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Participant Variation by Delivery Site Type in an Evidence-Based Physical Activity Program

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Abstract

This study examined participant demographic and physical function characteristics from EnhanceFitness, an evidence-based physical activity program for older adults. The sample consisted of 19,964 older adults. Participant data included self-reported health and demographic variables, and results for three physical function tests: chair stand, arm curls, and timed up-and-go. Linear regression models compared physical function test results among eight program site types. Participants were, on average, 72 years old, predominantly female, and reported having one chronic condition. Residential site participants' physical function test results were significantly poorer on chair stand and up-and-go at baseline, and up-and-go at four-month follow-up compared to the reference group (senior centers) after controlling for demographic variables and site clustering. Evidence-based health-promotion programs offered in community settings should assess demographic, health and physical function characteristics to best serve participants' specific needs, and offer classes tailored to participant function and ability while maintaining program fidelity.

EnhanceFitness® (EF) is a low-cost, evidence-based group exercise program that helps older adults at all levels of fitness maintain health and function (Belza, Snyder, Thompson, & LoGerfo, 2010; Wallace et al., 1998). EF was developed and tested in a randomized controlled trial by Group Health Cooperative and the Health Promotion Research Center at the University of Washington (Seattle, WA) (Wallace et al., 1998). Since 1999, Senior Services (Seattle, WA), a not-for-profit organization serving older adults in Washington State, has been the owner and licensing authority for EF, and is responsible for continued program dissemination, instructor training, and program data collection and management. The program can meet the needs of participants with varying levels of function, strength, and ability; exercises can be modified to be performed seated or using support while standing. EF protocol calls for three, one-hour classes per week; sites can offer EF on an ongoing basis or in 12 to16 week sessions. All classes are led by a certified EF instructor. Each one-hour session includes cardiovascular, strength, flexibility and balance exercises (Belza et al., 2010). The program includes physical function tests which measure participants' ability to complete vital actions of independent living that may be negatively impacted by aging-related frailty or loss of function (e.g., walking, climbing stairs, stooping/bending/kneeling); details of physical function tests are described below. (Hootman, Sacks, & Helmick, 2004; Rikli & Jones, 1999). The Centers for Disease Control and Prevention recommend a number of such evidence-based physical activity programs (including EF), but

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most are offered only in a limited number of locations, and therefore are unlikely to influence health at the population level. Between 2005 and 2011, more than 20,000 participants at 559 locations nationwide participated in EF, demonstrating the program's broad reach and sustainability since initial development.

In order for health promotion and disease prevention efforts to be successful, the development of evidence-based programs needs to be driven by two primary factors: broad dissemination and implementation to reach a large population, and achieving maximal benefit among participants. Understanding the characteristics of participants and how participants differ among delivery sites is key for facilitating future dissemination and implementation efforts; programs must be prepared to serve the unique needs of participants served in diverse community settings. In their review of implementation literature, Durlak and DuPre (2008) note that understanding participant characteristics is a critical aspect of program implementation that has received little attention in the literature.

Previous studies of health promotion programs in community delivery sites have identified a series of factors that may influence participant outcomes in evidence-based health promotion programs. *Type of delivery site*, which may include senior centers, faith-based organizations (Campbell et al., 2007), or veteran service organizations (Patterson et al., 2011) is one factor influencing participant outcomes. Faith-based settings for health promotion programs offer unique resources that may improve participant outcomes. For example, faith settings tend to be quite stable with consistent membership and attendance; participants in health promotion programs in faith settings may be more likely to attend consistently over time, maximizing their exposure to the intervention (Campbell et al., 2007) In the case of veteran service organizations, greater distance from the local Veterans Affairs facility was positively correlated with higher program engagement among participants, indicating veteran service posts are an important resource for health promotion programming for veterans with less geographic access to Veterans Affairs facilities (Patterson et al., 2011). Partnerships with nontraditional partners of health promotion such as parks and recreation departments, national non-profit networks and general community centers can improve access to health promotion programming for older adults who may have limited transportation resources, and can reach traditionally underserved communities in greater need of health promotion interventions (Ory et al., 2010; Stewart et al., 1997). For example, the YMCA, National Council of La Raza and Boys & Girls Clubs of America reach a combined 30 million people every year, and these organizations are increasingly implementing health promotion as part of their core programming (Hussein & Kerrissey, 2013). Evaluation of participant outcomes in evidence-based health promotion programs in settings other than faith-based organizations is limited in the current literature (Bopp & Fallon, 2013; DeHaven, Hunter, Wilder, Walton, & Berry, 2004).

Personal characteristics of the participants have been shown to influence program completion rates, pointing to the importance of accounting for participant variation in intervention dissemination research, especially with regard to ethnic minorities and underserved groups (Patterson et al., 2011; Smith, Ory, Belza, & Altpeter, 2012; Yancey, Ory, & Davis, 2006); participants completing programs, or maximizing their exposure to evidence-based interventions, are most likely to realize benefits of the intervention. Stewart

and colleagues reported a successful physical activity intervention in low-income senior housing that was tailored to accommodate participant physical abilities, health status, income and transportation resources (1997). Understanding participant characteristics within community delivery sites, and any variation among site types within programs, can facilitate program planning to maximize participant benefit.

The purpose of this study was to describe EF participant characteristics and physical function test results by delivery site type. We believe participant characteristics and physical function test results would vary by delivery site type (Stewart et al., 1997), potentially providing information to better tailor delivery of EF in community settings to meet participant needs.

