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Social Networks and Physical Activity Behaviors Among Cancer Survivors: Data From the 2005 Health Information National Trends Survey

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Abstract

The study examined the relation between social networks and physical activity behaviors among cancer survivors. The authors examined 873 cancer survivors (596 women, 277 men) 50 years of age or older who participated in the 2005 Health Information National Trends Survey.

Multivariate logistic regression analysis showed that survivors who talked about health with friends/family were more likely to pay attention to new physical activity recommendations (OR = 2.89, CI [1.01, 8.33]). Female survivors were more likely to pay attention to new physical activity recommendations (OR = 2.65, CI [1.55, 4.53]) and more likely to have seen, heard, or read physical activity/exercise and cancer information within the past 12 months (OR = 2.09, CI [1.13, 3.85]) compared with their male counterparts. For male survivors, those who were a member of at least one community organization were more likely to pay attention to new physical activity/exercise recommendations (OR = 5.31, CI [1.32, 21.22]) than the men who were not members. Overall, cancer survivors with a social network (i.e., talking to family/friends about health) were more likely to pay attention to new exercise recommendations compared with those who did not have a social network. Significant differences were also observed by gender with physical activity levels, knowledge, and attitudes. Social networking is an important component in cancer survivorship and further research is needed to encourage social networking strategies that might facilitate in increasing physical activity behaviors among cancer survivors.

The National Cancer Institute estimated that more than 13.6 million cancer survivors are living in the United States today (Siegel et al., 2012). Given the advances in early detection and treatment, about 65% of adults currently diagnosed with cancer are expected to survive 5 years after their diagnosis. Although the increased survival rates are encouraging, long-term cancer survivors are at a higher risk of developing physical and psychological chronic problems secondary to their cancer treatment (Eakin et al., 2006). Specifically, many cancer survivors suffer the problem of long-term and late effects related to survivorship such as cardiovascular disease, obesity, diabetes, osteoporosis, poor quality of life, and development of second primary cancers (Travis et al., 2006).

The important role of social support is often associated with the promotion of health behaviors (Israel & Schurman, 1990). Social support refers to the availability of persons who can be supportive when one has a problem, through behaviors such as empathic listening or providing needed tangible goods (Wills & Filer, 2001; Wills & Shinar, 2000). Moreover, beneficial social support has been identified through social networks and ties (Berkman & Glass, 2000; Heaney & Israel, 2002) and through relationships with friends and family members (Seeman, 1996).

Recent research has shown the importance of social networks on changing an individual's lifestyle behaviors and that the lack of social ties can reliably predict increased morbidity and mortality from cancer and other diseases (Kawachi et al., 1996; Kroenke, Kubzansky, Schernhammer, Holmes, & Kawachi, 2006). Social networks are defined as an individual's web of surrounding relationships (Berkman & Glass, 2000) and generally fall into two categories: structural or functional (Kang et al., 2007). Structural models focus on the network size, contact frequency, and type of social involvement. It is generally measured as a social integration score, which is a combined index of marital status, number of contacts with family and friends, and membership of a group organization (Kang et al., 2007; Kinney, Bloor, Martin, & Sandler, 2005; Loucks, Berkman, Gruenewald, & Seeman, 2005). Functional models evaluate an individual's perception of the types and qualities of relationships. It is usually measured by perceived instrumental and emotional support often provided by the members of the networks and the level of satisfaction of support (Due, Holstein, Lund, Modvig, & Avlund, 1999; Kang et al., 2007; Kinney et al., 2005). Both levels of networks are interrelated, since broader social structure increases the likelihood of entry to other forms of support (Lin, Ye, & Ensel, 1999).

