively. Future efforts may inform older adults about their important role in modeling FHH communication behavior to encourage information sharing in future generations while providing information about how to collect and disseminate FHH to increase their familiarity and ability to share FHH within the family.

Keywords Family health history · Communication networks · Heart disease · Cancer · Social relationships

Introduction

Older adults often express their desire to be useful and valuable to society and feel that it is their moral responsibility to provide for others and future generations (Narushima 2005; Okun 1994; Trheurer and Wister 2010). Studies have shown that those who feel low levels of social usefulness experience higher mortality, lower self-rated health (Okamoto and Tanaka 2004), and more impairment with activities of daily living (ADLs) (Grand et al. 1988). The concept of generativity, interest in contributing to the development and well-being of the society and future generations (Erikson 1982; McAdams and de St. Aubin 1992), has been increasingly considered in research concerning the health and well-being of older adults. Older adults with generative desire tend to engage in more social and productive activities (Narushima 2005; Okun 1994) that can facilitate better cognitive, physical (Adams et al. 2010; Gruenewald et al. 2012; Gottlieb and Gillespie 2008; Yuen et al. 2008), and psychological well-being (Greenfield and Marks 2004; Lum and Lightfoot 2005; Wheeler et al. 1998). These findings suggest the benefits of facilitating generative activities among older adults to enhance their well-being.

Sharing family health history (FHH) information

FHH information takes into account inherited, environmental, and behavioral factors that influence the development of common chronic diseases and can be a powerful risk assessment tool to determine preventive actions (Claassen et al. 2010; Valdez et al. 2011). For most common chronic conditions such as coronary artery disease and various types of cancers, even a

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moderate familial risk (one first-degree relative or two second-degree relatives from the same lineage with late-onset condition) is associated with a twofold increase of individual risk compared to the general population risk (Scheuner et al. 1997). Thus, FHH-based health risk assessments are used to develop individualized public health recommendations such as lifestyle and health screenings in clinical settings (Guttmacher et al. 2004; Zoorob et al. 2001). Furthermore, increasing awareness of one's own FHH has been shown to facilitate health behaviors like exercise, healthy diet, and participation in health screenings (Baptiste-Roberts et al. 2007). Recognizing its utility in chronic disease prevention, increasing FHH knowledge among the population has been identified as a public health priority in the USA (Qureshi et al. 2009; Yoon et al. 2003). However, the level of FHH knowledge remains low in the USA with less than one third of the population reporting that they had actively collected this information (Yoon et al. 2004). In light of recent developments in genetic testing and risk assessments that bring great potential to improve health, sharing FHH information within the family becomes increasingly important.

Sharing family health information contributes to the health and well-being of family members and may be considered a generative activity. Asking older adults to share a life story creates an opportunity to engage them in generative action (Ehlman and Ligon 2012) while facilitating the preservation of historical information that can benefit future generations (Taft et al. 2004). FHH is a specific type of information that is particularly important to the health of family members, especially the younger generations. The assessment and dissemination of FHH occur within the familial social context in which many members share both genetic and environmental risk factors. Older individuals tend to have more knowledge about the health history of family members (Foster et al. 2002), especially the information about previous generations (Green et al. 1997). However, older adults may be less likely to share FHH with family members due to the lower levels of health literacy and knowledge about genetics among them compared to younger individuals (Ashida et al. 2010). Although some also worry about alarming family members with threatening health information especially regarding highly penetrant conditions like Huntington's disease and hereditary cancer syndromes (Beery and Williams 2007; van Oostrom et al. 2007b), communicating FHH about more commonly occurring complex diseases like heart disease and nonhereditary cancer is likely to be less threatening (Rolland and Williams 2005). Because facilitating FHH communication between older adults and their family members, especially about common complex diseases, can have positive implications on the health of all family members, it is critical that we identify the factors to help facilitate FHH sharing among older adults.