Methods

Data were provided from existing program records at Senior Services, the agency that owns and licenses the use of EF. Through 2011, data were collected by participating sites on paper forms, sent to Senior Services, and scanned into a database. Data for this study included participant demographics and physical function test outcomes.

Participants

Demographic, health and physical function test information was available for 19,964 participants from 559 EF sites between 2005 and 2011. Participants voluntarily enrolled and participated in EF classes available in their communities. Data were included only for participants who consented to share their information; 2,911 participants declined to share their information in this time period and are not included in the sample of 19,964. Participant information included: age, gender, race/ethnicity, marital status, education, household income, disability status, and health conditions. All demographics were voluntarily self-reported by participants at the time of enrollment in EF. Participants missing data for all outcome measures at baseline were excluded from analysis (n=61).

Physical Function Tests

EF instructors are responsible for conducting three physical function tests of participants in their classes. Baseline tests are conducted at or shortly after enrollment. Follow-up tests are conducted approximately every four months in the first year for new participants and at least annually for participants continuing in the program beyond one year. The tests are: the number of times a participant can stand from a chair in 30 seconds (chair stand) (n=19,131 baseline, n=10,216 four-month follow-up); the number of weighted arm curl repetitions a participant can complete in 30 seconds (arm curls) (n=19,900 baseline, n=10,461 four-month follow-up); and the amount of time in seconds it takes for a participant to stand from a chair, walk eight feet, turn around, walk back to the chair, and return to a seated position (up-and-go) (n=19,195 baseline, n=10,213 four-month follow-up) (Rikli & Jones, 1999).

Site Information

Information from Senior Services administrative records included site identification number (used to link participant data to sites), site name, and site type. Site data were linked to

participant data on site identification number to categorize participants based on site type. Fifteen different site types were represented in the data. Site types were re-coded into eight categories (Figure 1): senior centers, social service organizations, residential sites, recreational organizations, healthcare organizations, faith-based organizations, YMCAs, and other sites. YMCAs were categorized separately from other recreational organizations due to their unique mission, services, and programming that are generally not available at other recreational organizations. The first seven site types accounted for 95.7% of participant data; the remaining eight site types were recoded into the "other" category.

Statistical Analysis

Descriptive statistics were calculated for participant demographics and physical function test results for the entire sample and were stratified by site type. Physical function test results were modeled as a function of site type using linear regression. Outcome measures were continuous. Analyses were performed to assess the influence of potential covariates on the outcome. Models were adjusted for age (65–80 years old = reference, under 65, and over 80), gender (female=reference), interaction of age and gender, Caucasian race, self-reported arthritis, count of comorbid conditions as a continuous variable, YMCA affiliation, and baseline physical function test score (follow-up models only). Models were adjusted for YMCA affiliation because of the likelihood of differential resource availability, such as support from the national YMCA of the USA home office (Hussein & Kerrissey, 2013); community-based programs affiliated with or sponsored by a YMCA may have more generous resources at their disposal than similar community settings operating independently, including dedicated paid staff and instructors. Site type predictor was a categorical variable; site type was automatically recoded into a series of dummy variables using the effect coding command within the linear regression model. Participants at senior centers serve as the reference site type; senior center is the most commonly occurring site type in the sample (n=7,629) and most closely reflects the average of the aggregate sample with respect to the covariates included in the regression models. Models employed robust standard errors to account for different sample size between site types and clustering at the site level. Analyses were conducted using Stata (Version 11, StataCorp, College Station, TX). This research was not subject to human subjects review by the Institutional Review Board at the University of Washington because it used only existing, de-identified program data.

Results

Participants were, on average, 72.3 (± 9.8) years old, with nearly 60% of all participants between the ages of 65 and 80. Most participants were women (83.1%). More than half of participants (56.3%) identified as Caucasian, 14.4% as African American, 4.3% as Asian-American, 7.0% as Hispanic, and 3.3% as some other race. Over one-third of participants (35.8%) were married or partnered, while 46.5% were single, divorced, or widowed. Thirty-five percent of participants had at least some college education. Fifteen percent of participants self-reported having a disability. On average, participants reported one chronic condition (± 1.3), including arthritis (28.7%), diabetes (12.5%), and hypertension (26.6%) (Table 1).

Characteristics of participants with only baseline outcome data was generally similar to participants with both baseline and 4-month follow-up outcome data (Table 1). Slightly more baseline-only participants were under the age of 65 (22.0%) compared to baseline-plus-follow-up participants (16.7%). Baseline-only participants reported slightly more disability, arthritis, diabetes and hypertension, but differences were not statistically different from baseline-plus-follow-up participants.

When stratified by site type, participants at recreational organizations and YMCAs were three years younger than average, while participants at residential sites were 4.6 years older than average. More men participated in the program at healthcare organizations than at the other site types. Participants at YMCAs were more likely to be Caucasian, while participants at faith-based organizations and recreational organizations were more likely to be African American. Participants at faith-based organizations, recreational organizations, residential sites, and other sites had more comorbid conditions than average. Participants at faith-based organizations, recreational organizations, and residential sites reported more arthritis, diabetes, and hypertension than average, while participants at social service organizations and senior centers (hypertension only) had lower than average reports of these conditions (Table 1).

Follow-up testing rates by site type were quite similar, with six of eight site types achieving 50–55% follow-up (Table 2). YMCAs and Other site types achieved only 35.5% and 43.5% follow-up, respectively.

