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The Association Between Social Factors and Physical Activity Among Low-Income Adults Living in Public Housing

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Abstract

Objectives—We sought to examine the association between structural, functional, and normative social factors and physical activity among urban, low-income, racially/ethnically diverse adults.

Methods—We conducted a baseline cross-sectional survey among residents of 12 low-income housing communities in metropolitan Boston, Massachusetts. Participants were also asked to wear a pedometer for 5 days. We analyzed complete data from 1112 residents (weighted n=1635).

Results—Residents with smaller social networks were significantly less physically active than were residents with larger social networks (b=–1503.7; *P*=.01) and residents with conflicting demands were more active than were residents with none (b=601.6; *P*=.01), when we controlled

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Contributors

R. C. Shelton took the lead in conceptualizing the analyses, interpreting the data, and drafting the article. L. H. McNeill assisted with conception and interpretation of data analysis and revising the article. E. Puleo took the lead in analyzing the data and conducting statistical analyses. K. Y. Wolin contributed to interpretation of the data and revision of the article. K. M. Emmons supervised all aspects of the study including data collection, study design, and data interpretation, and contributed to revision of the article. G.G. Bennett contributed to supervision of data collection and data interpretation, and assisted with revision of the article. All authors approved the final version of the article.

Human Participant Protection

The study protocol involved human participants and was approved by the Human Subjects Committee at the Harvard School of Public Health.

for employment status, gender, poverty level, current health status, age, and perceived safety. Social networks were most strongly associated with physical activity among Hispanics and younger residents (aged 18–35 years).

Conclusions—These findings indicate that social factors, including social networks and role-related conflicting demands, may be important drivers of physical activity among low-income populations. Researchers and practitioners should consider social factors in developing multilevel physical activity interventions for this population.

A large proportion of adults in the United States remains physically inactive, despite consistent evidence of the benefits of reduced chronic disease morbidity and mortality that regular physical activity confers.[1] As with many health behaviors, patterns in physical activity differ according to a number of sociodemographic factors including age, race/ethnicity, gender, and work status.[2–6] Increasing participation in physical activity among all segments of the population necessitates understanding the determinants of physical activity that can then be effectively targeted through programs and policies.

Recognition is growing of the role the social environment has in influencing physical activity.[5,7,8] The research conducted in this area suggests that a range of potentially modifiable social factors plays an important role in shaping physical activity patterns. These factors may be organized as: (1) structural, which may include the existence and quantity of social ties,[9] as well as the roles and responsibilities that may stem from one's social position and life circumstances[10,11]; (2) functional, including perceptions of social support[12] and social cohesion[13]; and (3) normative, pertaining to social norms for physical activity.[14,15]

With respect to structural social factors, evidence of associations with physical activity has been mixed. For example, some studies have found a significant positive association between marital status and physical activity,[16] whereas other studies report no association.[17,18] However, other social network indicators (e.g., network size, frequency and quantity of contact, homogeneity) have been associated with energy expenditure, exercise adherence, and increased level of physical activity.[19–21] Participation or membership in groups has also been identified as a potentially important factor that may influence physical activity.[22,23] Additionally, having multiple role-related responsibilities or demands stemming from social or familial relationships or one's social position may have important consequences for health behaviors,[10,11,24] and these factors may be particularly influential among lower-income populations.[19,25,26]

With respect to functional aspects, social support from friends and family and having a companion for activity have consistently emerged as important correlates of leisure-time physical activity and walking.[17,22,27–37] Some evidence has shown that greater levels of social capital, social cohesion, trust of neighbors, and sense of community are associated with greater participation in leisure-time physical activity[38,39] and higher levels of walking for leisure and transportation.[40–43] By contrast, much of the literature on social norms and normative influences has reported no or weak associations with physical activity,[5] with some exceptions.[19,44]

Although researchers are beginning to understand the important role of social factors in relation to physical activity, very little is still understood about how these factors influence low-income, racially/ethnically diverse populations who bear a disproportionate burden of chronic disease incidence, morbidity, and mortality. The current research was guided by the social–contextual framework, conceptualized by Sorensen et al.[25] to inform the development of cancer prevention interventions among working-class, multiethnic populations. This transdisciplinary framework recognizes that health behaviors occur within a larger social context, and identifies factors across multiple levels (e.g., interpersonal, community) that

may influence health behaviors and outcomes, directly or indirectly, through mediating mechanisms. McNeill et al.[45] provided conceptual model.