Factors such as cultural demand, inner desire to help others, and concern for and commitment to the next generation may facilitate generative actions (McAdams and de St. Aubin 1992). In the context of FHH sharing, the extent to which older adults share this information with family members may be facilitated by their inner desire to promote the health and well-being of their family and younger generations through the prevention of chronic diseases. For example, older adults' perceptions related to FHH, such as the importance of reducing the risk of their family members developing chronic diseases (outcome expectancies) and the likelihood that the risk of family members developing these diseases can be reduced by sharing FHH (outcome expectation), may determine the extent to which older adults share FHH. Furthermore, the social and behavioral theories posit that individuals' perceptions about their own knowledge of family health information (familiarity) and confidence in communicating (self-efficacy) can contribute to the extent to which older adults share FHH information (McAlister et al. 2008). In fact, previous studies showed that one's perception about the importance of sharing (Ashida et al. 2013), ability to obtain FHH information, and familiarity with own FHH (Ashida et al. 2012) were associated with its communication in a general population sample.

According to the concepts of generativity, older adults may also feel the cultural demand to share FHH information with family members. For example, individuals in families in which open family communication about health information is expected may be more motivated to share FHH. The importance of role modeling, or observational learning, in facilitating behavioral change has also been suggested in the social cognitive theory (Bandura 1986; McAlister et al. 2008). Studies have documented the importance of parental role modeling on various health-related behaviors (Golan and Crow 2004; Skouteris et al. 2011) and the benefit of good parental communication skills in facilitating communication among their children (Hutchinson and Cooney 1998), suggesting the presence of cascading effects (Perrino et al. 2000). Thus, individuals who have previous experience receiving FHH information from their own parents may be more motivated to share this information with their family members and the younger generations.

The importance of the fit between individuals and their social environment, specifically the presence of respect in relationships, has also been found to be important in whether older adults engage in generative activity (Ehlman and Ligon 2012). The level of respect from younger generations appears to determine the level of motivation to engage in generative actions among older adults (Cheng 2009). Evidence strongly suggests that reciprocal social support, compared to one-way

provision or receipt of support, are especially important on the well-being of older adults (Heaney and Israel 2008; House et al. 1988). Previous studies showed that social support exchanges among family members were associated with communication of disease risks within the family (Hughes et al. 2002; Koehly et al. 2009; van Oostrom et al. 2007a). Thus, it is possible that the extent to which reciprocal social support exchange occurs within family systems determines older adults' desire and ability to share FHH information with family members. Studies have documented reluctance among younger family members to share FHH information with older members to avoid distress (Forrest et al. 2008) and discordances in FHH reports between different generations within same families (Hastrup et al. 1985). Facilitating reciprocal exchange of support and information is especially important in improving the accuracy of FHH communicated within families.

Population-based public health efforts that encourage older individuals to share FHH with their family members, along with ongoing efforts to increase awareness about the importance of sharing FHH among the public (Qureshi et al. 2009; Yoon et al. 2003), can provide an opportunity for older adults to engage in generative activity. The concepts of generativity can help us understand the underlying psychosocial factors that motivate and allow older adults to share FHH. Most studies of FHH communication were conducted with clinic-based populations (Bowen et al. 2003). Therefore, we have limited knowledge about the facilitators of FHH communication among general community-based older adults, especially those of minority population who are disproportionately affected by common complex diseases (Williams and Jackson 2005). Heart disease and cancer were the first and second leading causes of deaths in the USA in 2011 (CDC 2012). Increasing FHH knowledge among those who are at increased risk due to family history is important in reducing negative impacts of these conditions that are highly prevalent in our population.

Based on the concepts introduced above, this study evaluated the social and psychological factors associated with sharing of FHH about heart disease and cancer among older adults by interviewing senior center participants in inner city areas. More specifically, we evaluated whether (1) behaviors of the past generations (participants' parents sharing FHH with them in the past), (2) the extent to which social support is exchanged, and (3) individual perceptions about health and health history information are associated with the number of family members with whom older individuals shared FHH within family. Sociodemographic characteristics shown to be associated with health communication in previous studies (i.e., gender, race, marital status educational attainment, personal disease history) (Qureshi et al. 2009; Berkman et al. 2004; Kaphingst et al. 2012) were also considered in the analyses.