Moreover, there is evidence that those who are integrated into a community (Berkman & Glass, 2000) and those who have access to information provided by community-based organizations, are more likely to have better health status (Redmond, Baer, Clark, Lipsitz, & Hicks, 2010). As such, the Structural Information Model of Health Communication provides an appropriate lens to explore the role of social networks in attention and adherence to physical activity recommendations (Viswanath, Ramanadhan, & Kontos, 2007). The Structural Information Model of Health Communication posits that differential communication outcomes (e.g., access, usage, attention, and processing of health communication messages) are influenced by antecedents such as socioeconomic status and geography, and the effects of those factors may vary by moderating conditions such as age, sex, race/ethnicity, and social networks. All structural antecedents are hypothesized to influence the information environment, thereby leading to differential communication behaviors that may, in turn, affect behavioral outcomes, such as knowledge, beliefs, and adoption of preventive behaviors, disease outcomes, incidence and mortality (Blake, Flynt-Wallington, & Viswanath, 2011; Viswanath et al., 2007).

The powerful effect of social networks on health behaviors have been studied in studies (Ye, Williams, & Xu, 2009) but little work has examined what aspects of social networks are important in prolonging survival and improving health behavior outcomes, among cancer survivors. One health behavior that has become of increasing interest in cancer research is the examination of physical activity and cancer survivorship showing that regular physical

activity might alleviate certain chronic conditions developed during survivorship (Fong et al., 2012; Schmitz et al., 2005). A recent review of physical activity interventions for cancer survivors showed that regular physical activity had positive effects on physiology, body composition, physical functions, psychological outcomes, and quality of life in breast cancer patients and reduced body mass index, body weight, increased peak oxygen consumption, peak power output, and improved quality of life among other cancer patients (Fong et al., 2012). The American Cancer Society recommends that cancer survivors should participate in at least 150 min per week of moderate-intensity exercise that is safe, effective, and enjoyable (Rock et al., 2012). However, less than 20% of adult cancer survivors are meeting the recommended physical activity guidelines, which may increase risk of developing a chronic illness, recurrence, or a new secondary cancer (Blanchard, Courneya, & Stein, 2008; Hamer, Stamatakis, & Saxton, 2009).

Having a social network has been identified as a positive factor of physical activity and other health behaviors in cancer survivors (Anderson-Bill, Winett, & Wojcik, 2011; Barber, 2012; McNeill, Wyrwich, Brownson, Clark, & Kreuter, 2006; Molloy, Dixon, Hamer, & Sniehotta, 2010). The association between social network and health was originally written by Durkheim (1951), describing “that the lack of social networks predicted mortality from almost every case of death (Berkman, Glass, Brissette, & Seeman, 2000). The most commonly examined feature of social networks with regards to cancer outcomes has been social network size (Kroenke et al., 2013) where studies have found cancer survivors with larger networks (i.e., greater social integration) had better chances of survival and quality of life (Beasley et al., 2010; Chou, Stewart, Wild, & Bloom, 2012; Kroenke et al., 2006; Kroenke et al., 2013; Pinqart & Duberstein, 2010).

Despite a growing body of research which has assessed the importance of social networks and physical activity, little is known about the role of social networks as a facilitator of physical activity engagement in adult cancer survivors. One of the main limitations of previous research among cancer survivors is that most of the participants in previous studies were breast cancer survivors (Barber, 2012). More research is needed to understand the effects of social networks on physical activity behaviors and to develop gender specific social network and support strategies to help increase physical activity engagement in adult cancer survivors. A better understanding of the effects in different types of social networks on physical activity among cancer survivors might help the design of future social networking interventions allowing researchers to focus their attention on the most salient behavioral determinants. Thus, the primary goal of this study was to use the data from a national health communication survey called Health Information National Trends Survey (HINTS; Nelson et al., 2004) to examine the association between social networks and physical activity behaviors such as reported levels, attitude, and knowledge among cancer survivors, and whether gender modifies the association in social networks and physical activity behaviors among cancer survivors. Because of the limitation of measures in this dataset, we examined social networks focusing on the structural level, which is the three items of social networks (i.e., marital status, communication with friend and family, and membership of a community organization) and the availability of each social tie (Ye et al., 2009).