We investigated whether a range of social factors contributes to differences in physical activity among urban, racially/ethnically diverse adults living in low-income housing. We extended the social–contextual framework to enhance the specificity and organization of the social factors being considered. Specifically, we conceptualized social factors as (1) structural (social networks, social participation, conflicting demands, and role responsibilities); (2) functional (general social support, social support for physical activity, and social cohesion); and (3) normative (social norms). We hypothesized that each of these social factors would be positively associated with physical activity. We also examined whether female gender, racial/ethnic minority status, and age moderated these associations, as these populations are typically believed to be less active and suffer a disproportionate burden of activity-related chronic disease.

METHODS

We used baseline data collected between 2004 and 2005 from a cluster randomized controlled trial of a colorectal cancer prevention intervention. Twelve low-income housing communities in metropolitan Boston, Massachusetts, served as the primary sampling units, and individuals within sites served as secondary sampling units. We took a census sample in smaller sites with fewer than 300 residents (n=6). In sites with more than 300 residents (n=6), we drew a random sample to obtain a 35% sample with at least 250 participants per site. Detailed information on sampling and recruitment was provided previously.[45,46] Eligibility criteria included (1) residing within the housing community, (2) being at least 18 years old, (3) fluency in English or Spanish, and (4) not currently undergoing cancer treatment.

Baseline surveys were completed by 1554 participants with an overall response rate of 53% (range: 34% to 92% across sites). We conducted the analyses among a subsample of residents who (1) were ambulatory and could provide pedometer data, and (2) completed the full baseline survey. We excluded 374 residents because they did not have pedometer data, as a result of being nonambulatory or having an insufficient amount of observations to provide an accurate measure. We excluded an additional 68 residents because they were administered a shorter version of the survey (because of factors such as scheduling or limited time) that did not ask about social factors. Participants not included in these analyses were more likely to be older, disabled or unemployed, and born outside the United States compared with their participating counterparts. A total of 1112 residents served as the final sample.

Survey and Measures

All participants provided informed consent and completed an interviewer-administered survey in English or Spanish. A $25 grocery store gift card was provided as an incentive following data collection.

Physical activity was measured with pedometers (Yamax SW200, Tokyo, Japan). The pedometer protocol has been previously described in full detail.[47] In brief, participants were asked to keep their regular daily routine and wear a pedometer for 5 days from the time they woke up until they went to bed, except when bathing, showering, swimming, and sleeping. Participants recorded information about the time during which the pedometer was worn in a log. Physical activity was treated as a continuous outcome, defined as the average number of steps per day across valid days (e.g., days where the minimum wear time of 8 hours/day was met).

Structural social factors—We used an adapted version of Berkman's measure to assess personal social network,[48] reflecting the size of social networks (the structure of social relationships that surround an individual; Table 1). On the basis of the distribution of responses, we categorized this as 0–1, 2, or 3+ for these analyses. Although participation in organizations is typically included in this measure, we examined this question separately to better evaluate this factor's independent influence. We assessed organized social participation by asking participants whether they are an active member of any groups or clubs (categorized as 0, 1, and 2+). We measured role responsibilities by asking participants how much responsibility they have for household and financial duties, categorized as none or some responsibilities. We measured conflicting demands by asking participants whether their daily activities make conflicting demands on them (yes or no).

Functional social factors—We assessed general social support with 5 questions about emotional, financial, and instrumental support, based on the domains of the Inventory of Socially Supportive Behaviors,[49] categorized here as 0–4 and 5. We based social support for physical activity on 2 items assessing perceived family or friend support of exercise, categorized here as none (0), low (1), medium (2–3), and high (4–6). We assessed social cohesion, defined here as the extent of connectedness and solidarity among groups in society,[13] by using a measure that assesses perceptions of trust and shared values in one's neighborhood.[50] A summary score ranged from 1 to 4 with higher scores indicating higher social cohesion.