Methods

Procedures

Participants were recruited at three senior centers operated by the Parks and Recreation services in Memphis, TN. All centers are located in the inner city area and had a large proportion of minority participants from a wide range of socioeconomic backgrounds, ranging from those indicating their homeless status to those reporting over US\$50,000 annual income. Information about this study was included in monthly newsletters and also posted at the participating centers. Interested seniors either called or visited the front desk at each center to make interview appointments. Recruitment criteria included those age 60 years and older who could visit the center to participate in face-to-face interviews without cognitive difficulties to answer the questions. Age 60 was selected because the majority of Americans are retiring in their early 60s (Blau 2008; Gallop 2013), and literature suggests that those retired are more likely to have time and resources to provide to other family members (Bengtson 2001). Therefore, this subgroup may be open to participating in interventions to enhance family health history knowledge. A total of 110 seniors participated in a one-time interview that lasted between 35 min to 1 h with research personnel trained to maintain their confidentiality. Written consent was obtained prior to the interview and respondents received a US\$10 gift card to local grocery stores. This study was approved by the Institutional Review Board of the University of Memphis.

Measures

Familial social network enumeration In order to identify FHH communication network members, each respondent first listed his or her "biological family members including parents, siblings, children, and grandchildren" regardless of whether these individuals were currently living. Following, respondents listed "other people, like spouse, other relatives, and close friends who [they] may talk to about [their or their family's] health." Close friends and nonbiological family members were included because these individuals were shown to be important in FHH communication as they can receive information that can be shared back with the biological family members to whom the information is important (Koehly et al. 2003). A sum of all enumerated members yielded social network size. Demographic information about each enumerated member (age, gender, whether currently living, relationship to participant) was obtained from the respondents.

Extent of FHH communication After enumerating the network members, respondents were asked to select those to whom they have "ever told" about family members who were

diagnosed with chronic conditions such as cancer, heart disease, and diabetes. The count of the selected network members yielded the number of members with whom respondents shared FHH information (extent of FHH communication within the familial network). Ties between respondents and their parents were excluded from this calculation because of the overlap with one of the main independent variables of this study, receiving FHH information from parents.

Social relationships Respondents identified members “who has ever told [them] about a family member or members who were diagnosed” with conditions like cancer or heart disease. If the respondent selected at least one parent for this question, it was considered that he/she *received FHH information from parent* (coded as “1” as opposed to “0” for not receiving). There were two *social support* items considered: “[who provides you with/to whom do you provide] emotional support?” The extent of social support exchange with family was assessed by counting the number of social network members who were selected for both of these items (“who provides you” and “to whom do you provide”), yielding the number of members with whom the respondent engages in reciprocal support exchange. Only the support exchanges with currently living network members were included here because support questions were asked in terms of the participants’ present social interactions. This measure was used as a proxy suggesting the overall support exchange patterns within the family.

Perceptions about FHH The concepts of the outcome expectation, outcome expectancies, and self-efficacy were drawn from the social cognitive theory (Baranowski et al. 2002). There were six *outcome expectation* questions (three relationship categories, two diseases): “how likely is it that the risk of your [sibling(s)/child(ren)/grandchild(ren)] developing [cancer/heart disease] can be reduced by sharing family health history with them?” [“not at all likely (1)” to “extremely likely (5)”. The average scores across three relationship categories were taken for each condition, resulting in two overall family measures (Cronbach’s α s=0.97 and 0.96 for cancer and heart disease, respectively). The *outcome expectancies* were measured using six items: “how important is it to reduce the risk of your [sibling(s)/child(ren)/grandchild(ren)] developing [cancer/heart disease]?” [“not at all important (1)” to “extremely important (5)”. The average scores were created across three relationship categories for each condition (α s=0.96 and 0.91 for cancer and heart disease, respectively). The five *self-efficacy* questions were “how sure are you that you could share family health history with your [brothers/sisters/sons/daughters/grandchildren]?” Response options ranged from “not at all sure (1)” to “extremely sure (5).” The average across these five items was taken to construct an overall self-efficacy variable (α =0.81). A one-item question about *familiarity*, “how familiar are you with your family’s health

history?”, “not at all familiar (1)” to “very familiar (5),” was adapted from a previous study (McBride et al. 2009) and used as a proxy for participants’ knowledge (*behavioral capability*).

