

First Place Research



Encouraging Physical Activity Among Retirement Community Residents

The Role of Campus Commitment, Programming, Staffing, Promotion, Financing and Accreditation

Lauren Harris-Kojetin, Ph.D., Kristen Kiefer, M.P.P., Anjali Joseph, M.Arch., and Craig Zimring, Ph.D.

ABSTRACT

Despite the well-established benefits of physical activity for older adults, seniors ages 75 and above are among the most sedentary of Americans. Continuing care retirement communities (CCRCs) seem ideal settings for creating physical activity-promoting environments. We report on results of a nationally representative sample survey of CCRCs that are members of the American Association of Homes and Services for the Aging. Campuses with more physical activity opportunities on campus or in the outside community, more physical activity-related staff, better physical activity facilities and activities, more types of sources to finance the costs of physical activity, and more channels to promote physical activity tend to have more physically active residents. Campuses in which management places more importance on encouraging physical activity among residents also have more physically active residents.

INTRODUCTION

The over-85 age group has been for some time the most rapidly growing sector of the U.S. population, with a corresponding increase in the prevalence of disability and chronic health conditions. These demographic trends have serious implications for financing and delivery of long term care services. This might be partially mitigated by increases in physical activity (Leveille, 1999). There is strong evidence that physical activity can play a critical role in the management of chronic diseases in older adults, delaying disabilities and prolonging independence (Leveille, 1999; Shephard, 1997).

Despite the well-established benefits of physical activity for older adults (Shephard, 1997), the segment of the adult American population ages 75 years and above is the most sedentary (Barnes & Schoenborn, 2003; King, Rejeski, & Buchner, 1998; USDHHS, 1996). Among its recommendations to enhance health and increase physical activity among older adults, The National Blueprint on Physical Activity Among Adults Age 50 and Older calls for action “to create, promote and sustain communities that support lifelong physical activity” (Robert Wood Johnson Foundation [RWJF], 2000). Continuing care retirement communities (CCRCs) provide a good opportunity for promoting physical activity. With multiple settings under the control of a single administration, CCRCs can develop a range of programs to support physical activity. Some 660,000 Americans live in retirement communities and this number is likely to rapidly expand as the baby boom generation ages (American Association of Homes and Services for the Aging [AAHSA], 2005).

A growing literature suggests that the physical environment (e.g., architecture, terrain, building layout) is an important contributor to physical activity by older people (e.g., Berrigan & Troiano, 2002; Giles-Corti & Donovan, 2002; Handy, Boarnet, Ewing, & Killingsworth, 2002; Humpel et al., 2004; Miller, 2000). However, we are unaware of any studies that have assessed the role of organizational and

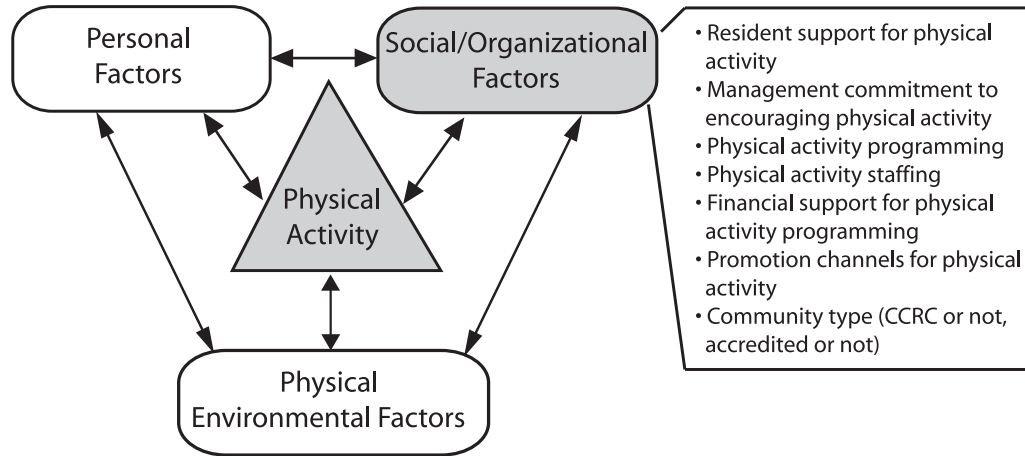
social support for physical activity (e.g., management commitment, channels to promote physical activity, staffing) within retirement communities and their relationship with resident physical activity levels. We report on results of a nationally representative sample survey of CCRCs and other senior housing providers that are members of the American Association of Homes and Services for the Aging (AAHSA).¹ This article describes the extent of programming and resources devoted to encouraging physical activity among residents in these communities and their relationship to resident participation in physical activity.²

What Is Physical Activity?

Physical activity has been defined as any “bodily movement produced by the contraction of skeletal muscles that substantially increases energy expenditure, although the intensity and duration can vary” (Singh, 2002, p. 263). Reading, watching television, and playing bingo are examples of nonphysical activities, while walking, swimming, playing tennis, or gardening are examples of physical activities. The Surgeon General recommends at least 30 minutes of moderate intensity physical activity on most days of the week for health impact. Physical activity benefits can be accrued in small bouts of regular household, occupational, and leisure activities over the course of the day rather than necessarily in a single dedicated exercise session (Pate & Pratt, 1995).

Social Ecological Model of Influences on Physical Activity

We use a social ecological model for this study that acknowledges the multiple factors that interact and influence an older person’s decision to be active (Satariano & McAuley, 2003; Zimring, Joseph, Nicoll, & Tsepas, 2005). This paper focuses on the role of social and organizational factors within this model and their relationship with physical activity among older residents of CCRCs and other retirement communities (shaded sections in **Exhibit 1**). Organizational factors include the philosophy and

Exhibit 1. A Social Ecological Model of Influences on Physical Activity

culture of the organization with regard to physical activity, staffing, and the structure and nature of the physical activity programs and services offered to residents. Social factors include support for, participation in, and accompaniment by friends (including fellow residents) while engaging in physical activity – all of which are associated with higher levels of physical activity among older adults (Ball, Bauman, Leslie, & Owen, 2001; Booth, Owen, Bauman, Clavisi, & Leslie, 2000; Glass, Mendes de Leon, Marottoli, & Berkman, 1999; King, 2001).

