Participatory Research to Promote Physical Activity at Congregate-Meal Sites

Paul A. Estabrooks, Elizabeth H. Fox, Shawna E. Doerksen, Michael H. Bradshaw, and Abby C. King

The purpose of this study was to determine the feasibility and effectiveness of an on-site physical activity (PA) program offered with congregate meals. Study 1 surveyed meal-site users on their likelihood to participate. Study 2 used meal-site-manager interviews and site visits to determine organizational feasibility. Study 3, a controlled pilot study, randomized meal sites to a 12-week group-based social-cognitive (GBSC) intervention or a standard-care control. Studies 1 and 2 indicated that most meal-site users would participate in an on-site PA program, and meal sites had well-suited physical resources and strong organizational support for this type of program. In Study 3, GBSC participants increased their weekly PA over those in the control condition ($p < .05, ES = .79$). Results indicated that changes in task cohesion might have mediated intervention effectiveness. These studies demonstrate that a PA program offered in this venue is feasible, is effective in promoting PA, and could have a strong public health impact.

**Key Words:** exercise, elderly, group cohesion, research to practice

The incidence of cardiovascular disease and its risk factors increases with age (Shephard, 1997). In fact, 80% of men and 89% of women between the ages of 65 and 74 years have at least one major cardiac risk factor (McConnell & Davies, 1992; Thomsen, Larsen, & Schroll, 1995). This vulnerability among older adults can be greatly reduced by regular physical activity (PA; American College of Sports Medicine [ACSM], 1998). Older adults who are active reduce their risk of cardiovascular disease by one and one half in comparison with those who are inactive (Panagiotakos, Pitsavos, Chrysohoou, Stefanadis, & Toutouzas, 2001). Beyond being an independent predictor of cardiovascular disease, regular PA is also associated with reductions in other chronic-disease risk factors including hypertension, obesity, Type 2 diabetes mellitus, and impaired lipid metabolism (Knight, Bermingham, & Mahajan, 1999; Mensink, Ziese, & Kok, 1999). For older adults who have already

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suffered a cardiac event or are coping with chronic disease, cardiac tolerance can be improved significantly with regular, moderate-intensity PA (Stahle, Mattsson, Ryden, Unden, & Nordlander, 1999). Studies of rehabilitative PA after myocardial infarction demonstrate that active participants lower their risk of death by 20–25% compared with controls (Miller, Balady, & Fletcher, 1997).

Even though research has shown that moderate-intensity PA is safe for the elderly, few older adults meet the current national recommendations for moderate-intensity PA. In the United States, 30% or less of adults over the age of 65 years participate regularly in the types of PA that are associated with reduced cardiovascular-disease risk (National Center for Chronic Disease Prevention and Health Promotion, 2002). Conversely, 36% are considered inactive and 34% are active, but not at the levels recommended to reduce the risk of chronic adverse health conditions (National Center for Chronic Disease Prevention and Health Promotion). To compound this problem, poor and frail older adults, who could benefit most from regular PA, are far less active than the national average of adults over the age of 65 (Administration on Aging [AOA], 1996). The general purpose of this article is to determine the feasibility and effectiveness of a PA-promotion intervention for a population of high-need older adults.

Although a number of interventions targeting increased PA for older adults have been completed, research has not focused on the older adults who would benefit most from increased PA (King, Rejeski, & Buchner, 1998; van der Bij, Laurant, & Wensing, 2002). Furthermore, few studies have integrated intervention strategies into ongoing programs in organizations that could facilitate program maintenance once the original research project was concluded. The vast majority of studies have been randomized control trials with strict inclusion criteria delivered by research personnel (King et al., 1998; van der Bij et al.). As a result, study participants are typically healthy, well educated, and of moderate or high socioeconomic status living in metropolitan areas.

There is a need to determine the feasibility and test the effectiveness of PA interventions that target high-need older adults including the frail elderly, lower socioeconomic-status groups, rural elderly, and socially isolated or depressed adults (King et al., 1998). There is also a need to develop and test interventions that can be institutionalized in preexisting organizational structures and reach a broad audience without extensive research involvement (Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004; Glasgow, Vogt, & Boles, 1999).

The United States Department of Health and Human Services (USDHHS) Elderly Nutrition Program has a mission to provide elders with a continuum of services for the prevention and management of long-term care, with an objective to avoid unnecessary and costly institutionalization (AOA, 1996). Given the health benefits we have noted, a PA intervention targeting congregate-meal-site users falls within the general mission of the organization. Area AoAs, which are present throughout the United States, represent the organizational structure that administers local Elderly Nutrition Program congregate-meal sites. Currently there are over 4,000 congregate-meal providers, each operating multiple sites that provide, in
total, congregate meals for approximately 1.8 million older adults in the United States (USDHHS, 2002).

Users of Elderly Nutrition Program congregate-meal sites represent a high-need population (AOA, 1996). This population is typically poorer than age-matched nonusers. For example, almost 90% of participants live below the USDHHS poverty level, which is twice the rate for the overall elderly population in the United States. In addition to living in poverty, congregate-meal-site users are frailer than age-matched nonusers and at a greater risk for chronic diseases and loss of functional independence (AOA). Furthermore, twice as many congregate-meal-site users live alone and feel socially isolated as the overall elderly population (AOA). Users of congregate-meal sites are a high-need population that could benefit greatly from a program of regular, moderate-intensity PA, especially one that targeted increased social integration and support.