Participant characteristics The characteristics of the participants considered include age, gender, race, marital status (currently married or living as married vs. widowed, divorced, separated, or never married), educational levels (high school degree or less vs. some college or higher), and personal diagnosis (cancer, heart disease).

Analyses

The characteristics of the respondents, their FHH communication networks, and potential psychosocial determinants of FHH communication were examined by evaluating the descriptive statistics. Bivariate analyses were first conducted using generalized linear models to fit a Poisson regression for each of the potential predictor variables and covariates to the outcome. Poisson regression was selected because the outcome was the count data, the number of family members respondent shared FHH with, and this approach allowed for the inclusion of the participants who did not share FHH with anyone in the family. Demographic covariates considered include: age (in years), female, White, married (vs. not currently married), high school degree or less, social network size, and personal diagnosis of cancer and heart disease as previous studies reported the role of such disease experience on FHH communication (Yoon et al. 2004). Explanatory variables of interest were whether the respondent received FHH from at least one parent, reciprocal exchange of emotional social support with family, and perceptions about FHH (i.e., outcome expectations, expectancies, self-efficacy, and familiarity). The statistically significant variables ($p<0.05$) were then entered together into the multivariable Poisson regression model as predictors of the extent of the FHH communication within family. The potential need to adjust for participants coming from three senior centers was examined using two dummy variables but was determined unnecessary. Analyses were conducted using the Statistical Package for Social Sciences (SPSS 21).

Results

A total of 110 seniors participated; however, three respondents were excluded from the analysis due to missing data in perception variables. The majority of respondents were African American (70 %), female (78 %), not currently married (80 %), and retired or currently not working (89 %). The average age of the respondents was 73.3 years (SD=7.6),

ranging from 57 to 90. Although all respondents indicated that they were ages 60 years or older, one person’s age was calculated to be 57 years based on the reported birth date. The demographic characteristics of the participants are presented in Table 1.

Family health history communication networks

Using the enumeration questions explained above, respondents listed an average of 14.71 network members (SD= 5.83), ranging from 5 to 32. All respondents listed two parents in their networks, and half (51 %) selected at least one of their parents as someone “who has ever told [them]” about family member(s)’ diagnosis of chronic diseases. A total of 1,574 network members were listed by 107 respondents included in the analyses: 520 (33 %) were siblings, 339 (22 %) were grandchildren, and 285 (18 %) were children. When only the currently living members were considered, the average network size was 9.69 (SD=5.14), ranging from 2 to 30. Among 1,037 network members currently living, 306 (30 %) were siblings, 256 (25 %) were children, 306 (30 %) were grandchildren, and 43 (4 %) were spouses or significant others.

Considering all network members, both living and deceased (N=1,574), respondents reported sharing FHH related to relevant common complex diseases with 404 (26 %) of their network members. Among these 404 network members respondents “have ever told about” FHH, 155 (38 %) were children, 126 (31 %) were siblings, 33 (8 %) were grandchildren, 15 (4 %) were nieces and nephews, 17 (4 %)

were spouses or other nonbiological family members, and 26 (6 %) were their parents. Not counting their parents, respondents communicated FHH with, on average, 3.5 (SD=3.6) family members, ranging from 0 to 17 members. Therefore, 155 out of 285 children (54 %), 126 out of 525 siblings (24 %), and 33 out of 339 grandchildren (10 %) were informed by the respondents about FHH. Nineteen percent of the respondents did not communicate FHH with any family members. Among the 87 participants who communicated with at least one family member, the average number of family members participants shared FHH with was 4.34 (SD=3.6), ranging from 1 to 17. The sociodemographic characteristics of the participants did not differ between those who communicated with at least one family member and those who did not. Participants who communicated with family reported more network members with whom they exchanged emotional support (M=2.87 vs. M=0.70, p<0.001) and higher self-efficacy to share FHH (M=4.12 vs. M=3.67, p=0.01) than those who did not.