Key Areas of Interest

The goals of this inquiry are to:

1. Examine levels of physical activity among residents living in three different settings – independent living, assisted living, and nursing care;
2. Understand the organizational programs and structures and the social environment in place in senior living communities to encourage physical activity among older adults; and,
3. Identify how these organizational and social factors are related to levels of physical activity participation among older adults in these communities.

Throughout this article, the independent living

setting is abbreviated as IL, assisted living as AL and nursing care as NC. This project was reviewed and approved by the Georgia Institute of Technology's Institutional Review Board.

METHODS

Target Population

There are an estimated 2,600 CCRCs in the United States. While there is no “universal” definition for continuing care retirement communities (CCRCs), they are usually campus-type retirement communities offering a range of housing, services and healthcare that is centrally planned and administered. CCRCs are intended to supply a *continuum of care* throughout the lifetime of elderly residents. This allows residents to enter into the community while still relatively healthy and then move on to more intensive care if and as it becomes necessary (Sanders, 1997). Residents sign a contract with CCRCs articulating the specific housing and health services to be provided. These contracts come in several models, ranging from moderate to expensive, usually requiring an upfront entrance fee and ongoing monthly fee. About three-quarters of CCRCs are not-for-profit organizations (AAHSA, 2005).

Sample

The scientifically drawn random sample consists of 800 not-for-profit CCRCs and housing providers that are AAHSA members. Sampling inclusion criteria required that providers offer more than one setting—one of which is IL—at the same address or at addresses within close geographic proximity as indicated in the AAHSA membership database.

Data Collection Design and Response Rate

Data were collected in early 2004. Surveys were sent via U.S. mail to prime contacts for sampled providers. Prime contacts could complete the survey either by U.S. mail or web. A total of 463 surveys were returned. Forty-one of these cases had to be excluded because their responses indicated that they did not meet inclusion criteria. Another 24 cases (all web survey completions) had to be excluded because of corrupt data (n=10) or blank surveys being submitted (n=14). In total, we had 398 valid completions for an overall response rate of 52 percent (398/759).³

Characteristics of Responding Providers

The key characteristics of responding facilities are summarized in **Exhibit 2**.

Variables of Interest

Organizational and Social Variables. The ten variables expected to be related to the physical activity outcome variables are described below.

Resident Support for Physical Activity. We created a summative scale based on responses to these ten survey questions:

1. Whether or not the campus has walking clubs organized by residents on campus or in outside community (two items)
2. Whether or not the campus has exercise clubs organized by residents on campus or in the outside community (two items)
3. Whether or not the campus uses monetary

donations made by residents as a funding source for its physical activity programming, buildings or equipment (two items)

4. Whether or not the campus uses money raised by a resident council as a funding source for its physical activity programming, buildings or equipment (two items)
5. Whether or not the campus uses word of mouth by residents or a resident council/association to promote physical activity programs and facilities to other residents (two items)

Management's Perception of the Importance of Encouraging Physical Activity (Commitment). Respondents were asked how important it is to encourage physical activity among residents in different settings – IL, AL, and NC. The three-category response options include “not at all important,” “somewhat important,” and “very important.” We use this as a proxy for campus management's commitment to encouraging physical activity among residents.

Number of Organized Opportunities for Physical Activity Offered on Campus and Number of Organized Opportunities for Physical Activity Offered in the Outside Community. Respondents were asked whether or not any of 13 organized physical activity opportunities or programs are available on their campus or in the outside community within a quarter mile from their campus (**Exhibit 3**). In most cases, an organized activity is more likely to be available on campus than outside of campus. We created two scales (each ranging from 0 to 13) that measure how many of these organized physical activities are available on campus and off-campus, respectively.

Self-Rating of Quality of Physical Activity Facilities and Activities on Campus. Respondents were asked to rate their campus on a four-point scale regarding the quality of their community's physical activity facilities and activities. The response categories are: excellent – we have all the latest and greatest activities and facilities; good – our facilities and activities are good, but not state-of-the-art; average – our facilities and activities are okay, could use some

Exhibit 2. Key Characteristics of Responding Campuses

Characteristics of Responding Campuses		Distribution
Whether CCRC	CCRC Non-CCRC	75% 25%
Type of contract ¹	Type A Type B Type C No contract	25% 22% 43% 6%
Settings offered ²	AL & IL NC & IL All three levels	12% 16% 72%
Average age of residents (years)	Independent Living residents Assisted Living residents Nursing Care residents	82 85 86
Average number of residents on campus	Independent Living residents Assisted Living residents Nursing Care residents	157 45 82
Location ³	Urban-large Urban-small Suburban Rural	14% 27% 43% 16%
Campus size (acreage)	<5 acres 5-25 acres 26-50 acres 51-100 acres >100 acres	16% 37% 24% 15% 9%
Campus age	1-10 years old 11-30 years old 31-40 years old >40 years old	10% 39% 16% 35%
Campus terrain	Entirely flat Mostly flat with some gradual slopes Some hills Very hilly	30% 51% 12% 6%

¹Type A – extensive (lifetime), assisted living and skilled nursing costs included in basic fees; Type B – modified, some lifetime care benefits covered through basic fees, while other benefits offered at an additional charge, as needed; Type C – fee-for-service, all services offered on a pay-as-you-go basis, at a rate specified by the provider.

²IL – Independent Living, AL – Assisted Living, NC – Nursing Care.

³Urban-large – located within city limits of city with a population exceeding 500,000.

Urban-small – located within city limits of a city with a population up to 500,000.

Suburban – located within 50 miles of small or large urban population.

Rural – no small or large urban population within 50 miles of the campus.