Normative social factors—We measured social norms by using 2 items that assessed perceptions of friends' and family members' own physical activity, categorized here as 0–1 or 2–3.

Sociodemographic variables and covariates—Participants reported their race and ethnicity, categorized here as Black, Hispanic, and White/Other (because of low sample size in the latter group). Nativity was measured by asking people to report where they were born and was categorized into born in the United States, born in Puerto Rico, or born outside the United States and Puerto Rico. We determined whether residents were categorized as (1) at or below or (2) above poverty level by combining yearly household income and the number of people supported by that income.[51] We used standard demographic questions to measure gender, age, employment, education, and language preference. We also collected data on perceived neighborhood safety[46] and current health status (e.g., any health problems that make it hard to exercise).

Statistical Analyses

For all analyses, we used resident-level data, accounting for the complex cluster sampling design. We weighted data up to the population size within each housing site, based on the cluster design (weighted n=1635). We first calculated base weights, which weighted the sample to reflect the population size within each housing site.[52] Our nonresponse adjustment to these weights was based on gender and age category (<50 years; ≥50 years) because we assumed that these variables defined response rate cells in which individuals had equal probability of responding. Because we found the data for steps per day to be nonnormally distributed, we used a square root transformation to achieve normality. We used both transformed and nontransformed steps per day data to examine models (using robust standard errors). Results were similar in coefficient size and direction and had equivalent levels of significance. We report nontransformed data to ease interpretation.

We first conducted separate age-adjusted bivariate models predicting steps per day for potential covariates and the social variables. We conducted multivariable linear regression

models to examine the main effect association between each significant social variable and steps per day, including theoretically relevant covariates that were significant at the *P* =.15 level in bivariate age-adjusted analyses. To evaluate effect modification, we examined separate bivariate models for interaction terms of interest among social factors that remained significant in multivariable main effect models. For these bivariate interaction analyses, we examined whether the association between each significant social factor and steps per day was moderated by gender, race/ethnicity, and age. Because of the limited degrees of freedom available in cluster designs, we conducted stratified multivariable models for those interaction terms that were significant (*P* = .05). In all analyses we used SUDAAN version 9.01 (Research Triangle Institute, Research Triangle Park, NC) and SAS version 9.1 (SAS Institute, Cary, NC) statistical software for clustered data.

RESULTS

Sociodemographic characteristics of the sample are described in Table 2. The mean age of the sample was 48.1 years (SE=0.43; range: 18–94). The mean body mass index was 30.1 kilograms of weight divided by meters in height squared (SE=0.24; median=29.0; SE=0.27), and participants took an average of 5678.6 steps per day (range: 500–20000). In separate age-adjusted bivariate models, social networks (*P* <.001), social cohesion (*P* =.01), and role responsibilities (*P* =.04) were significantly and positively associated with steps per day, and conflicting demands reached borderline significance (*P* =.08; Table 3).

Social networks remained positively and significantly associated with steps per day in the multivariable model (*P*<.001), when we controlled for employment status, gender, age, poverty level, race/ethnicity, current health problems, and neighborhood safety (Table 3). Compared with residents with a larger social network (score of 3+), those with smaller social networks were significantly less active; residents with social network scores of 0–1 ties took an average of 1567.5 (SE=495.5) fewer steps per day and those with scores of 2 took an average of 399.4 (SE=230.6) fewer steps per day. Social cohesion was no longer significant in multivariable analyses (*P*=.26; b=171.4; SE=159.1), when we controlled for the same covariates (data not shown).