Descriptive statistics of the explanatory variables are presented in Table 2. Considering only the currently living network members (N=1,037), respondents exchanged reciprocal emotional support with 243 (23 %) of the network members or an average number of 2.47 (SD=3.55) members within the network. Of the 243 members who exchanged emotional support reciprocally with the respondents, 44 % were their children, 22 % were siblings, 11 % were grandchildren, and 8 % were spouses. The number of network members from

Table 1 Participant characteristics (N=107)

	Frequency (%)
Female	83 (77.6)
Race	
White	30 (28.0)
African American	75 (70.1)
Other	2 (1.9)
Marital status	
Married/living as married	22 (20.6)
Widowed	50 (46.7)
Divorced/separated	24 (22.4)
Never married	11 (10.3)
Education	
High school diploma or lower	45 (42.1)
Vocational school/some college	25 (23.3)
College degree or higher	37 (34.6)
Personal health history	
Cancer diagnosis	21 (19.6)
Heart disease diagnosis	28 (26.2)

Table 2 Social relationship characteristics and perceptions about FHH

	Mean (SD) Frequency (%)	Range
Social relationships		
Social network size (all enumerated)	14.71 (5.83)	5–32
Social network size (currently living)	9.69 (5.14)	2–30
Number shared FHH with ^a	3.53 (3.63)	0–17
Reciprocal emotional support	2.47 (3.55)	0–22
Received FHH from parent	55 (51.4)	
Perceptions		
Outcome expectation: cancer ^b	3.63 (1.03)	1–5
Outcome expectation: heart disease ^b	3.72 (0.98)	1–5
Outcome expectancies: cancer ^b	4.14 (0.92)	1–5
Outcome expectancies: heart disease ^b	4.14 (0.89)	1–5
Self-efficacy to share FHH with family ^c	4.04 (0.71)	2–5
Familiarity with own FHH ^d	3.91 (1.07)	1–5

^a Sharing FHH to parents excluded

^b N=104 due to missing data

^c Response options ranging from “not at all sure (1)” to “extremely sure (5)”

^d Response options ranging from “not at all familiar (1)” to “very familiar (5)”

whom respondents only received emotional support (but did not provide) was 30 (3 %), and the number of members to whom respondents provided but did not receive emotional support was 255 (25 %).

Perceptions about health and family health history

The average perceived outcome expectation that sharing FHH can help reduce the risk of family members encountering cancer and heart disease was 3.63 (SD=1.03) and 3.72 (SD=0.98), respectively (averages falling between “somewhat likely” and “very likely”). The outcome expectancies that it is important to reduce the risks of cancer and heart disease among family members were 4.1 (SD=0.92 cancer, SD=0.89 heart disease) for both conditions (“very important”). The average self-efficacy score was 4.0 (SD=0.71), indicating that respondents were “very sure” that they could share FHH with family members. On average, participants felt “mostly familiar” with their own FHH ($M=3.9$, $SD=1.1$). For all of these variables, the responses covered a wide range of perceptions among respondents.

The roles of parental behavior, social support, and perceptions in FHH communication

The results of the bivariate analyses are presented in Table 3. As shown, personal history of cancer ($p<0.001$) and heart disease ($p=0.01$) diagnosis were significantly associated with higher number of family members to whom respondents

communicated FHH. In terms of social relationship factors, larger social network size ($p=0.05$), higher number of network members with whom respondents exchanged reciprocal emotional support ($p<0.001$), and receiving FHH from at least one parent ($p<0.001$) were significantly associated with a higher number of family members to whom respondents communicated FHH. Similarly, higher levels of self-efficacy ($p<0.001$), familiarity with own FHH ($p<0.001$), and outcome expectations for both cancer ($p=0.05$) and heart disease ($p=0.03$) were significantly associated with a higher number of family members the respondents shared FHH with.