Exhibit 3. Percentage of Campuses That Offer Each Organized Physical Activity on Campus or in the Outside Community

In Descending Order of Prevalence by On-Campus Activities	% on Campus	% in Outside Community
Physical therapy	78	14
Aerobics	40	17
Walking clubs organized by staff	39	7
Swimming	34	31
T'ai chi or martial arts	34	11
Walking clubs organized by residents	34	6
Water aerobics	33	21
Shuffleboard	30	4
Dance	29	12
Yoga	26	12
Golf	14	18
Bowling (indoor or outdoor)	14	11
Tennis	5	16

Bolded percentage indicates that prevalence is higher in outside community than on campus.

improvements in the near future; and, below average – we need to improve and upgrade our activities and facilities.

Number of Physical Activity Staff. Respondents were asked how many full-time and part-time staff have it as part of their job description to plan, schedule, or staff organized physical activity opportunities on campus.

Number of Sources Used for Financing Physical Activity Programs, Facilities, and Equipment. Respondents were asked to indicate which, if any, among seven sources they use to help finance the costs of physical activity: annual operating budget; capital budget; resident monetary donations; money raised by resident council; per resident fee for usage; monthly dues to all residents; and, endowments. Respondents were asked to distinguish the use of these sources for financing physical activity programs versus physical activity buildings and equipment.

We developed a measure that sums the number of

sources a campus uses to help finance physical activity costs, for programming or buildings and equipment. The summary measure ranges from zero to fourteen. Zero indicates that a campus uses none of the seven financing sources for either programming or buildings/equipment while fourteen indicates that a campus uses all seven sources to finance both programming and buildings/equipment.

Number of Channels Used to Promote Physical Activity Programs and Facilities to Residents. Respondents were asked to indicate which, if any, among a list of seven channels they use to promote physical activity programs and facilities to residents: newsletters; resident word of mouth; staff word of mouth; resident councils; memos; internal media; and, medical staff advisement. The scale for this summary measure ranges from zero, indicating that a campus uses none of the seven channels, to seven, indicating that a campus uses all seven channels.

CCRCs Versus Non-CCRCs. Respondents were asked whether or not their organization is a continuing care retirement community (CCRC).

Accredited CCRCs Versus Non-Accredited CCRCs. There are currently 340 CCRCs across 34 states and the District of Columbia accredited by the Continuing Care Accreditation Commission (CCAC), accounting for about 13 percent of all CCRCs nationwide. CCAC, housed within the Commission on the Accreditation of Rehabilitation Facilities (CARF), accredits CCRCs and issues a “seal of approval” to facilities that meet certain standards. We created a variable to indicate which of the responding CCRCs have CCAC accreditation, based on a list of accredited CCRCs we obtained from CCAC.

Outcome Variables. The key outcome described in this paper is resident participation in physical activity. The data for these outcome measures were reported by respondents based on observed and recorded information available to them when completing the survey. Respondents were asked to provide information on the percent of residents in each setting participating in different types of physical activities. We measure participation in physical activity in two ways:

1. Participation in particular physical activities
2. Overall physical activity

Participation in Particular Physical Activities. Respondents were asked what percent of residents participate in each of 13 physical activities at least once a week. Walking is by far the most popular activity among residents in all three settings, followed by aerobics and physical therapy (**Exhibit 4**). King suggests that the types of activities that may be most attractive to older adults “are moderate in intensity, simple and convenient to engage in, inexpensive, and noncompetitive” (King, 2001, p. 37). Walking meets all of these criteria. As expected, for all physical activities there is a decline in participation levels from IL to AL and NC settings. The only exception to this decline in participation is physical therapy, which is greatest among NC residents. This

Exhibit 4. Average Percentage of Residents Who Participate in Different Physical Activities

Activity	IL Residents (%)	AL Residents (%)	NC Residents (%)
Walking on own	72	60	21
Aerobics	9	7	4
Physical therapy	7	9	20
Walking as part of a club	7	4	2
Swimming (indoor or outdoor)	7	1	1
Water aerobics	5	1	<1
Golf	5	1	<1
Dance	4	1	1
T'ai chi/martial arts	3	1	1
Shuffleboard	3	1	1
Bowling (indoor or lawn)	3	2	3
Yoga/Pilates	2	1	<1
Tennis (indoor or outdoor)	1	0	<1

trend reflects the greater focus on providing restorative care to NC residents compared to IL and AL residents.

Overall Physical Activity. Respondents were asked to estimate the percentage of residents in each setting who do at least 30 minutes of physical activity (PA) at least three times a week. The survey question wording is based on physical activity guidelines that recommend at least 30 minutes of moderate intensity physical activity several times per week (Fletcher et al., 1996). The average percentage of IL residents (43 percent) participating in PA for at least 30 minutes duration three times a week is almost twice the average percentage of NC residents (23 percent). AL residents fall in the middle, with an average of about one third (32 percent) participating in PA for at least 30 minutes duration three times a week. The

literature suggests a decline in physical activity levels with decreasing functional ability and increasing age, and that is borne out by these findings.

Analysis

We examined the extent of bivariate relationships between the social and organizational characteristics and the physical activity outcome measures. For the dichotomous CCRC and CCAC variables, we used t-tests for difference of means between independent samples. For the other eight organizational and social characteristics we used Pearson's correlation coefficients.

We tested three multivariate linear regression models to predict overall physical activity—one model for each setting—using only the social and organizational characteristics that were statistically significant in the bivariate analyses for each respective setting.⁴ In all three models, we included three variables to help control for resident ability to participate in physical activity—average resident age, average percentage of residents who do their own laundry with or without assistance on a regular basis, and average percentage of residents who shop for groceries or personal items with or without assistance on a regular basis. Missing data were handled pairwise to enable maximum use of the data available. The intent in running these models is to determine which of the characteristics found significant in bivariate relationships with overall physical activity contribute most to the variation in overall physical activity levels.

Limitations of the Study

This study depends on self-report of retirement community managers and other campus staff. Campus staff and management do not have a complete picture of the full range of activities in which residents participate. This is particularly true of IL residents, who are more likely to engage in physical activity off-campus on their own. The study also does not include the perspective of residents.