Although significant in bivariate models, role responsibilities dropped out in multivariable analyses (*P*=.42; b=313.1; SE=387.3). However, the effect of conflicting demands strengthened in relation to steps per day in multivariable models; those with conflicting demands were more active than were those with no conflicting demands (*P* = .01; b= 571.9; SE = 228.1; Table 3). Although only a relatively small proportion of residents walked more than 10000 steps per day (15.1%), we explored whether social factors were associated with the dichotomous outcome, but found that none were significant in multivariate models (data not shown). We built a final multivariable model for continuous steps per day that included both primary exposure variables. When we controlled for covariates, both social networks and conflicting demands remained statistically significant; residents with conflicting demands took 601.6 (SE= 231.5) more steps per day than did residents with no conflicting demands (*P* = .01), whereas residents with smaller social networks took 1503.7 (SE= 510.9) fewer steps per day than did residents with larger social networks (*P* = .01; Table 3).

We examined whether the association between social networks and steps per day varied by several factors that were selected a priori: gender, race/ethnicity, and age (the latter measured categorically). We first explored these interaction terms in separate bivariate models, and found that the interactions between race/ethnicity and social networks and age and social networks were both significant (*P*=.04 and *P*<.001, respectively). We examined main effect multivariable models stratified by race/ethnicity and found that the social networks factor was strongly associated with steps per day for Hispanics (*P*<.001), but was

not for Blacks (*P*=.2) or the White/Other group (*P*=.16), when we controlled for current health problems, employment status, gender, poverty level, safety, and age (Table 4). Hispanics with smaller social networks took on average 2415.5 (SE=685.7) fewer steps per day than did Hispanics with larger social networks. We also examined main effect multivariable models stratified by age, and found that social networks was highly significant for those aged 35 years or younger (*P*<.001), after we controlled for the same covariates (Table 4). Residents aged 18 to 35 years with no or very few social ties took on average 2657.9 (SE=678.8) fewer steps per day than did 18- to 35-year-old residents with a larger social network. There were no significant interactions for conflicting demands.

DISCUSSION

We investigated the influence of social factors on physical activity among a large sample of low-income, multiethnic public housing residents. In a population with low average levels of physical activity, we found that several social factors were important correlates of pedometer-measured physical activity.

With respect to social networks, residents with no or very few social ties took an average of more than 1500 fewer steps per day than did residents with a larger social network. This difference is striking when one considers that the mean steps per day among this population is already very low (~5600), close to previously identified thresholds for sedentary physical activity and well below levels of physical activity among the general US population.[47,53–55] This finding suggests that having limited social networks may be a risk factor for physical inactivity among this population. Our findings are consistent with earlier literature on social networks and physical activity,[19–21] and suggest that the quantity of social ties has important implications for physical activity among low-income housing residents.

Differences in this association were found by age and by race/ethnicity, such that social networks were most important among Hispanic and younger residents (aged 18–35 years). Among young adults and Hispanics, social network ties was a very strong correlate, with younger and Hispanic socially isolated residents taking about 2500 fewer steps per day (equivalent to more than a mile a day) than did their counterparts with more social network ties. Among young adults, this social isolation may influence motivation and opportunities to be active, or may reflect lack of social engagement or participation in unhealthy behaviors that reduce mobility. Among some Hispanics, issues related to immigration status (e.g., living in and adjusting to a new country) may enhance isolation and limit opportunities for activity. More research among larger samples is needed to investigate these issues, using both qualitative and quantitative methods.

A number of mechanisms exist through which social networks may influence physical activity, including providing access to role models, forming a sense of connectedness with others, providing feedback and information, developing healthy coping mechanisms, and facilitating access to resources and material goods that support activity.[56] Social ties may also impact physical activity levels through provision of social support and development of social norms that support or constrain physical activity,[9,12] although these factors were not significant predictors of pedometer-measured physical activity in this study. Future research should continue to investigate mediating mechanisms for this association. In addition, our measure of personal social network focused on 1 aspect of social networks (size). Future studies should also examine other characteristics of the social ties (e.g., quality of relationships), including aspects of networks themselves (e.g., homogeneity, density).