The multivariate Poisson regression models predicting the number of network member respondents shared FHH with are presented in Table 4. Social network size (all enumerated members) was used as a covariate to control for varying family sizes in both models. Model 1 includes all variables that showed significant associations with the outcome in the bivariate analyses. Explanatory factors that are no longer significant were removed using a backward stepwise method. Model 2 presents the final model that includes statistically significant explanatory variables along with the social network size as a control variable. Results show that the respondents who received FHH from at least one parent ($\exp\{0.34\}=1.41$, $p=0.001$) shared FHH with 41 % more family members, and each additional network member with whom respondents exchange reciprocal emotional support ($\exp\{0.04\}=1.04$, $p=0.003$) was associated with 4 % increase in the outcome. Similarly, every unit increase in perceived familiarity with one’s own FHH ($\exp\{0.14\}=1.15$, $p=0.012$)

Table 3 Bivariate models for the number of familial network members with whom respondents shared FHH ($N=107$)

	Coefficient	SE	95 % CI	<i>p</i> value
Individual characteristics				
Age	0.008	0.007	−0.006 to 0.021	0.266
Female	0.106	0.127	−0.143 to 0.355	0.403
White	−0.066	0.116	−0.294 to 0.162	0.568
Married	0.129	0.123	−0.111 to 0.370	0.292
High school degree or less	−0.043	0.105	−0.248 to 0.162	0.679
Cancer diagnosis	0.428	0.116	0.201 to 0.654	<0.001
Heart disease diagnosis	0.284	0.110	0.068 to 0.500	0.010
Social relationships				
Network size	0.017	0.009	0.000 to 0.034	0.047
Emotional support: reciprocal	0.061	0.011	0.040 to 0.081	<0.001
Received FHH from parent	0.396	0.106	0.189 to 0.603	<0.001
Perceptions				
Outcome expectation: cancer	0.102	0.053	−0.002 to 0.206	0.053
Outcome expectation: heart disease	0.124	0.056	0.013 to 0.234	0.028
Outcome expectancies: cancer	−0.004	0.058	−0.117 to 0.109	0.949
Outcome expectancies: heart disease	0.047	0.061	−0.072 to 0.166	0.442
Self-efficacy to share FHH with family	0.284	0.077	0.134 to 0.433	<0.001
Familiarity with own FHH	0.188	0.053	0.084 to 0.292	<0.001

Table 4 Multivariate models for the number of familial network members with whom respondents shared FHH ($N=107$)

	Model 1				Model 2			
	Coefficient	<i>p</i> value	RR	95 % CI	Coefficient	<i>p</i> value	RR	95 % CI
Intercept	-0.955	0.048	0.385	0.149–0.990	-0.687	0.109	0.503	0.217–1.165
Individual characteristics								
Cancer diagnosis	0.483	<0.001	1.621	1.277–2.057	0.464	<0.001	1.590	1.258–2.009
Heart disease diagnosis	0.181	0.138	1.198	0.944–1.521				
Social relationships								
Network size	0.014	0.149	1.014	0.995–1.033	0.016	0.092	1.016	0.997–1.035
Emotional support: reciprocal	0.029	0.022	1.029	1.004–1.055	0.036	0.003	1.036	1.012–1.061
Received FHH from parent	0.246	0.030	1.279	1.025–1.596	0.341	0.001	1.407	1.414–1.734
Perceptions								
Outcome expectation: cancer	0.074	0.438	1.077	0.893–1.300				
Outcome expectation: heart disease	-0.004	0.970	0.966	0.814–1.220				
Self-efficacy to share FHH	0.142	0.093	1.153	0.977–1.361	0.183	0.023	1.201	1.026–1.405
Familiarity with own FHH	0.190	<0.001	1.210	1.082–1.353	0.139	0.012	1.149	1.031–1.280

and self-efficacy to share FHH with family ($\exp\{0.18\}=1.20$, $p=0.023$) were associated with 15 and 20 % increases in the number of network members with whom respondents shared FHH, respectively. The number of family members respondents shared FHH with was 59 % higher ($\exp\{0.46\}=1.59$, $p<0.001$) among those with personal history of cancer than those without.