The response rate is quite high for studies of this

type, but remains only slightly over 50 percent and the nature of AAHSA's database did not allow us to compare the characteristics of responders and non-responders. The physical activity outcome measure of at least 30 minutes a day for at least three times per week is a high criterion to set. With this measure we do not capture physical activity levels of less frequency or duration. The list of specific physical activities used as outcome measures tends to focus more on programmed, organized physical activities. The list also excludes numerous other types of physical activities that older adults may participate in (e.g., bicycling, gardening) that may be done alone or as part of a group.

RESULTS

For each of the ten organizational or social variables, we look at the distribution of the measure across the communities and note whether there are statistically significant relationships between the measure and either of the two physical activity outcome measures for each of the three settings, where applicable.

To focus on substantively meaningful results, relationships are reported and discussed *only when*: (1) the results are statistically significant at the 0.05 level or better; and (2) the prevalence of the physical activity outcome variable is at least five percent of the responding communities for at least one category of the social/organizational variable in the analysis. All correlations reported are positive unless indicated by (-).

Resident Support for Physical Activity

The summative "resident support for physical activity" scale ranges from 0, indicating that a campus has none of the 10 attributes, to 10, indicating that a campus has all 10 attributes. The average score across all campuses is 3; the majority of campuses tend to have lower levels of resident support for and involvement in promoting physical activity, as defined by this measure. Five percent of campuses

have the lowest score (no attributes), 57 percent score between 1 and 3, 35 percent score between 4 and 7, and 3 percent score between 8 and 10.

Campuses that have greater resident support for physical activity have more IL residents participating in 10 out of 13 different types of specific physical activities. This relationship is much more limited among AL and NC residents, with significant outcomes for only 3 and 1 of the 13 physical activities, respectively (Exhibit 5).

Management’s Perception of the Importance of Encouraging Physical Activity

The majority of respondents report that encouraging physical activity among residents is very important in all three settings. However, a larger percentage of respondents report that encouraging physical activity is very important for IL residents compared to AL and NC residents (95 percent, 88

percent, and 81 percent, respectively). Almost one-fifth of respondents say that encouraging physical activity among NC residents is only somewhat (18 percent) or not at all (1 percent) important, while about one-tenth say this for AL residents (12 percent and < 1 percent, respectively), and only one-twentieth say this for IL residents (5 percent and 0 percent, respectively).

For a subset of physical activities, the importance that management places on encouraging physical activity is significantly related to residents engaging in that physical activity. A weak, positive relationship exists between perceived importance and level of participation in water aerobics (.14), aerobics (.13), golf (.11), and swimming (.11) for IL residents and walking as part of a club for both AL (.11) and NC residents (.10). As with many other organizational variables discussed in this article, a larger number of significant relationships occur in the IL resident setting compared to the AL and NC resident settings.

Exhibit 5. Relationship Between Resident Support for Physical Activity and Resident Engagement in Specific Types of Physical Activity

Campuses with greater resident support of physical activity have more residents participating in these physical activities... <i>(in descending order of strength of relationship).</i>	Pearson's R Correlation		
	Independent Living (IL) Residents	Assisted Living (AL) Residents	Nursing Care (NC) Residents
Swimming	.30	.19	NS
Water aerobics	.28	.14	.17
Tennis	.22	NS	NS
Golf	.18	NS	NS
Walk as part of a club	.18	NS	NS
Yoga	.18	NS	NS
Dance	.17	NS	NS
T'ai chi or martial arts	.16	NS	NS
Aerobics	.15	NS	NS
Physical therapy	.15	.12	NS

NS = not a statistically significant relationship at the 0.05 level or better, therefore measure of strength of association not reported.

Campuses that place more importance on encouraging physical activity among residents are slightly more likely to have more residents in all settings engage in physical activity for at least 30 minutes a day, three days a week. The relationship is weak but significant, being stronger among NC residents ($R = .22$) and AL residents ($R = .18$) than among IL residents ($R = .11$). This suggests that an environment in which management and staff encourage physical activity among NC and AL residents may play a valuable role in increasing their levels of physical activity. The slightly stronger relationship between management commitment and overall physical activity levels in AL and NC settings compared to IL settings may also be due to a measurement artifact—the slightly greater variability of the management commitment variable in the AL and NC settings. Virtually all respondents (95 percent) said that encouraging physical activity is very important for IL residents, providing little potential for an association to be found with IL resident physical activity levels.

Number of Organized Opportunities for Physical Activity Offered on Campus and in the Outside Community

Four percent of campuses offer none of the 13 physical activities asked about on the survey, 45 percent offer 1 to 3 activities, 28 percent offer 4 to 6 activities, and 23 percent of campuses make available 7 to 13 of the opportunities on their campus.

Findings show a weak but significant positive relationship between the number of on-campus organized physical activities and the percentage of AL ($R = .15$) and IL ($R = .18$) residents engaging in at least 30 minutes of physical activity a day for at least three times a week. This suggests that, while there are many factors that may affect the likelihood of a resident engaging in physical activity, the presence of multiple different kinds of opportunities for physical activity on campus may play a role for IL and AL residents.

Not surprisingly, the distribution of organized

physical activities off-campus is very different from the distribution on campus. Whereas campuses most commonly offer one to three activities on-site, the majority of campuses (50 percent) tend to be located in areas where no physical activities are available to residents in the outside community. About one-third (32 percent) of campuses have one to three physical activities available off-campus, about one in ten (11 percent) campuses have access to four to six programs off-site, and about one in twenty (7 percent) have access to more than seven physical activity programs in the outside community. This suggests that campus management, staff, and residents see the campus as the key venue for providing physical activity opportunities to residents; in effect, in many cases the campus is a self-contained community when it comes to providing physical activity opportunities. This also makes sense, since activities on campus are likely more accessible to residents and more convenient than off-campus activities.

As with the number of organized physical activities on campus, findings indicate a weak but significant positive relationship between the number of off-campus organized physical activities and the percentage of AL ($R = .14$) and IL ($R = .13$) residents engaging in at least 30 minutes of physical activity a day for at least three times a week.