In total, 9,488 participants had physical function test measures only for baseline; 10, 476 participants had physical function test measures for baseline and four-month follow-up for at least one physical function test (Table 1). At baseline, participants could, on average, perform 12.40 (± 4.74) chair stands in 30 seconds (Figure 1), 16.69 (± 6.89) arm curls in 30 seconds (Figure 2), and complete the up-and-go in 9.18 (± 43.89) seconds (Figure 3). The difference at baseline between baseline-only participants and baseline-plus-follow-up participants was less than 3% for all tests. Among participants with both baseline and 4-month physical function test results, participants improved in all three tests between baseline and first follow-up. When stratified by site type, participants with both baseline and four-month follow-up fitness test results had improvements across all measures and all sites. The effect size of improvements between baseline and four-month follow-up represented a 10–14% improvement, on average: an average increase of 1.45 (± 4.05) chair stand repetitions, 2.06 (± 6.31) arm curl repetitions, and a decrease of 1.15 (± 60.45) seconds for up-and-go (results not shown).

In fully adjusted models, participants at residential sites performed significantly fewer chair stands (adjusted mean difference = −1.15, $p<0.001$) at baseline compared with participants at senior centers. There were no significant differences for arm curls. Participants at residential sites completed the up-and-go 1.61 seconds slower ($p<0.001$) than participants at senior centers (Table 3).

There were no significant differences between the reference group and other site types for chair stands or arm curls at four-month follow-up. In fully adjusted models, participants at

residential sites performed the up-and-go 1.64 seconds slower ($p = 0.002$) than participants at faith-based organizations. Follow-up results should be interpreted cautiously due to substantial loss to follow-up (46.5% to 47.3%) from baseline (Table 3).

Among participants with both baseline and follow-up physical function test results, longitudinal models regressing change between baseline and follow-up (follow-up test result minus baseline test result) on site type were not significant in adjusted models (results not shown).

Discussion

EnhanceFitness serves a diverse population of older adults nationwide, including seniors with chronic conditions, in a variety of community-based settings. Between baseline testing and first follow-up at approximately four months, EF participants showed improvements in chair stands, arm curls, and up-and-go. Among participants with baseline and follow-up results, those at residential sites showed less improvement over time than participants at other site types. When modeling functional test results on site type, participants at residential sites showed poorer performance on chair stand and up-and-go at baseline and follow-up compared to participants at senior centers in fully adjusted models. Outcome measures for participants at other site types did not differ significantly from the reference group in fully adjusted models.

Most sites experienced 45–50% loss to follow-up between baseline and 4-month follow-up; other site types and YMCAs experienced the greatest loss to follow-up of 57% and 65% respectively. Loss to follow-up increases at every subsequent follow-up beyond four months. While four months may seem like a short intervention period, EF has been shown to maintain and improve function within this period (Wallace et al., 1998); utilizing the first four-month follow-up in analysis preserves the most complete sample. Loss to follow-up may stem from many sources. For other site types, which are a combination of a variety of site types (Table 2) that tend to have fewer participants, loss to follow-up may reflect inconsistent class schedules, inability to retain instructors, limited resources to continue classes, or limited staff support to collect and return participant data. In the case of YMCAs, age of participants is likely the primary contributor to loss to follow-up; YMCA participants were 3 years younger than the average EF participant and may not have found EF sufficiently challenging for their ability level. In addition, YMCAs also offer extensive programming for older adults, resulting in competition for participants that EF classes in other settings do not experience. Sites licensed to offer EF classes were encouraged, but not required, to provide complete data on their participants across time to Senior Services; staff and instructors may have elected not to administer physical function tests, or may not have collected follow-up data. Preliminary results from qualitative research with participants and instructors (in progress) also indicate that follow-up physical function testing interfered with class time. Participants reported not attending on scheduled physical function test days; instructors confirmed lower attendance on days when physical function tests replace part or all of regular class time.

Participants at residential sites were significantly older than participants at the other site types at 76.9 years; less likely to be Caucasian; more likely to self-report having arthritis, diabetes, or hypertension; and more likely to self-report more total chronic conditions. After adjusting for age, gender, race and chronic conditions, residential site participants still had lower physical function test results than other participants. Residential site participants performed the up-and-go 1.61 seconds slower at baseline and 1.64 seconds slower at follow-up compared with senior center participants. This indicates that while residential site participants experienced overall improvement between baseline and follow-up (Figure 1a–c), participants at other site types experienced greater improvement between baseline and follow-up. From a clinical perspective, this may indicate that participants at residential sites had poorer lower body strength compared to participants at senior centers (Resnick, 1998).

EnhanceFitness is known, based on the results of a randomized controlled trial, to help older adults maintain physical function necessary for independent living (Wallace et al., 1998), and physical activity has been shown to be beneficial for older adults (Leenders et al., 2013; Taaffe, Duret, Wheeler, & Marcus, 1999). However, variation in participants' demographics, health, and physical function across the types of delivery sites may affect participants' experience of evidence-based physical activity programs in community settings (Yancey et al., 2006), particularly in residential sites. While EF is designed to be adapted for participants with varying levels of ability, special attention is needed to ensure class components meet the needs and abilities of participants. Trained EF instructors, who teach with fidelity to the EF protocol and sensitivity to participant needs and abilities, lay a critical foundation for maximizing participant experience.