Method

Study Design and Participants

Data were obtained from the 2005 HINTS, a cross-sectional national health communication survey conducted by the National Cancer Institute. The aim of this biennial survey was to collect information about health communication, cancer history, general cancer knowledge, cancer-specific risk and screening, primary cancer risk behaviors, health status, and demographics (Nelson et al., 2004). The survey used random digit dialing samples for all telephone exchanges in the United States. The 2005 data were collected from February through August in 2005. The response rate for the household level screener interviews was 34% and 61.3% for the extended interviews. The data were weighted to be nationally representative and minorities were oversampled to adequately represent minority populations. Our eligible participants included those who reported *yes* to the question, “Have you ever been diagnosed as having cancer?”

Measures

Demographics—Demographics measures included age, reported average body mass index (kg/m^2), self-reported health status, race/ethnicity, education, household income, family history of cancer, and insurance.

Social Networks—The measure of social networks was focused on the structural level, which is reflected by network size, contact frequency, and type of social involvement (Kang et al., 2007). Specifically, the measure of structural social networks was based off previous research by Ye and colleagues (2009) assessing the responses to the survey on marital status, having friends or family members that one can talk about his or her health, and community organization membership. This is a modified version of the Berkman-Syme Social Network Index, which is a validated tool in categorizing the levels of social networks in previous studies (Fratiglioni, Wang, Ericsson, Maytan, & Winblad, 2000; Kawachi et al., 1996; Michael, Berkman, Colditz, Holmes, & Kawachi, 2002; Ye et al., 2009). These social network variables were used to demonstrate the contrast between different degrees of richness of social networks (Fratiglioni et al., 2000) and to examine whether social isolation was negatively related to physical activity levels, knowledge, and attitudes.

Physical Activity—Reported physical activity levels was measured by multiplying number of days and minutes per day of moderate-intensity physical activity or exercise comparable to walking as if in a hurry. This total amount (minutes/week) was used to examine the percentage of whether or not cancer survivors are meeting American Cancer Society–recommended physical activity levels of 150 min a week of moderate-intensity physical activity (Rock et al., 2012). Responses for physical activity attitude were measured accordingly to the question, “When a new physical activity/exercise recommendation comes out, do you ...” (pay attention to it; ignore it; don’t know) and for physical activity knowledge, “In the past 12 months, have you seen, heard, or read anything about PA/exercise and cancer (yes/no)?

Data Analysis

Data were analyzed using SAS 9.2. The HINTS dataset provides sample weights for each sampled case and the SAS complex module was used to take into account the complex sampling design and to adjust for population sampling weight. Descriptive statistics for the characteristics, social networks, and physical activity behaviors of the overall sample, and male and female cancer survivors were presented. All data were reported in percentages after adjusting for weighting. *P* values from chi-square or *t* test analyses were used to compare differences between gender for demographics, social networks, and physical activity behaviors. For comparison purposes, multivariate logistic regression analysis were conducted for overall, women, and men to assess the independent association of each aspect of social networks with physical activity behaviors, with adjustment for the two other variables (i.e., social networks or physical activity behaviors), age, body mass index, ethnicity, education, income, health status, family history of cancer, and insurance. Variables in the model were analyzed by the Wald test and interpreted using odds ratios and 95% confidence intervals. Missing values for each independent variable were handled by creating a category for missing or unknown data values that was included in the regression model. Significance was determined at the $p < 0.05$ level.