Although less striking in magnitude, we also found that residents with conflicting demands had higher levels of pedometer-measured activity, taking on average nearly 600 more steps

per day. This finding is similar to that of Emmons et al., who found that having competing role demands was associated with self-reported physical activity among a sample of working-class, multiethnic adults.[19] These findings are in contrast to previous population-based studies reporting that caregiving duties may serve as a barrier to physical activity participation, particularly among women.[18,57] Among our sample, residents with conflicting demands on their daily activities may have been those who work multiple jobs or have stressful responsibilities and, therefore, have more sources of physical activity (e.g., occupational, transportation, domestic), that would be captured by a pedometer. More research is needed to understand the influence of competing demands on physical activity, as well as other health behaviors and outcomes, including indicators of mental health.

Interestingly we did not find a multivariable association between some of the other social factors and physical activity. Because of efforts to reduce survey respondent burden, several measures were adapted, which may have contributed to limited variability of responses and null associations. Alternatively, this limitation may suggest that the social determinants of physical activity differ across populations and contexts, and that other factors (e.g., poverty, inadequate resources, limited access to or time for physical activity, cultural norms) are more important in understanding physical activity among residents of low-income housing. In addition, steps per day may be largely nonpurposeful in this population, and accumulated through transportation and occupational activities, so some social factors may have less influence on their physical activity. Although not explored here, it is also important to recognize and investigate the negative functional aspects of social factors,[9,12,58] which may include obligation, coercion, and the modeling and reinforcement of unhealthful social norms. Research should continue to explore these associations among this population to help disentangle these substantive and methodological issues.

Limitations and Strengths

These findings should be considered in light of study limitations, including the cross-sectional nature of analyses. The response rate for this study was lower than hoped, but it was consistent with that of other community-based studies.[59,60] Furthermore, findings are only generalizable to ambulatory residents of urban, lower-income housing in the United States, a population that is predominantly female. We used several adapted measures of social factors (to reduce respondent burden) that may have contributed to null findings for some of the social variables. In addition, the measures we used to capture social factors were individual-level measures that capture perceptions of the social environment. Although perceptions are important in shaping behavior, researchers may consider using network or neighborhood-level measures of social factors to capture different aspects of the social environment that may have implications for health among this population, including aspects of the built environment (e.g., access to recreational facilities, walkability of sidewalks, land-use patterns).[61,62] Finally, we cannot determine from our findings the type or source of physical activity of our participants. In light of the sociocultural context of low-income housing and the nature of the sample (low-income), we suspect it was accumulated through activities of daily living, in keeping with recommendations from the active living literature.[63,64] Furthermore, the approaches used here for measuring physical activity are valid and reliable strategies for measuring physical activity. Pedometer-measured activity has been recommended for measuring steps accumulated through nonleisure activities,[47,65,66] including walking, a common source of activity among lower-income populations.

This research also has several important strengths. This investigation was conducted among a large, systematically sampled, racially and ethnically diverse sample. These findings contribute to the small but growing literature on social determinants of physical activity among lower-income populations. Although we had limited degrees of freedom, we

controlled for a number of potentially confounding variables in our analyses, including important environmental factors such as safety. Research suggests that physical activity tied to transportation, domestic, and occupational activities (including walking) may be more common among low-income populations and some racial/ethnic minority groups,[6,47,67,68] However, these forms of activity are least reliably recalled. Thus, pedometer-assessed physical activity levels in such a large, diverse, and low-income cohort is a significant contribution of the present study.

Conclusions

This study enhances understanding of how the social environment contributes to differences in physical activity and reinforces that, although individual-level factors are clearly important, physical activity is shaped by multiple levels of influence. Taken together, this growing literature suggests that social factors should be considered when determinants of physical activity are studied, and that physical activity interventions among lower-income populations should address multiple levels, including the social network level and other aspects of social context.