Discussion

This study examined factors associated with the extent to which community-dwelling older adults shared FHH information with their familial social network members and showed that interpersonal factors may play key roles in determining this communication behavior. Respondents who received FHH related to heart disease or cancer from their parents in the past reported sharing FHH with more family members, with the majority of information receivers being their own children. This finding may represent one of the ways through which social relationships influence individual behaviors, for example, observational learning through exposure to role models (Bandura 1986; Heaney and Israel 2008). The presence of such role models may also help create a familial norm that expects open family communication, thus enhancing the perception of cultural demand to promote the well-being of future generations (McAdams and de St. Aubin 1992).

In addition, the quality of social relationships, particularly the reciprocal exchange of emotional support, may be important in facilitating the FHH dissemination processes among older adults. The act of exchanging social support may open

up opportunities for communication (Ryan et al. 1995), potentially increasing the fit between individuals and their social environment that allows older adults to feel accepted and motivated to engage in generative activities (Cheng 2009; Ehlman and Ligon 2012). Because previous research on FHH communication also showed the importance of social relationships (Koehly et al. 2009), enhancing social relationships, especially the reciprocal social interactions, within families may play key roles in facilitating the FHH communication among older adults. Future efforts to facilitate health communication may benefit from informing not only the older adults but also their younger family members about the importance of mutual social exchanges within the family. Because some younger family members report reluctance in sharing FHH information with older members (Forrest et al. 2008), facilitating such mutual exchange is not only likely to have positive implications on the psychological well-being of older adults themselves (Israel and Antonucci 1987) but also to help improve the accuracy of FHH shared within families.

About one quarter of familial network members were informed about FHH from the respondents, with half of their children and one quarter of siblings receiving information. This is consistent with the literature that shows rather low levels of communication about chronic disease FHH among the public (Yoon et al. 2004) and highlights our missed opportunities in chronic disease prevention especially among those at increased risk due to family history. The average size of the currently living network and levels of support exchange reported by the participants in this study were similar (Antonucci and Akiyama 1987) or slightly smaller than previously reported (Ashida and Heaney 2008) and is likely due to the current study's focus on the FHH communication network rather than an overall social support network.

Disseminating FHH information to biological children is especially important because these adult children can later inform the younger family members when they reach an appropriate age. Considering that FHH information about first- and second-degree relatives is particularly important in determining disease risks (Scheuner et al. 1997), these findings suggest the need to further facilitate FHH communication within the families of older adults and highlight the importance of older individuals acting as role models.

Consistent with the previous studies with a general adult population (Ashida et al. 2012), individual perceptions such as familiarity with one's own FHH and self-efficacy to share FHH may be important on the extent to which older adults disseminate this information. Although the effect of self-efficacy may partly be explained by respondents' perceived familiarity with FHH, these variables were not significantly correlated in this current study ($r=0.10$) suggesting their distinct importance. Adequate knowledge or familiarity about their own FHH is essential for older adults to share this information with family members. When knowledge is present, self-efficacy can increase one's belief about his/her own behavioral capability and may facilitate FHH sharing (McAlister et al. 2008). Therefore, future public health interventions should consider familiarity with FHH and self-efficacy as distinct areas to enhance by providing information or tools to help collect accurate FHH information from family members and to consolidate it for effective dissemination.

Most respondents believed that it was very important to reduce the risks of their family members encountering heart disease and cancer and that sharing FHH could help reduce their risks. These perceptions were not significantly associated with the levels of FHH communication when other factors such as social relationships, familiarity, and self-efficacy were accounted for in the multivariate model. However, high levels of outcome expectations and expectancies reported by the respondents in this study are encouraging and support previous reports that older adults are concerned about the well-being of future generations (Narushima 2005; Okun 1994; Trheurer and Wister 2010). In fact, a number of respondents in this current study expressed their intent to talk to their family members to obtain and share FHH after completing our interviews because answering questions during the interviews made them aware of its importance. Future studies are needed to determine whether increasing awareness by providing such cues to action would actually increase FHH communication.