Number of Physical Activity Staff

The number of full- and part-time staff on campus whose job relates in some way to physical activity programming ranges from 0 to 40, with the median number of staff involved in physical activity being 4. Over one-third (36 percent) of campuses have between 1 and 3 of these staff, about four in ten (41 percent) have 4 to 6 staff, and two in ten (20 percent) have 7 to 14 of these staff. As outliers, less than 3 percent of campuses have either no such staff (< 1 percent) or 15 to 40 such staff (2 percent).

For a small subset of physical activities, there is a weak significant positive relationship between the number of staff whose job is involved in some way with physical activity programming and the percent-

age of residents engaging in the activity. On campuses with more physical activity-related staff, IL residents are slightly more likely to engage in walking as part of a club (R = .10), AL residents are somewhat more likely to do shuffleboard (R = .19), walk on their own (R = .13), and do yoga (R = .12), and NC residents are slightly more likely to do water aerobics (R = .15).

AL residents on campuses with more staff involved in providing physical activity programming are slightly more likely than those with fewer physical activity-related staff to engage in at least 30 minutes of physical activity a day for three days a week (R = .12).

Self-Rating of Quality of Physical Activity Facilities and Activities on Campus

About one-fifth (18 percent) of respondents believe their campuses have state-of-the art physical

activity facilities and activities. About four in ten (41 percent) campuses view their physical activity facilities and activities as good though not state-of-the-art. The remaining four in ten respondents recognize that their facilities and activities could use some improvement or upgrade in the near future, describing their physical activity amenities as average (32 percent) or below average (9 percent).

A significant, moderate, and positive relationship exists between the self-rating of the quality of campus physical activity resources and the number of organized physical activity opportunities available on campus (R = .48). These findings suggest that the quality of campus physical activity resources is perceived by management to be, at least in part, a matter of how many physical activity offerings they can make available to residents on campus.

Campuses with perceived better physical activity resources tend to have more IL residents participat-

Exhibit 6. Relationship Between Perceived Quality of Campus Physical Activity Facilities and Activities and Resident Engagement in Specific Types of Physical Activity

Campuses with better quality physical activity resources on-site tend to have more residents participating in these physical activities... <i>(in descending order of strength of relationship).</i>	Pearson's R Correlation		
	Independent Living (IL) Residents	Assisted Living (AL) Residents	Nursing Care (NC) Residents
Water aerobics	.32	.14	.13
Aerobics	.27	.21	.20
Swimming	.26	.18	NS
Golf	.24	NS	NS
Dance	.21	.12	.13
Tennis	.20	NS	NS
Yoga	.17	NS	.14
Physical therapy	.16	NS	NS
Walking in a club	.16	NS	NS
T'ai chi or martial arts	.11	NS	NS
Walk on ones own	NS	.11	NS
Shuffleboard	NS	.10	NS

NS = not a statistically significant relationship at the 0.05 level or better, therefore measure of strength of association not reported.

ing in a large variety of different physical activities (**Exhibit 6**), with the strength of relationship ranging from moderate to weak. Having better quality campus physical activity resources is related to engaging in a greater number of activities among IL residents (ten activities) than among AL or NC residents (six and four activities, respectively). Further, the relationship is weaker among the AL and NC residents (than for IL residents) for those activities for which there is a significant relationship. Campuses with better self-rated physical activity facilities and activities tend to have more IL and AL residents engage in physical activity for at least 30 minutes a day, three days a week ($R = .20$ for IL residents and $R = .11$ for AL residents).

Number of Sources Used for Financing Physical Activity Programs, Facilities, and Equipment

The median number of financial sources used to finance the costs of physical activity programming and buildings/equipment is four. The majority of campuses use between 1 and 4 financing sources (54 percent), about one-third (31 percent) use between 5 and 9 sources, and five percent use 10 to 14 sources. About one-tenth (11 percent) report using none of these sources to finance physical activity costs.

Campuses using more financing sources have more IL residents participating in a variety of physical activities including swimming (.31), water aerobics (.24), golf (.17), dance (.15), tennis (.14), aerobics (.14), yoga (.13), physical therapy (.12), and t'ai chi (.10). The strength of these relationships ranges from moderately weak to very weak. For AL residents, the use of more financing sources is associated with greater participation only for physical therapy ($R = .16$), swimming ($R = .14$), and walking on ones own ($R = .13$). There is a weak but significant, positive relationship between number of financing sources and percentage of AL residents engaging in 30 minutes a day of physical activity, three days a week ($R = .11$). There is a weak, positive, significant relationship between the number of financing

sources and participation in water aerobics for NC residents ($R = .13$).

Number of Channels Used to Promote Physical Activity Programs and Facilities to Residents

The average number of channels used to promote physical activity on campus is four. About one in twenty (7 percent) campuses use none of the channels asked about on the survey, about one-quarter (26 percent) use between one and three of the channels, a majority (62 percent) use between four and six, and only one in twenty (5 percent) use all seven channels.

Campuses using more of the seven channels to promote physical activity among residents have more IL and AL residents doing water aerobics (.21 and .10), yoga (.19 and .10), swimming (.18 and .12), and aerobics (.12 and .11). The use of more promotion channels is associated with greater participation by IL residents in a variety of other activities, including dance (.23), golf (.18), bowling (.15), t'ai chi (.13), and physical therapy (.10). This suggests that, particularly for IL residents but to a lesser extent also for AL residents, getting the word out about physical opportunities is associated with more residents partaking of those opportunities. The correlations are small, however, indicating a weak relationship.

This finding is in line with studies of health education campaigns showing that making people aware of a health benefit opportunity (e.g., getting a flu shot, getting a mammogram) is a necessary but not sufficient condition for getting people to partake of the opportunity (e.g., Egger, Spark, Lawson, & Donovan, 1999; Glanz, Lewis, & Rimer, 1997; Kotler, Roberto, & Lee, 2002). Using more channels to promote physical activity opportunities is related to increased engagement in only one physical activity (.13 for water aerobics) among NC residents.