Results

Table 1 describes the background characteristics for female and male cancer survivors. Of the 5491 participants that completed the 2005 HINTS survey, 873 met our study criteria (i.e., cancer survivor) which included 596 women and 277 men. The mean age of our sample was 64.5 years and most participants identified themselves as Non-Hispanic Whites (80.6%). There were significant gender differences in age, education, type of cancer, health status, family history of cancer, and insurance. Specifically, men were older, had higher education, higher self-reported health status (i.e., excellent to very good), higher percentage of having insurance (92.9%), and had lower percentages of having a family member with cancer (69.3% vs. 77.7%). Also, women were more likely to report having breast cancer (27.0%), gynecologic cancer (26.1%), or skin cancer (24.4%), whereas most men reported having skin cancer (33.1%) or genitourinary cancer (30.8%).

Table 2 describes social networks and physical activity behaviors among cancer survivors. In terms of social networks, male cancer survivors were more likely to be married (78.3% vs. 57.6%), but their female counterparts were more likely to have friends or family that they could talk about their health (83.8% vs. 75.1%). There were no significant differences in percentages of membership of one or more community organizations. For physical activity behaviors, male cancer survivors had a significantly higher percentage of reported physical activity levels of at least 150 min per week (56.6% vs. 41.6%), but female cancer survivors were more likely to pay attention when a new physical activity/exercise recommendation comes out (32.7% vs. 26.6%) and more likely to have seen, heard, or read anything about physical activity/exercise and cancer within the past 12 months (20.3% vs. 14.7%).

The association between physical activity behaviors and social network characteristics were further examined in separate logistic models adjusted for covariates (see Table 3). For both

male and female cancer survivors, those who talked about health with friends or family were more likely to pay attention to new physical activity/exercise recommendations (OR = 2.89, 95% CI [1.01, 8.33]). Regarding gender specific associations, the only significant association was among male cancer survivors who had one or more memberships of community organizations were more likely to pay attention to new physical activity/exercise recommendations (OR = 5.31, 95% CI [1.32, 21.22]). It is of interest to note that female cancer survivors who communicated with friends and family about health were more likely to have seen, heard, read anything about physical activity and cancer but for men communicating with friends and family about health had an opposite effect. Also, whereas men who reported to have one or more memberships in community organizations were more likely to have seen, heard, read about physical activity and cancer knowledge, women who were in a community organization lead to a lower association of seeing, hearing, or reading anything about physical activity and cancer for the past 12 months.

Discussion

This study examined the association between social networks and physical activity behaviors among male and female cancer survivors. Our main findings showed that cancer survivors who talked with family and friends about health were more likely to pay attention to new exercise recommendations. Results were consistent with previous research in cancer survivors, showing that more social networks lead to higher physical activity behaviors (Matthews et al., 2007; Rabin, Pinto, Trunzo, Frierson, & Bucknam, 2006). In general, there are multiple ways that social networks might influence physical activity behaviors. Social relationships may help regulate social behavior, including health-related behaviors (Ye et al., 2009). Social networking also involves regulation, influence, and constraints that might directly and indirectly stimulate healthy behaviors (Lewis & Rook, 1999; Umberson, 1992). Also, individuals with more social ties may have more resources to obtain health information and help deal with the psychological distress related to cancer survivorship (Seeman, 1996).

Significant differences by gender were observed with physical activity behaviors. Male cancer survivors reported higher levels of physical activity, while their female counterparts reported to have more social networks (except for marital status), were more likely to pay attention to physical activity recommendations, and more likely to look for information about exercise and cancer. Previous research has shown that men and women structure their personal networks differently and that certain types of social networks have different functions for them (Antonucci & Akiyama, 1987; Umberson, 1992). These gender difference findings might suggest that female cancer survivors are more information scanners compared with their male counterparts. The term *information scanning* is commonly defined as acquired information that happens with routine patterns of exposure from mediated and interpersonal sources that can be recalled with a minimal prompt (Atkin, 1973; Griffin, Dunwoody, & Neuwirth, 1999; Niederdeppe et al., 2007). Examples of information scanning are browsing news media, paying attention to health content in regular television viewing, hearing cancer information from friends, family, or physicians (Kelly et al., 2010; Niederdeppe et al., 2007). Information scanning may not always be relevant to decision making but previous research has shown that seeking relevant health information