We believed that site type would be independently associated with physical function test results, but statistically significant results were limited to residential sites despite a large sample size. While EF aims to improve physical function necessary for independent living, maintenance of function is clinically relevant for EF participants. Unfortunately, regression models constrict analysis to assessing statistically significant increases or decreases in physical function tests. As noted in the results section above, non-significant findings in models measuring the functional change between baseline and four-month follow-up test may reflect small effect size (10–14%) associated with maintenance of function, but the clinical importance of modest improvement or maintenance of function should not be discounted (Manini & Pahor, 2009). While analysis of maintenance of function is beyond the scope of this analysis, future research should explore participant, site or program characteristics that could impact maintenance. There may be other explanations for test results among participants at residential sites, including less physical activity outside of class time (Resnick, Galik, Gruber-Baldini, & Zimmerman, 2010), poorer overall health, lower intensity during class time, psychosocial factors such as cognitive status, depression, social support and fear of falling (Resnick, 1998), or unmeasured confounding factors not captured in covariates included in the models. Due to the nature of the administrative records, we were unable to divide the residential sites into more discrete subgroups (e.g. independent living, public housing, assisted living); however, staff at Senior Services informed us that residential sites are comprised primarily of independent living settings (personal communication, May 19, 2014). Unmeasured variation among participants at residential

sites could result in spurious findings, but we believe the high proportion of independent living sites within the residential site category minimizes the risk of unmeasured variation.

The EF instructor is responsible for collecting participant information, attendance, and results of physical function tests. Limited attendance data precluded analysis on participation dose effects, which could account for differences in physical function test results. Conducting physical function tests requires instructors set aside separate time, or conduct tests during class time. A variety of challenges with collecting this data result in substantial missing data and loss to follow-up. First, not all participants completed all of the demographic information, resulting in missing data (Table 1). In addition, not all participants consented to share their data for research purposes. Participant absences during follow-up physical function testing result in additional missing data and loss to follow-up. Lack of significant findings in longitudinal models measuring change between baseline and four-month follow-up physical function test results could be impacted by the substantial loss to follow-up between testing periods. The large sample size relieves some of the impact of missing data in the models; however, differences between participants without follow-up measures compared to those with follow-up measures may not be randomly distributed for measured variables of interest or unmeasured variables, introducing potential for bias or confounding. In addition, sensitivity analyses were conducted to assess the impact of missing data by two methods: records with missing data were excluded from models, and missing data was coded as a unique dummy variable to account for potential non-random differences in records with missing data. Model results were not substantially different between methods, and final models reported here exclude records with missing data.

There are several options for improving data collection, consistency, and quality. In 2012, Senior Services launched an integrated online data entry system. This system allows more feedback to sites, instructors, and participants, which may motivate instructors to enter data accurately. In particular, the new system automatically generates reports for participants summarizing their performance over time; participants may find this motivating or want to share information on their progress with health and care providers. In addition, the system also generates reports summarizing the performance of participants aggregated by class or instructor; instructors may find this information useful in tailoring their classes to the ability level of their current participants.

Instructors and site staff are often busy, making record keeping an additional administrative responsibility. Employing a volunteer model with class participants may help ease some of this burden; current class participants could assist in collecting attendance information or registering new class participants.(Hager & Brudney, 2004) Anecdotal evidence suggests that some classes are using participant volunteers to assist in data collection. Improved data collection, accuracy, and quality are important, not only for program self-assessment within sites, but also to leverage additional resources. In 2012, Senior Services entered into an expanded licensing agreement with YMCA of the USA (Y-USA). This nationally networked community organization has over 2,700 locations nationwide, reaching into 10,000 communities, with a strong dedication to health, well-being, and fitness. Y-USA brings critical capacity to a national scale-up effort of EF, including experience with disseminating evidence-based programs (Ackermann, Finch, Brizendine, Zhou, & Marrero, 2008;

Ackermann & Marrero, 2007). EF is also a covered benefit under managed care plans in two states (Ackermann, Williams, et al., 2008; Nguyen et al., 2007), and is expanding to Medicare Advantage plans. Should funding or reimbursement be available on a larger scale for evidence-based programs in community-based settings, such as the YMCA, accurate record keeping is likely to be necessary to receive payment.

Encouraging accurate record keeping may be facilitated in a variety of ways. Utilizing the reporting functions of the new online system may provide informal motivation for instructors and staff to stay apprised of the status of their EF classes. More formally, the reports could be used for setting measurable enrollment or performance goals, or as part of staff and instructor performance evaluations; complete and accurate data would be critical to setting and measuring goals. Small, non-monetary incentives at the organizational level, such as achievement certificates, may also encourage improved data quality; such positive recognition has been demonstrated to improve data quality in other under-resourced settings (Hager & Brudney, 2004).

Conclusion

EF is an evidence-based physical activity program that reaches a broad array of older adults in diverse community settings. Participants' physical function test results were significantly poorer among participants at residential sites, after controlling for demographic variables and site clustering. While participants at residential sites on average experienced improved physical function test results over time, they did not improve as much as participants in other settings. These results illuminate opportunities for program planners offering classes in residential settings to improve existing programming and better plan future programming to meet the needs of residential site participants. Tailoring classes in varied delivery sites within program protocol, such as focusing on lower extremity function and self-efficacy for physical activity in residential sites (Resnick, 1998), may help achieve the best possible outcomes for participants and contribute to successful implementation of evidence-based programs in community settings.

More broadly, future research should focus on the intersection of program and participant characteristics that are likely to influence dissemination and implementation. Complete participant demographic and performance data is one important component. Accurate attendance data can be used to assess both participant dose effects and program recruitment and retention. Finally, assessing organizational readiness in advance of implementation, and assessing program fidelity over time may best position community-based organizations to successfully implement evidence-based programs to maximize the program benefits for the populations they serve.