CCRCs Versus Non-CCRCs

Three-quarters of the campuses responding to the survey are CCRCs (**Exhibit 2**). Compared to non-CCRCs, CCRCs have a higher average percentage

of IL residents doing aerobics (11 to 6 percent), swimming (8 to 4 percent), golfing (6 to 2 percent), and water aerobics (6 to 2 percent). Because CCRC residents usually enter a CCRC as IL residents, these findings suggest that CCRCs—if they take action—have the potential to help and encourage residents to maintain higher physical activity levels as they transition to other settings.

Accredited CCRCs Versus Non-Accredited CCRCs

About one-third (32 percent) of the responding CCRCs (resulting in 24 percent of all responding campuses) are accredited CCRCs.⁵ Campuses with CCAC accreditation have more IL residents, on average, engaging in the following activities (compared to those that are not accredited): aerobics (17 to 14 percent), swimming (10 to 9 percent), water aerobics (9 to 7 percent), and yoga (7 to 6 percent). CCAC-accredited campuses, on average, also have more AL residents walking as part of a club (7 to 4 percent) and more NC residents doing aerobics (5 to 3 percent). Accredited campuses have greater engagement among IL residents in physical activity for at least 30 minutes a day, three days a week than non-accredited campuses.

Multivariate Models Examining Overall Physical Activity Levels in Each Setting

Among IL residents, management's self-rating of its campus's quality of physical activity programs and facilities was the only significant organizational characteristic in the model (**Exhibit 7**). The number of physical activity program opportunities in the community outside the campus tended toward significance in the model ($p < .10$). For both AL and NC residents, the only significant organizational characteristic is management's commitment to encouraging physical activity among these residents.

SUMMARY AND DISCUSSION

A variety of organizational characteristics—that tap

how much and in what ways physical activity is formally and informally supported on campuses—are associated with higher resident physical activity levels across settings (**Exhibit 8**). Specific physical activities most frequently associated positively with the different organizational characteristics examined include aerobics, water aerobics, swimming, and walking. These relationships are more common among IL residents, but some also occur among AL and NC residents. These relationships are more prevalent for specific types of physical activities than for the more stringent overall physical activity measure, requiring at least 30 minutes at least three times per week.⁶ These results give campus management and residents ideas for how to begin to improve physical activity participation among campus residents.

Campuses that have greater resident support for physical activity have more physically active IL residents. Campuses in which management places more importance on encouraging physical activity among residents tend to have more physically active residents in all settings. These findings suggest that a social environment in which management, staff, and residents encourage physical activity among residents may play a valuable role in increasing residents' physical activity levels.

Across all three settings, campuses that offer aerobics and dance on-site have more residents engaging in physical activity than campuses without these offerings. In general, having a physical activity offering on campus is associated with more participation in that activity than when the activity is available off-campus. However, off-site access to dance, tennis, golf, and yoga is associated with greater participation in these activities than on campuses without these off-site offerings.

Campuses with more physical activity opportunities on campus or in the outside community tend to have slightly more physically active IL and AL residents. This suggests that, while there are many factors that may affect the likelihood of a resident engaging in physical activity, the presence of multiple different kinds of opportunities for physical

Exhibit 7. Multiple Linear Regression Predicting Overall Physical Activity Level in IL, AL and NC Settings		
Social/Organizational Characteristics	Standardized Beta	Significance
Independent Living (IL) Residents		
Management commitment to encouraging physical activity	.07	.24
No. of on-campus physical activity opportunities	.09	.20
No. of outside community physical activity opportunities	.11	.06
<i>Self-rating of quality of physical activity facilities and activities*</i>	.13	.04
Accredited CCRC	.04	.49
% do own laundry with or without assistance on a regular basis	-.07	.35
% shop for groceries or personal items with or without assistance on a regular basis	.13	.07
Average age of IL residents	-.14	.01
R ² = .10 (F = 4.0; p = .00)		
Assisted Living (AL) Residents		
<i>Management commitment to encouraging physical activity</i>	.15	.02
No. of on-campus physical activity opportunities	.11	.17
No. of outside community physical activity opportunities	.10	.12
Self-rating of quality of physical activity facilities and activities	-.03	.70
No. of physical activity staff	.08	.28
No. of sources to finance physical activity programs and facilities	.03	.71
% do own laundry with or without assistance on a regular basis	.01	.91
% shop for groceries or personal items with or without assistance on a regular basis	.08	.30
Average age of AL residents	.00	.99
R ² = .09 (F = 2.2; p = .02)		
Nursing Care (NC) Residents		
<i>Management commitment to encouraging physical activity</i>	.19	.00
% do own laundry with or without assistance on a regular basis	.13	.03
% shop for groceries or personal items with or without assistance on a regular basis	.17	.01
Average age of NC residents	-.06	.36
R ² = .10 (F = 6.9; p = .00)		
*Social/organizational characteristics that significantly contribute to the model are italicized.		

Exhibit 8. Summary of Statistically Significant Bivariate and Multivariate Relationships Between Organizational and Social Characteristics and Physical Activity Outcomes

✓ Indicates bivariate relationship and shading indicates multivariate relationship.	Specific Physical Activities*			Overall Physical Activity		
	IL	AL	NC	IL	AL	NC
Resident support for physical activity	✓	✓	✓			
Management encouraging physical activity	✓	✓	✓	✓	✓	✓
No. physical activities on campus	NA	NA	NA	✓	✓	
No. physical activities in outside community	NA	NA	NA	✓	✓	
No. physical activity staff	✓	✓	✓		✓	
Self-rating of quality of campus physical activity facilities and activities	✓	✓	✓	✓	✓	
No. sources used to finance physical activity	✓	✓	✓			
No. channels used to promote physical activity	✓	✓	✓			
CCRCs versus non-CCRCs	✓					
Accredited versus non-accredited CCRCs	✓	✓	✓	✓		

Statistically significant multivariate results are shaded.
 * Indicates significant relationship exists for at least one specific physical activity.
 NA = these relationships were not examined.

activity on campus or in the outside community may play a role. Findings also suggest that campuses which do not have the capacity to provide particular activities on campus should identify their availability in the local outside community and facilitate residents' access to them.