that cancer patients encounter daily (i.e., exercises to prevent recurrence) may influence making actual health behavior changes (Niederdeppe et al., 2007). Findings from the current study suggest that more research efforts are needed in physical activity information scanning and seeking behaviors among cancer survivors to better help understand information scanning types and methods to help increase actual physical activity levels, especially among female cancer survivors. Our results also showed that having membership in at least one community organization lead to a higher percentage of paying attention to new physical activity/exercise recommendations only among male cancer survivors. From these results, it may be likely that membership in a community organization may stimulate awareness about new physical activity recommendations, supporting the benefits of community membership to increase awareness of healthy behaviors for male cancer survivors.

Overall, these relations indicate and support that health-related personal interaction is important but the types of social networks to stimulate health behaviors might differ across gender for cancer survivors. These findings also suggest the need of more gender specific studies among cancer survivors given that most studies examining social networks and physical activity among cancer survivors have been breast cancer survivors (Barber, 2012). Although there was no direct comparison by cancer type, the current study expands upon previous research by examining social networks and physical activity behaviors among a more diverse sample of non-breast cancer survivors such as survivors of skin cancer (28.3%), gynecologic cancer (14.6%), and genitourinary cancer (14.6%). These results may especially be useful for future researchers interested in social networks and physical activity among non-breast cancer survivors and extends upon current literature that communicating about health with friends and family may help cancer survivors pay more attention to current physical activity guidelines and that community membership for male cancer survivors might be an important factor to promote physical activity behaviors. For example, targeting community-based centers such as public recreation centers or senior centers to promote physical activity behaviors for male cancer survivors might be a future study of interest.

Study Limitations

Limitations were identified in this study, which may limit the conclusions that can be drawn from the analysis. The findings are based on a single cross-sectional national survey, thus the casual relation between social networks and physical activity behaviors cannot be fully determined and for the purposes of this study, we did not investigate reverse causality where the observed effects may go the opposite direction of that proposed. Future investigation is warranted to examine whether there are reverse causality effects in physical activity behaviors and social networks among cancer survivors. Some responses (i.e., physical activity attitudes) had high percentages (~50%) of missing data which is also noted as a limitation. In addition, the small sample size of men compared with women also limits generalizability of our findings. Moreover, the three social network items and physical activity behaviors do not represent the full range of other social networks that are relevant to physical activity behaviors. However, with limited current research done in this field, this study adds important information about public opinions on social networks and physical activity behaviors among cancer survivors, especially with male cancer survivors. Last, the 2005 HINTS data might not reflect current social network and physical activity trends

among cancer survivors. However, the current social network and physical activity questions presented in this study were only offered in the 2005 HINTS version. There might be a need to add the questions asked in 2005 into newer versions of HINTS in order to understand the current trends. Regardless, with the limited knowledge in social networks and physical activity behaviors, this study extends upon the importance of social networks in promoting physical activity for cancer survivors.

Conclusions

This study provides new information regarding perceptions and beliefs about social networks and physical activity behaviors among cancer survivors. Specifically, findings from this study demonstrated that among both genders, socially isolated cancer survivors are less likely to engage in physical activity behaviors compared with those with higher levels of social networks. Family and friends of cancer survivors may be used as facilitators to pay more attention to current exercise guidelines. This study also allows us to predict effective gender specific social networks that might affect physical activity behaviors among cancer survivors. The gender differences noticed further supports the need for more research into the social contexts and meaning of various elements of social networks (Ye et al., 2009) and by cancer type. For example, studies that target male cancer survivors to promote membership in a community organization might facilitate the importance of new knowledge in physical activity behaviors. Future studies may also want to investigate further by examining the social network and physical activity behavior differences among cancer type, current stage of cancer, and by the time of diagnosis. With less than 20% of adult cancer survivors meeting the recommended physical activity guidelines of at least 150 min per week of moderate-intensity physical activity (Blanchard et al., 2008; Hamer et al., 2009), more research is needed to develop and encourage social networking strategies to increase physical activity engagement in cancer survivors.