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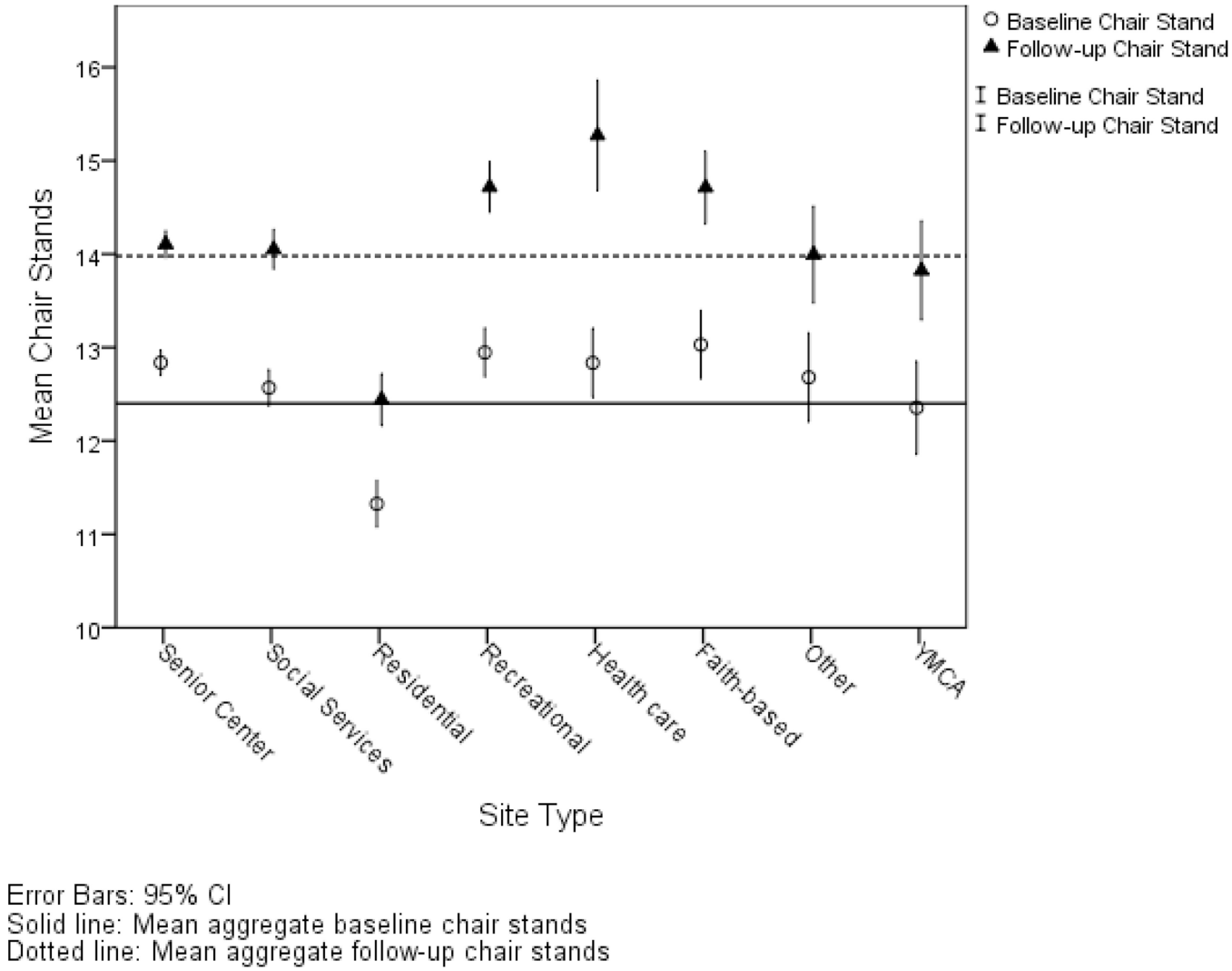

Figure 1.
Mean Chair Stands by Site Type.