Campuses with more physical activity-related staff are slightly more likely to have more residents in all settings physically active. Campuses with better (self-rated) physical activity facilities and activities and campuses using more types of sources to finance the costs of physical activity (programming, buildings, and equipment) tend to have more physically active residents in all settings, with the relationship most robust for IL and least robust among NC residents. Particularly for IL residents, offering newer, state-of-the-art facilities and finding a variety of ways to get funds to finance newer facilities and a variety of physical activity programming can get more residents to participate in physical activity. We

did not ask about budget amount spent on facilities and programming, only number of sources. So, it is not possible to determine whether or not number of financing sources is a surrogate for size of budget.

Promoting physical activity through campus-based channels can help enhance physical activity levels. Among the channels campuses use to promote physical activity opportunities to residents, the use of internal media (e.g., TV, radio) is associated with greater engagement in a larger number of physical activities (for IL and to a lesser extent AL residents) than any other channel. Distributing memos and newsletters to residents and the use of medical staff advisement to encourage physical activity are also associated with somewhat greater IL involvement in several activities. Campuses using more of a variety of channels to promote physical activity among residents tend to have more IL and AL residents engaging in a variety of physical activities.

Compared to non-CCRCs, CCRCs have a higher

percentage of IL residents engaging in a variety of physical activities. Compared to non-accredited CCRCs, CCAC-accredited CCRCs have slightly more residents in all settings engaging in organized physical activities, though the relationship is most common among IL residents and least common among NC residents. CCAC accreditation standards include a requirement that CCRCs are actively maintaining their campuses according to their own philosophy of health and wellness to minimize resident risk and enhance quality of life. This may help explain why CCAC-accredited campuses have more physically active residents. Compared to non-accredited CCRCs, accredited CCRCs in the study have more characteristics associated with higher levels of physical activity – more promotion channels, more physical activity offerings both on-site and off-campus, higher resident support for physical activity, and better self-ratings of their physical activity resources. Alternatively, self-selection to CCAC-accredited campuses by healthier residents with a predisposition to physical activity may also help explain this finding.

The multivariate findings suggest that providing the latest, best quality physical activity programming opportunities can positively affect IL residents' physical activity levels, while AL and NC residents' activity levels may depend more on management being committed to creating a social environment supportive of encouraging physical activity for these residents. Our results are in line with evidence that suggests that independent older adults participate in self-initiated and community activities (physical, social, and recreational activities) in facilities with more challenging programs while frailer older residents (AL and NC residents) tend to participate more in facility-organized activities under staff supervision (Jenkins, Mehraban Pienta, & Horgas, 2002; Lemke & Moos, 1989).

The social and organizational characteristics in each of the three multivariate models explain only about 10 percent of the variation in resident physical activity levels. While certain organizational charac-

teristics appear to help encourage or facilitate resident physical activity, much remains unexplained by these models. Future work could collect data from samples of residents across campuses, to examine residents' perspectives on the role of peers, and formal and informal social networks among residents and friends or family outside of the campus, the extent of support among these social groups for an active lifestyle, and its relationship to residents' physical activity levels. Additional work could also examine the extent and variety of any formal policies in place at campuses that may, directly or indirectly, promote or hinder a social and physical environment conducive to an active resident lifestyle.

As an exploratory study, this article begins to identify how social and organizational support and resources within a retirement community may be related to participation in physical activity. As depicted in the social ecological model, the nature of causation among the physical environment, personal characteristics, organizational and social factors and physical activity is complex and we do not assert that simply having a positive attitude toward physical activity will result in greater resident physical activity participation. Rather, there are a variety of organizational factors that appear to help enable motivated and able residents—likely within communities with physical environments also conducive to physical activity—to be more physically active.

ENDNOTES

¹ AAHSA is a professional membership organization of 5,600 not-for-profit aging services providers across the care continuum (senior housing, assisted living, nursing care, CCRCs, and adult day services).

² In a separate paper (Zimring, Joseph, Harris-Kojetin, & Kiefer, accepted for publication in *Journal of Housing for the Elderly*), we look at the role that physical environmental factors play in facilitating physical activity among retirement community residents.

³ We computed the response rate according to the methods described in the American Association for Public Opinion Research's document, *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, 2004.

⁴ For each setting, we originally ran the full model with all ten social and organizational variables. Here we report only the more parsimonious models because there were no differences between the full models and the more parsimonious models in any setting.

⁵ Since about 13 percent of U.S. CCRCs are accredited, our results over-represent accredited CCRCs.

⁶ These results suggest that the overall physical activity measure may be tapping physical activities not included on the survey and/or that campus characteristics not examined here (including physical environment characteristics) may help better explain variation in overall physical activity levels.