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Table 1Study characteristics of cancer survivors, by gender ($N = 873$)

| Characteristic (%) | Total survivors ($N = 873$) | Women ($n = 596$) | Men ($n = 277$) | p^a |
|----------------------|-------------------------------|---------------------|-------------------|--------|
| Age (years) | | | | |
| 18–34 | 5.1 | 7.3 | 2.3 | .010 |
| 35–49 | 17.5 | 20.2 | 14.2 | |
| 50–64 | 32.2 | 29.1 | 36.0 | |
| 65–74 | 22.7 | 21.7 | 24.2 | |
| 75+ | 22.4 | 21.6 | 23.3 | |
| Unknown | 0.1 | 0.1 | 0 | |
| Ethnicity | | | | |
| Non-Hispanic Whites | 80.6 | 79.9 | 81.5 | .56 |
| Non-Hispanic Blacks | 4.8 | 5.9 | 3.4 | |
| Hispanic | 4.9 | 5.3 | 4.4 | |
| Non-Hispanic other | 3.1 | 2.9 | 3.5 | |
| Unknown | 6.6 | 6.1 | 7.2 | |
| Education | | | | |
| <High school | 13.6 | 15.6 | 11.1 | .043 |
| High school graduate | 30.2 | 29.1 | 31.7 | |
| Some college | 29.5 | 32.2 | 26.0 | |
| College graduate | 22.7 | 19.0 | 27.3 | |
| Unknown | 4.0 | 4.1 | 3.9 | |
| Income (US\$) | | | | |
| <25 K | 25.2 | 27.0 | 22.8 | .085 |
| 25K–50 K | 21.5 | 20.0 | 23.4 | |
| 50K–75 K | 15.5 | 11.8 | 20.3 | |
| 75K+ | 18.1 | 18.2 | 18.1 | |
| Unknown | 19.7 | 23.0 | 15.4 | |
| Health Status | | | | |
| Excellent | 8.8 | 7.7 | 10.2 | .022 |
| Very good | 26.3 | 24.9 | 28.1 | |
| Good | 30.8 | 33.0 | 27.9 | |
| Fair | 22.1 | 25.3 | 17.9 | |
| Poor | 8.5 | 5.4 | 12.5 | |
| Unknown | 3.5 | 3.7 | 3.4 | |
| Type of cancer | | | | |
| Breast | 15.1 | 27.0 | 0.1 | <.0001 |
| Skin (melanoma) | 28.3 | 24.4 | 33.1 | |
| Gynecologic | 14.6 | 26.1 | — | |
| Genitourinary | 14.6 | 1.9 | 30.8 | |
| Gastrointestinal | 7.8 | 5.2 | 11.1 | |
| Other ^b | 18.3 | 14.9 | 22.7 | |

| Characteristic (%) | Total survivors (N = 873) | Women (n = 596) | Men (n = 277) | <i>p</i> ^a |
|--------------------------------------|---------------------------|-----------------|---------------|-----------------------|
| Any family members have cancer? | | | | |
| Yes | 75.0 | 77.7 | 69.3 | .01 |
| No | 24.1 | 21.1 | 30.3 | |
| Insurance (yes) | 89.9 | 87.6 | 92.9 | .02 |
| Body mass index (kg/m ²) | | | | |
| <25 (normal) | 36.0 | 39.6 | 31.3 | .11 |
| 25–30 (overweight) | 36.0 | 31.2 | 42.1 | |
| 30 + (obese) | 22.2 | 21.9 | 22.7 | |
| Unknown | 5.8 | 7.3 | 3.9 | |

Note. Percentages after adjusting for weighting.

^a *p* < .05.