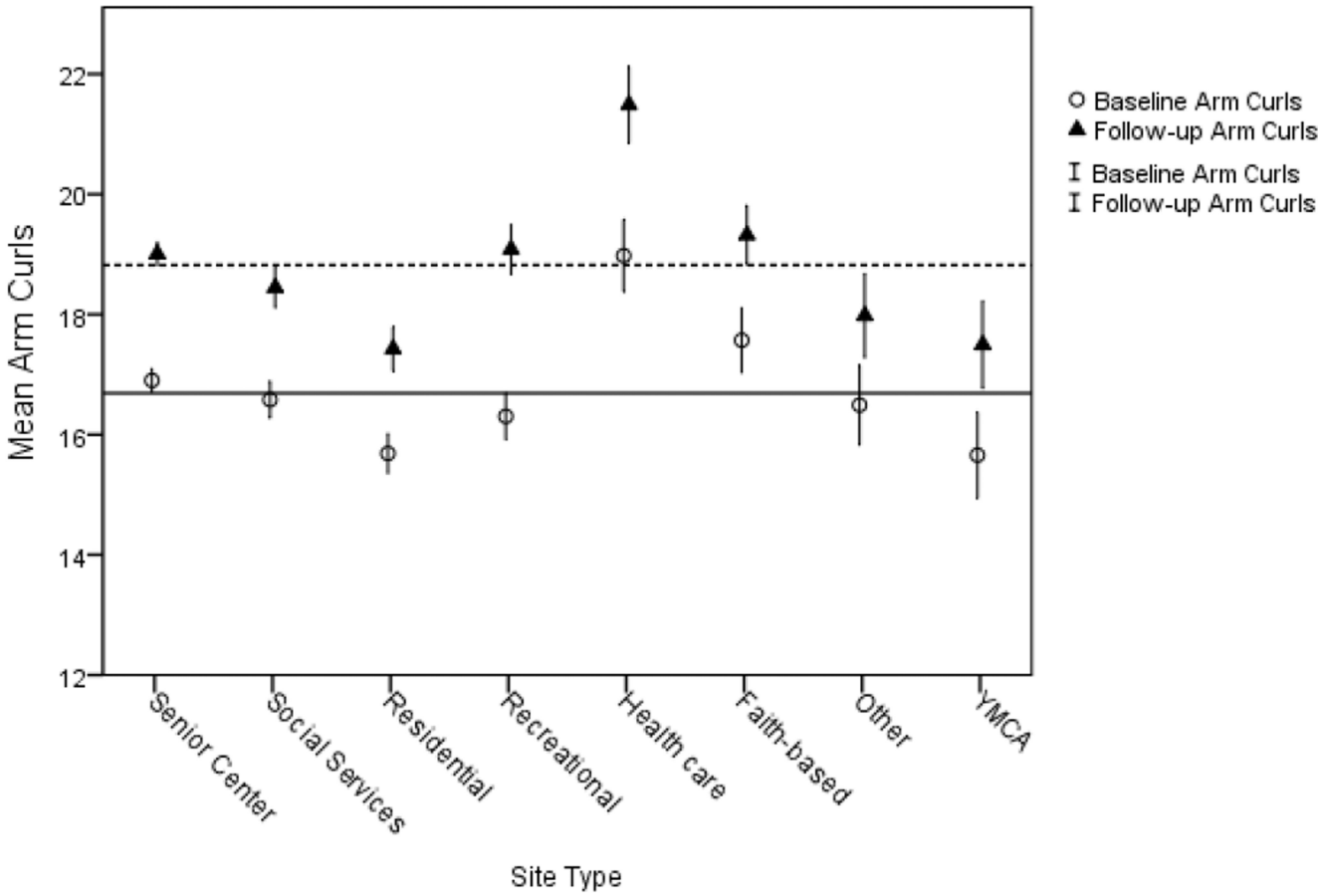

Figure 2.
Mean Arm Curls by Site Type.

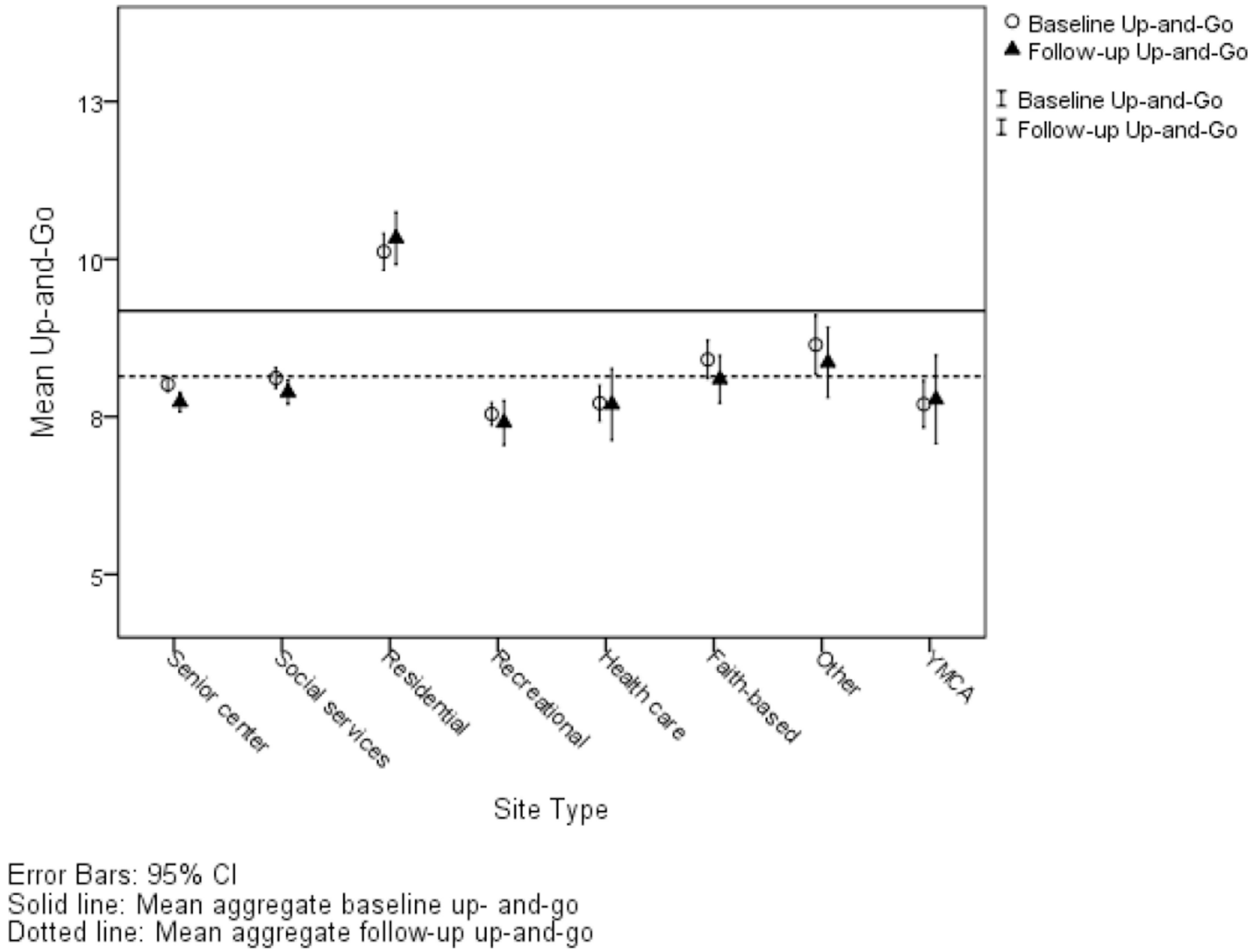

Figure 3.
Mean Up-and-Go by Site Type.