REFERENCES

- American Association for Public Opinion Research (AAPOR). (2004). *Standard definitions: Final dispositions of case codes and outcome rates for surveys* (3rd ed.). Lenexa, KS: AAPOR. Retrieved from http://www.aapor.org/pdfs/standarddefs_ver3.pdf
- American Association of Homes and Services for the Aging (AAHSA). (2005). *The continuing care retirement communities 2004 profile*. Washington, DC: AAHSA.
- Ball, K., Bauman, A., Leslie, E., & Owen, N. (2001). Perceived environmental aesthetics and convenience and company are associated with walking for exercise among Australian adults. *Preventive Medicine, 33*(5), 434–440.
- Barnes, P., & Schoenborn, C. (2003). Physical activity among adults: United States, 2000. *Advance Data from Vital and Health Statistics, No. 333*, May 14. Retrieved from <http://www.cdc.gov/nchs/data/ad/ad333.pdf>
- Berrigan, D., & Troiano, R.P. (2002). The association between urban form and physical activity in U.S. adults. *American Journal of Preventive Medicine, 23*(2S), 74–79.
- Booth, M.L., Owen, N., Bauman, A., Clavisi, O., & Leslie, E. (2000). Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Preventive Medicine, 31*(1), 15–22.
- Egger, G., Spark, R., Lawson, J., & Donovan, R. (1999). *Health promotion strategies & methods* (Rev. ed.). New York: The McGraw-Hill Companies, Inc.
- Fletcher, G., Balady, G., Blair, S., Blumenthal, J., Caspersen, C., Chaitman, B., et al. (1996). Statement on exercise. Benefits and recommendations for physical activity programs for all Americans: A statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology. American Heart Association. *Circulation, 94*, 857–862.
- Giles-Corti, B., & Donovan, R.J. (2002). Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. *Preventive Medicine, 35*(6), 601–611.
- Glanz, K., Lewis, F.M., & Rimer, B. (Eds.). (1997). *Health behavior and health education: Theory, research, and practice* (2nd ed.). San Francisco: Jossey-Bass Publishers.
- Glass, T.A., Mendes de Leon, C., Marottoli, R.A., & Berkman, L.F. (1999). Population-based study of social and productive activities as predictors of survival among elderly Americans. *British Medical Journal, 319*(7208), 478–483.
- Handy, S.L., Boarnet, M.G., Ewing, R., & Killingsworth, R.E. (2002). How the built environment affects physical activity: Views from urban planning. *American Journal of Preventive Medicine, 23*(2s), 64–73.
- Humpel, N., Owen, N., Leslie, E., Marshall, A.L., Bauman, A.E., & Sallis, J. F. (2004). Associations of location and perceived environmental attributes with walking in neighborhoods. *American Journal of Health Promotion, 18*, 239–242.
- Jenkins, K.R., Mehraban Pienta, A., & Horgas, A.L. (2002). Activity and health-related quality of life in continuing care retirement communities. *Research on Aging: Beverly Hills, 24*(1), 124–149.
- King, A.C. (2001). Interventions to promote physical activity by older adults. *The Journals of Gerontology, 56A* (Suppl. Nutrition, Physical Activity, and Quality of Life), 34–46.
- King, A.C., Rejeski, W.J., & Buchner, D.M. (1998). Physical activity interventions targeting older adults: A critical review and recommendations. *American Journal of Preventive Medicine, 15*(4), 316–333.
- Kotler, P., Roberto, N., & Lee, N. (2002). *Social marketing: Improving the quality of life* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Lemke, S., & Moos, R. (1989). Personal and environmental determinants of activity involvement among elderly residents of congregate living facilities. *Journal of Gerontology, 44*(4), S139–S148.
- Leveille, S. (1999). Aging successfully until death in old age: Opportunities for increasing active life expectancy. *American Journal of Epidemiology, 149*, 654–664.
- Miller, M. (2000). Physical activity, functional limitations and disability in older adults. *Journal of the American Geriatric Society, 48*, 1264–1272.
- Pate, R.R., & Pratt, M. (1995). Physical activity and public health. *JAMA: Journal of the American Medical Association, 273*, 402.
- Robert Wood Johnson Foundation (RWJF). (2000). The national blueprint on physical activity among adults age 50 and older.

Sanders, J. (1997). Continuing care retirement communities: A background and summary of current issues. Washington, DC: Office of the Assistant Secretary for Planning and Evaluation.

Satariano, W.A., & McAuley, E. (2003). Promoting physical activity among older adults: From ecology to the individual. *American Journal of Preventive Medicine*, 25(3)(Suppl. 2), 184-192.

Shephard, R.J. (1997). *Aging, physical activity, and health*. Champaign, IL: Human Kinetics.

Singh, M.A.F. (2002). Exercise comes of age: Rationale and recommendations for a geriatric exercise prescription. *The Journals of Gerontology*, 57A(5), M262-M282.

USDHHS. (1996). *Physical activity and health: A report of the surgeon general*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

Zimring, C., Joseph, A., Harris-Kojetin, L., & Kiefer, K. (in press). Presence and visibility of outdoor and indoor physical activity features and participation in physical activity among older adults in retirement communities. *Journal of Housing for the Elderly*.

Zimring, C., Joseph, A., Nicoll, G.L., & Tsepas, S. (2005). Influences of building design and site design on physical activity: Research and intervention opportunities. *American Journal of Preventive Medicine*, 28(2)(Suppl. 2), 186-193.

ACKNOWLEDGMENTS

This project was funded by a grant from the Robert Wood Johnson Foundation. The authors thank our Advisory Committee members for their advice and guidance in conducting the study. We express our gratitude to the management and staff of the AAHSA member retirement communities that participated in the survey, without whose time, insights, and efforts this article would not have been possible. We acknowledge the valuable efforts of staff at The Sutton Group in collecting the survey data. We appreciate the invaluable contributions of Susan Ganson in helping us develop the sampling frame and Katrinka (Katie) Smith Sloan in initially bringing together our interdisciplinary, cross-organizational project team. Thank you to two anonymous reviewers for your insightful comments and to Bradley Fulton for his guidance in preparing this article.

© 2005, National Investment Center for the Seniors Housing & Care Industries

Lauren Harris-Kojetin, Ph.D.
Director of Research
Institute for the Future of Aging Services
American Association of Homes and Services for the Aging
2519 Connecticut Avenue, NW
Washington, DC 20008
(202) 508-9462 Phone
(202) 783-4266 Fax
lharris-kojetin@aaahsa.org

Kristen Kiefer, M.P.P.
Research Associate
Access to Benefits Coalition
The National Council on the Aging
300 D Street, SW, Suite 801
Washington, DC 20024
(202) 479-6639 Phone
(202) 479-0735 Fax
kristen.kiefer@ncoa.org

Anjali Joseph, M.Arch.
Doctoral Candidate, Ph.D. Program
College of Architecture
Georgia Institute of Technology
245 Fourth Street
Atlanta, GA 30332-0155
(770) 455-8704 Phone
anjali.joseph@coa.gatech.edu

Craig Zimring, Ph.D.
Professor
College of Architecture
Georgia Institute of Technology
245 Fourth Street
Atlanta, GA 30332-0155
(404) 894-3915 Phone
craig.zimring@arch.gatech.edu