^b Other types of cancer include head and neck, hematologic, thyroid, musculoskeletal, and lung.

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Table 2

Social networks and physical activity levels, attitudes, and knowledge among cancer survivors, by gender ($N = 873$)

| Characteristic | Total survivors ($N = 873$) | Women ($n = 596$) | Men ($n = 277$) | p^a |
|---|-------------------------------|---------------------|-------------------|--------|
| Social networks | | | | |
| Marital status (yes %) | 66.7 | 57.6 | 78.3 | <.0001 |
| Friends/family for health communication (yes %) | 80.0 | 83.8 | 75.1 | .015 |
| Membership of community organization (yes %) | 58.1 | 59.5 | 56.4 | .47 |
| Reported physical activity levels: <150 min/week of moderate-intensity physical activity (%) | 48.2 | 41.6 | 56.6 | <.01 |
| Physical activity attitudes: When a new physical activity/exercise recommendation comes out do you ...? (%) | | | | |
| Pay attention to it | 30.0 | 32.7 | 26.6 | <.01 |
| Ignore it | 19.7 | 15.5 | 25.0 | |
| Unknown | 50.2 | 51.7 | 48.4 | |
| Physical activity knowledge: In the past 12 months, have you seen, heard, or read anything about physical activity/exercise and cancer? (yes %) | 17.8 | 20.3 | 14.7 | .01 |

Percentages after adjusting for weighting.

^a $p < .05$.

Table 3Associations between gender, social networks, and physical activity behaviors ($N = 873$)

| Variable | Overall OR ^a (95% CI) | Women OR ^b (95% CI) | Men OR ^b (95% CI) |
|---|----------------------------------|--------------------------------|------------------------------|
| <i>Reported physical activity levels (≥ 150 vs. < 150 min/week)</i> | | | |
| Gender | | | |
| Men | Ref. | | |
| Women | 0.45 (0.29, 0.69) | | |
| Marital status | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 1.47 (0.96, 2.24) | 1.37 (0.76, 2.44) | 1.93 (0.51, 7.24) |
| Friends/family for health communication | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 1.47 (0.93, 2.33) | 1.01 (0.48, 2.10) | 2.09 (0.70, 6.17) |
| Membership of community organizations | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 1.07 (0.63, 1.78) | 1.06 (0.58, 1.94) | 0.82 (0.31, 2.19) |
| <i>Physical activity attitudes (pay attention vs. ignore)</i> | | | |
| Gender | | | |
| Men | Ref. | | |
| Women | 2.65 (1.55, 4.53) | | |
| Marital status | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 0.76 (0.28, 2.02) | 0.89 (0.20, 3.93) | 0.52 (0.10, 2.71) |
| Friends/family for health communication | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 2.89 (1.01, 8.33) | 3.79 (0.71, 20.15) | 2.98 (0.50, 17.63) |
| Membership of community organizations | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 1.72 (0.94, 3.15) | 1.05 (0.44, 2.55) | 5.31 (1.32, 21.22) |
| <i>Physical activity knowledge (with knowledge vs. no knowledge)</i> | | | |
| Gender | | | |
| Men | Ref. | | |
| Women | 2.09 (1.13, 3.85) | | |
| Marital status | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 0.76 (0.34, 1.68) | 0.81 (0.26, 2.43) | 0.85 (0.13, 5.23) |
| Friends/family for health communication | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 0.89 (0.37, 2.09) | 1.94 (0.32, 11.70) | 0.47 (0.12, 1.71) |
| Membership of community organizations | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 1.16 (0.60, 2.24) | 0.86 (0.36, 2.02) | 1.77 (0.10, 30.74) |

^a Each variable in the table is adjusted for gender, age, body mass index, ethnicity, education, income, insurance, family members having cancer, and health status.

^b Each variable in the table is adjusted for age, body mass index, ethnicity, education, income, insurance, family members having cancer, and health status.

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