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Table 1

Participant Summary (n, %)

	All Participants n=19,964		Baseline only n=9,488		Baseline + Follow-up n=10,476	
Female	16,479	83.1%	7,823	83.1%	8,656	83.0%
Age (mean, SD)	72.3	9.8	71.6	10.7	72.9	9.0
<65	3,841	19.2%	2,095	22.1%	1,746	16.7%
65–79	11,338	56.8%	4,975	52.4%	6,363	60.7%
80+	4,065	20.4%	1,894	20.0%	2,171	20.7%
Race						
Caucasian	11,059	56.3%	5,086	54.7%	5,973	57.8%
African American	2,823	14.4%	1,328	14.3%	1,495	14.5%
Asian-American	846	4.3%	227	2.4%	619	6.0%
Hispanic	1,373	7.0%	590	6.3%	783	7.6%
Multi-racial	217	1.1%	107	1.2%	110	1.1%
Native American	291	1.5%	173	1.9%	118	1.1%
Other	135	0.7%	57	0.6%	78	0.8%
Unknown	2,884	14.7%	1,729	18.6%	1,155	11.2%
Marital status						
Married	7,156	35.8%	3,227	34.0%	3,929	37.5%
Divorced	2,717	13.6%	1,324	14.0%	1,393	13.3%
Single	1,127	5.6%	542	5.7%	585	5.6%
Widowed	5,440	27.2%	2,401	25.3%	3,039	29.0%
Education						
Less than high school	4,374	21.9%	1,939	20.4%	2,435	23.2%
High school grad	4,851	24.3%	2,259	23.8%	2,592	24.7%
Some college	1,731	8.7%	832	8.8%	899	8.6%
College grad	5,297	26.5%	2,367	24.9%	2,930	28.0%
Income						
<$15k	3,642	20.1%	1,706	20.0%	1,936	20.1%
$15–49k	5,727	31.5%	2,530	29.7%	3,197	33.1%

	All Participants n=19,964		Baseline only n=9,488		Baseline + Follow-up n=10,476	
$50k+	1,360	7.5%	618	7.3%	742	7.7%
Unknown	7,429	40.9%	3,658	43.0%	3,771	39.1%
Disabled						
Yes	3,135	15.7%	1,539	16.2%	1,596	15.2%
No	12,721	63.7%	5,614	59.2%	7,107	67.8%
Unknown	4,108	20.6%	2,335	24.6%	1,773	16.9%
Comorbid conditions (mean, SD)	1.0	1.3	1.1	1.3	0.9	1.2
Arthritis	5,684	28.7%	2,943	31.4%	2,741	26.3%
Diabetes	2,471	12.5%	1,292	13.8%	1,179	11.3%
Hypertension	5,260	26.6%	2,656	28.3%	2,604	25.0%

	Senior Center n=7,629		Social Service Organization n=3,963		Residential Site n=2,548		Recreational Organization n=2,147	
Female	6,473	85.2%	3,004	81.5%	2,128	84.3%	1,820	85.2%
Age (mean, SD)	72.5	8.8	72.0	9.1	76.9	9.7	69.3	10.3
<65	1,328	17.4%	730	18.4%	268	10.5%	605	28.2%
65–79	4,651	61.0%	2,205	55.6%	1,232	48.4%	1,222	56.9%
80+	1,474	19.3%	642	16.2%	992	38.9%	282	13.1%
Race								
Caucasian	4,628	61.2%	2,045	56.1%	1,280	51.7%	1,074	51.1%
African American	861	11.4%	354	9.7%	335	13.5%	430	20.4%
Asian-American	119	1.6%	231	6.3%	123	5.0%	200	9.5%
Hispanic	397	5.3%	206	5.6%	313	12.6%	175	8.3%
Multi-racial	71	0.9%	32	0.9%	35	1.4%	34	1.6%
Native American	129	1.7%	96	2.6%	18	0.7%	15	0.7%
Other	61	0.8%	23	0.6%	20	0.8%	9	0.4%
Unknown	1,294	17.1%	660	18.1%	353	14.3%	166	7.9%
Marital status								
Married	2,740	35.9%	1,325	33.4%	524	20.6%	1,018	47.4%
Divorced	912	12.0%	423	10.7%	459	18.0%	289	13.5%
Single	329	4.3%	200	5.0%	176	6.9%	127	5.9%

	Senior Center n=7,629		Social Service Organization n=3,963		Residential Site n=2,548		Recreational Organization n=2,147	
Widowed	2,160	28.3%	946	23.9%	976	38.3%	481	22.4%
Education								
Less than high school	1,677	22.0%	994	25.1%	635	24.9%	457	21.3%
High school graduate	1,978	25.9%	772	19.5%	626	24.6%	609	28.4%
Some college	487	6.4%	242	6.1%	250	9.8%	178	8.3%
College graduate	1,954	25.6%	838	21.1%	578	22.7%	665	31.0%
Income								
<$15,000	1,194	16.8%	776	22.0%	729	30.4%	320	15.9%
$15–49,000	2,311	32.5%	996	28.3%	499	20.8%	768	38.2%
$50,000+	540	7.6%	199	5.7%	96	4.0%	184	9.1%
Unknown	3,064	43.1%	1,551	44.0%	1,075	44.8%	739	36.7%
Disabled								
Yes	1,136	14.9%	561	15.2%	551	21.6%	294	13.7%
No	4,834	63.4%	2,264	61.3%	1,369	53.7%	1,610	75.0%
Unknown	1,659	21.7%	868	23.5%	628	24.6%	243	11.3%
Comorbid conditions (mean, SD)	0.9	1.2	0.8	1.2	1.4	1.4	1.1	1.2
Arthritis	2,056	27.1%	845	23.0%	907	36.2%	676	31.8%
Diabetes	800	10.5%	361	9.8%	405	16.2%	312	14.7%
Hypertension	1,680	22.1%	724	19.7%	859	34.3%	672	31.6%