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TABLE 1

Constructs and Operationalization of Structural, Functional, and Normative Social Factors

Construct	Measure	Use in Analyses
Personal social network	Adapted from Berkman and Syme's[48] measure of social network ties: (a) spouse or partner, (b) number of relatives they feel close to, (c) number of close friends they have, (d) how many of their adult relatives live in the housing site.	Summary scores ranged from 0 to 4, reflecting the size and strength of social networks (the structure of social relationships that surround an individual). Based on the distribution of responses, this was categorized as 0–1, 2, or 3+ for these analyses.
Organized social participation	Participants were asked: Are you an active member of any of these groups or clubs? (a) Church, temple, mosque, or other religious group; (b) recreation or sport league; (c) civic, political, service, housing site, or other community organization; (d) professional trade or labor organization; (e) any other organization [fill-in].	A summary score was created ranging from 0 to 5, categorized as 0, 1, and 2+ for these analyses.
Role responsibilities	Participants were asked: How much responsibility do you have for: earning money to support yourself and your family; taking care of your own children or someone else's children; and taking care of another household?	Categorized here as none or some responsibilities.
Conflicting demands	Participants were asked: Do your daily activities make conflicting demands on you?	Categorized here as yes or no.
General social support	Assessed using 5 questions about emotional, financial, and instrumental support available to the respondent, based on the domains of the Inventory of Socially Supportive Behaviors.[49]	A summary score was created from 0 to 5, categorized here as 0–4 and 5, because of limited variability in responses.
Social support for physical activity	Based on 2 items assessing perceived family or friend support of exercise: (a) In the past 3 months, how often have your family or friends said they would exercise with you? (b) In the past 3 months, how often have your family or friends given you support or helped you stick with your exercise program?	A summary score was created, categorized here as none (0), low (1), medium (2–3), and high (4–6).
Social cohesion	Assessed using a measure to assess perceptions of trust and shared values in one's neighborhood.[50] Residents were asked to report their agreement (strongly agree, somewhat agree, somewhat disagree, strongly disagree) with 5 statements (e.g., people around here are willing to help their neighbors; people in this neighborhood can be trusted).	A summary score ranged from 1 to 4 with a higher score indicating higher social cohesion.
Social norms	Measured using 2 items that assessed perceptions of friends' and family members' own physical activity: (a) About how many of your family and friends do you think get at least 30 minutes of exercise each day? (b) In the past 3 months, how often has your family or friends made fun of people who exercise?	Categorized for these analyses as 0–1 or 2–3.

TABLE 2

Demographic Characteristics of Study Sample: Residents of 12 Low-Income Housing Communities in Metropolitan Boston, MA, 2004–2005

Characteristic	Weighted Sample (n = 1112)
Race/ethnicity, no. (%)	
Black	790 (48.6)
White	81 (5.0)
Hispanic	698 (42.8)
Other	57 (3.6)
Gender, no. (%)	
Male	431 (26.4)
Female	1204 (73.6)
Age, y, no. (%)	
< 35	394 (24.1)
35–49	444 (27.2)
50–64	528 (32.3)
≥65	268 (16.4)
Employment status, no. (%)	
Work full-time	400 (24.5)
Work part-time	264 (16.2)
Disabled	325 (19.8)
Not working	645 (39.5)
Poverty level,[a] no. (%)	
At or below poverty level	788 (53.4)
Above poverty level	689 (46.6)
Education, no. (%)	
Less than high school	597 (36.6)
Completed high school or vocational school	471 (28.8)
At least some college	564 (34.6)
Nativity, no. (%)	
Born in United States	896 (54.8)
Born in Puerto Rico	390 (23.9)
Not born in United States or Puerto Rico	348 (21.3)
English 1st language, no. (%)	
No	738 (45.2)
Yes	896 (54.8)
Mean steps per day (SE)	5678.62 (112.69)

[a] Poverty level determined according to US Department of Health and Human Services.[51]

TABLE 3

Bivariate and Multivariate Models Predicting Physical Activity Steps per Day Among Residents of 12 Low-Income Housing Communities in Metropolitan Boston, MA, 2004–2005