Consistent with the report showing that those who were affected by chronic diseases were more likely to share FHH with their family members (Yoon et al. 2004), respondents with personal diagnosis of cancer in this study reported higher levels of FHH communication. Disease diagnoses within the family can act as cues to action and motivate family members

to engage in screening or other preventive behaviors. Future primary and secondary prevention efforts may elicit participation from older adults who have been diagnosed with such conditions not only to focus public health efforts on families that are at increased disease risk based on their family history but also because these older adults may be more motivated to disseminate FHH.

There are some limitations to this study that need to be considered when interpreting the results. All respondents were recruited from three senior centers in Memphis, TN, who could participate in social programs independently; thus, generalizability of the findings to older adults in other areas is limited. This was a cross-sectional study; thus, a longitudinal study would be needed to identify factors that can increase FHH information reach. In this study, we asked about cancer and heart disease which limits our ability to apply findings to other conditions or specific types of cancers or heart diseases. Self-reported responses are subject to social desirability and recall bias. Social support measures only reflected the respondents' current support exchange patterns (used as proxy indicators for familial culture over time) and may not accurately reflect the support exchange patterns present at the time FHH was actually shared with family members. Conducting future studies of FHH communication networks considering the perspectives of multiple family members will greatly inform practice in facilitating two-way communication and social exchanges among members.

Implications

Large proportions of first-degree-relatives were not being informed of their family health information from the respondents in this study. Because the majority of the participants in this study identified themselves as African American, the low levels of FHH communication observed may partly be explained by generally lower levels of FHH knowledge (Orum et al. 2010; Wideroff et al. 2010) and disease risk perceptions (Orum et al. 2010; Nsiah-Kumi et al. 2009) among African Americans compared to non-Hispanic Whites or low levels of health communication within African American families (Weinrich et al. 2002). The findings of this study suggest the benefits of considering the factors determining generative activities in order to understand the extent to which older adults communicate FHH with their family members in this population. We specifically examined and showed the potential importance of role models and quality of social relationships within families that can help create a family norm to encourage open communication.

In a previous study, older adults who participated in volunteering expressed a desire to provide a good example for future generations (Narushima 2005). Our participants also

expressed their desire to share FHH in order to facilitate chronic disease prevention among their family members. Thus, increasing the awareness of older family members about the importance of setting an example of sharing FHH to protect the health of their family members, even though they may feel reluctant to share undesirable information, may be beneficial. Participants who received FHH from a parent reported 41 % more family members with whom they shared FHH in this study. Encouraging older adults to act as role models of such FHH sharing behavior has the potential to trigger a positive cascading effect within families (Perrino et al. 2000). For example, an older adult sharing FHH with his or her adult children can encourage the behaviors of their own children to share it with their grandchildren, influencing the positive behaviors of the generations to come and potentially shifting the cultural norm within the family.

Individuals increasingly receive tangible support from others as they age (Kahn and Riley 1979); however, older adults also tend to provide more social resources to other family members than they receive, especially emotional support (Bengtson 2001; Giarrusso et al. 1995). FHH is a type of information older adults have that is very valuable to the health and well-being of their family members. In addition to the cultural factors discussed earlier, the low levels of FHH communication among older adults may also be due to not feeling that the information is being sought or valued by their family members, thus mitigating their motivation to share (Cheng 2009; Ehlman and Ligon 2012). Therefore, efforts to facilitate FHH dissemination within families should involve informing both older adults and their family members about the importance of collecting and sharing FHH information for the health of all family members. Such efforts will not only help facilitate the primary prevention of chronic diseases among family members but also motivate older adults to engage in generative activity that can bring numerous health benefits to them (Adams et al. 2010; Gruenewald et al. 2012; Gottlieb and Gillespie 2008).

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Conflict of interest Sato Ashida and Ellen Schafer declare that they have no conflict of interest.

Compliance with ethics guidelines All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

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