	Health Care Organization n=1,303		Faith-based Organization n=1,121		Other n=850		YMCA n=673	
Female	883	68.1%	948	86.8%	648	77.3%	575	85.4%
Age (mean, SD)	71.2	9.9	70.2	12.6	72.0	9.3	68.9	11.3
<65	254	19.5%	295	26.3%	163	19.2%	198	29.4%
65–79	646	49.6%	569	50.8%	453	53.3%	360	53.5%
80+	191	14.7%	221	19.7%	163	19.2%	100	14.9%
Race								
Caucasian	711	55.0%	332	31.3%	514	63.1%	475	70.6%
African American	265	20.5%	422	39.8%	93	11.4%	63	9.4%
Asian-American	19	1.5%	127	12.0%	24	2.9%	3	0.4%

	Health Care Organization n=1,303		Faith-based Organization n=1,121		Other n=850		YMCA n=673	
Hispanic	145	11.2%	54	5.1%	74	9.1%	9	1.3%
Multi-racial	20	1.5%	12	1.1%	9	1.1%	4	0.6%
Native American	3	0.2%	4	0.4%	21	2.6%	5	0.7%
Other	4	0.3%	12	1.1%	3	0.4%	3	0.4%
Unknown	126	9.7%	97	9.2%	77	9.4%	111	16.5%
Marital status								
Married	511	39.2%	390	34.8%	344	40.5%	304	45.2%
Divorced	238	18.3%	176	15.7%	147	17.3%	73	10.8%
Single	100	7.7%	113	10.1%	55	6.5%	27	4.0%
Widowed	271	20.8%	286	25.5%	195	22.9%	125	18.6%
Education								
Less than high school	240	18.4%	171	15.3%	163	19.2%	37	5.5%
High school graduate	270	20.7%	270	24.1%	200	23.5%	126	18.7%
Some college	127	9.7%	177	15.8%	124	14.6%	146	21.7%
College graduate	465	35.7%	336	30.0%	248	29.2%	213	31.6%
Income								
<$15,000	194	18.8%	195	19.7%	157	22.3%	77	19.5%
$15–49,000	365	35.4%	359	36.3%	231	32.9%	198	50.1%
$50,000+	85	8.2%	91	9.2%	46	6.5%	119	30.1%
Unknown	387	37.5%	343	34.7%	269	38.3%	1	0.3%
Disabled								
Yes	227	17.4%	146	13.0%	120	14.1%	100	14.9%
No	897	68.8%	768	68.5%	569	66.9%	410	60.9%
Unknown	179	13.7%	207	18.5%	161	18.9%	163	24.2%
Comorbid conditions (mean, SD)	1.1	1.3	1.2	1.2	1.3	1.3	1.1	1.3
Arthritis	326	25.1%	367	33.4%	276	33.5%	231	34.3%
Diabetes	204	15.7%	203	18.5%	107	13.0%	79	11.7%
Hypertension	408	31.4%	435	39.6%	285	34.6%	197	29.3%

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Table 2

Site Type Summary

Site Type Category	Description	Sites	Participants	Follow-Up Test Rate
Senior center	Senior centers	182	7,642	54.1%
Multi-purpose social services organization	Nutrition centers, community centers, multi-service centers	101	3,700	55.1%
Residential site	Independent living communities, assisted living communities, public housing	102	2,573	50.6%
Recreational organization	Parks and recreation centers, health and fitness centers, neighborhood and activity centers	50	2,152	51.0%
Healthcare organization	Health centers, hospitals, day health programs	30	1,306	53.7%
Faith-based organization	Houses of worship, faith-based centers	38	1,126	55.3%
Other	Municipal and tribal centers, educational institutions, area agencies on aging, unspecified site type	29	853	43.5%
YMCA	YMCAs (does not include YMCA-sponsored classes in community locations)	27	673	35.5%

Table 3

Regression Models of Chair Stand, Arm Curl Reps and Up-and-Go as a Function of Delivery-Site Type (b)

	Senior Center	Social Service Organization	Residential Site	Recreational Organization	Health Care Organization	Faith-based Organization	Other	YMCA
Baseline								
Chair Stand	Reference	−0.41	−1.15†	−0.03	−0.59	0.07	−0.07	0.50
Arm Curls	Reference	−0.59	−0.43	−0.31	0.35	0.91	0.35	0.41
Up-And-Go	Reference	0.33	1.61†	−0.53	0.94	−0.21	0.54	1.44
Follow-Up								
Chair Stand	Reference	0.08	−0.27	0.48	0.87	0.71	−0.14	0.24
Arm Curls	Reference	−0.44	−0.42	0.27	0.47	0.21	−0.98	−0.68
Up-And-Go	Reference	0.24	1.64†	−0.30	0.43	−0.37	0.93	1.11

Notes:

† p<0.01