	Continuous Steps per Day							
	Bivariate Age-Adjusted Models		Multivariable Model: Social Networks		Multivariable Model: Conflicting Demands		Final Multivariable Model	
	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*
Employment status		<.001		.001		<.001		<.001
Work full or part time (Ref)								
Disabled or not working	–2291.4 (239.9)		–2302.9 (270.6)		–2228.6 (275.4)		–2146.9 (271.3)	
Gender		<.001		<.001		<.001		<.001
Male (Ref)								
Female	–1830.8 (268.5)		–1723.9 (270.6)		–1669.1 (270.7)		–1761.5 (269.9)	
Poverty level[a]		.07		.01		.01		.01
Above poverty level (Ref)								
At or below poverty level	–473.4 (231.5)		640.7 (243.1)		609.5 (243.9)		651.9 (243.8)	
Race/ethnicity		.02		<.001		.01		
Hispanic	–492.4 (397.5)		–297.7 (425.5)		–393.2 (421.2)			
Black	–928.6 (386.7)		–966.5 (415.3)		–920.2 (410.2)			
White/Other (Ref)								
Current health problems		<.001		<.001		<.001		<.001
Yes (Ref)								
No	1557.4 (211.0)		1096.4 (227.8)		1197.6 (232.7)		1140.3 (230.6)	
Age	–65.1 (6.1)	<.001	–40.4 (7.1)	<.001	–33.5 (7.1)	<.001	–36.1 (7.1)	<.001
Overall unsafe[b]		<.001		.01		.002		.003
Yes	–1104.8 (276.2)		–737.3 (266.5)		–821.4 (267.5)		–776.9 (263.3)	
No (Ref)								
Personal social network		<.001		<.001				.01
0–1	–1759.9 (469.7)		–1567.5 (495.5)				–1503.7 (510.9)	
2	–635.1 (228.0)		–399.4 (230.6)				–312.5 (234.9)	
≥ 3 (Ref)								
Conflicting demands		.08				.01		.01

	Continuous Steps per Day							
	Bivariate Age-Adjusted Models		Multivariable Model: Social Networks		Multivariable Model: Conflicting Demands		Final Multivariable Model	
	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*
Yes	398.7 (228.6)				571.9 (228.8)		601.6 (231.5)	
No (Ref)								
Role responsibilities		.04						
Some	787.1 (347.7)							
None (Ref)								
Organized social participation		.16						
0	–409.6 (324.4)							
1	22.2 (321.2)							
≥ 2 (Ref)								
Social cohesion	379.6 (151.7)	.01						
Physical activity social support		.92						
None (0)	100.1 (365.9)							
Low (1)	–249.2 (405.4)							
Medium (2–3)	–182.7 (286.0)							
High (4–6; Ref)								
General social support		.9						
0–4	28.8 (228.1)							
≥ 5 (Ref)								
Social norms		.81						
0–1	57.3 (235.9)							
2–3 (Ref)								

Note. Unweighted sample size was n = 1112. Weighted sample size was n = 1635.

[a] Poverty level determined according to US Department of Health and Human Services.[51]

[b] Overall unsafe refers to the perception of being unsafe in their neighborhood.

TABLE 4

Separate Age and Race/Ethnicity Stratified Models Predicting Physical Activity Steps per Day Among Residents of 12 Low-Income Housing Communities in Metropolitan Boston, MA, 2004–2005

	Continuous Steps per Day, Multivariable Models													
	Age 18–35 y[a]		Age 35–49 y[a]		Age 50–64 y[a]		Age ≥65 y[a]		Hispanic[b]		Black[b]		White and Other Race/Ethnicity[b]	
	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*	b (SE)	*P*
Personal social network		<.001		.23		.24		.64		<.001		.2		.16
0–1 (vs ≥3)	−2657.9 (678.8)		−841.4 (1176.6)		−836.9 (1282.1)		−614.6 (697.1)		−2415.5 (685.7)		−1139.9 (495.5)		1266.8 (1181.9)	
2 (vs ≥3)	−813.7 (461.4)		642.9 (451.9)		−730.9 (429.8)		−216.1 (420.0)		−733.9 (359.4)		−356.7 (323.2)		1326.3 (740.9)	

Note. Unweighted sample size was n = 1112. Weighted sample size was n = 1635.

[a] All models controlled for current health problems, employment status, gender, poverty level, and neighborhood safety.

[b] All models controlled for age, current health problems, employment status, gender, poverty level, neighborhood safety.