The study design, research questions, and progression of study completion were determined using a participatory approach that included collaboration with a single AoA in a large Midwestern state and congregate-meal-site users in the agency’s service area. The general purpose of the partnership was to develop a feasible and effective physical activity program that could then be disseminated across the agency’s service area. The collaborating area agency provided services to 43 meal sites in an 18-county geographic region. On average, the sites provided meals for approximately 25–30 participants, with approximately 70% attending the meal site 1 or more days per week over any given month.

The participatory process highlighted three studies that were considered necessary to inform a decision regarding implementation and future dissemination of a physical activity program. The purpose was to provide preliminary evidence of the feasibility and effectiveness of delivering a PA-promotion intervention in conjunction with congregate meals. Studies 1 and 2 addressed fundamental questions of feasibility that included the following: What is the likelihood that congregate-meal-site users would attend a PA program if it were offered in conjunction with their meals? Would the organizational and physical structure of congregate-meal sites support a regular PA program? Study 3 examined the potential effectiveness of a program that targeted social integration around PA and was delivered in conjunction with the congregate meals.

Study 1

An initial concern of the AoA partners was that such a PA program would not be of interest to the majority of the meal-site participants. As such, a first step was to collect data to determine the proportion of meal-site users that would participate if a program were offered. A number of researchers have also emphasized the importance of determining the reach of health-behavior interventions into the target population (Abrams et al., 1996; Glasgow et al., 1999; King, 2001). Reach can be defined as the number, proportion, and representativeness of program participants when compared with the target population (Glasgow et al., 2004).
The specific purpose of Study 1 was to determine the likely reach of a PA program offered at a congregate-meal site based on the number of days the program was offered and participant characteristics (i.e., age, gender, and self-efficacy for PA). A secondary purpose was to use these data to determine if the number of days a program was offered and participant self-efficacy could predict likelihood of participation, thereby providing a template for future PA-program recruitment strategies.

**METHOD**

**Participants.** Volunteers were recruited from six randomly selected congregate-meal sites in the 18-county region that received services from the AoA in north central Kansas. All participants at the congregate meal site were eligible to participate in the study (n = 152). Of those eligible, 91% volunteered to participate (n = 138). The average age of volunteers was 77.6 years (SD = 9.0), 69% were women, and 95% were White. The demographic profile of those who participated in this study was similar to the local AoA meal-site records for the general congregate-meal-service population.

**Measures.** Three items were used to assess the likelihood that participants would join a PA class if it were offered either directly before or directly after the meal. Each participant completed three items that were preceded by the phrase “I would join a PA program at my congregate meal site if it was offered.” The items were 1 day a week, 2 days a week, and 3 days a week. Each item response was on a three-point scale that included agree, disagree, and neither agree nor disagree. This measure was developed for the present study and has strong content validity. The measure was used as the primary outcome of Study 1, and the items were examined both individually and as a composite score. The composite score was created by converting the verbal responses to numeric values (i.e., disagree = 0, neither = 1, agree = 2) and computing a mean score across the three items. The internal consistency of the scale was strong (Cronbach’s $\alpha = .88$).

Bandura’s social-cognitive theory (1997) suggests that self-efficacy expectations are a fundamental determinant of behavioral choice. Physical activity research has consistently shown positive relationships between self-efficacy, program initiation, and subsequent maintenance (McAuley & Mihalko, 1998). The participants completed three items to determine their self-efficacy for participating in moderate PA. Moderate PA was defined for the participants as any PA that was done for 10 min or more and was about as hard to do as a brisk walk. The participants responded to three items—“I am confident in my ability to do moderate PA 1, 3, or most days each week”—using a nine-point scale with descriptive anchors that ranged from strongly disagree to strongly agree. This scale was based on the guidelines developed by Bandura (1986, 1997) and had a strong internal consistency (Cronbach’s $\alpha = .78$).

The study participants were asked to provide their age, gender, and ethnicity on the survey. Household income was also assessed, but very few of the
participants (<30%) were comfortable providing this information. Thus, it is not presented.

Procedure. The purpose of Study 1 was described to the meal-site participants before their daily lunch service. The Kansas State University Internal Review Board (IRB) approved the study protocol. Trained research assistants provided verbal and written descriptions of the study procedures to potential participants. All who agreed to participate signed an informed-consent form and were provided with a written description of the study plus the names and telephone numbers of the principal investigator and an IRB representative. Once consent was obtained from the study volunteers, a trained research assistant briefly described a typical moderate-intensity PA program that could be done at their congregate-meal site and also described the safety and benefits of such a program. The volunteers then completed a survey that included the measures of likelihood of participation, self-efficacy, and demographic characteristics. The order of variables assessed on the survey was rotated on a random basis to avoid a potential ordering effect.

RESULTS OF STUDY 1

Frequency analyses were used to determine the proportion of congregate-meal-site users who would join a PA program based on the number of days it was offered each week. Figure 1 depicts the number of participants who agreed, disagreed, or were neutral on joining such a program based on whether it was offered once, twice, or three times per week. Specifically, 58%, 52%, and 45% of the sample indicated that they would join a program offered one, two, or three times a week, respectively. In

![Figure 1](image-url)  
*Figure 1.* Proportion of meal-site participants who agreed, disagreed, or were neutral regarding joining a physical activity program offered at their site based on the number of days it was offered each week.
contrast, 11%, 18%, and 22% of the sample indicated that they were not sure if they would join a program offered one, two, or three times a week, respectively. The proportion of the sample that indicated they would not join a program did not vary appreciably based on days offered per week—31%, 30%, and 33%, respectively, for once, twice, or three times per week.

Chi-square analyses revealed that the proportion of participants who indicated they would join a PA program significantly decreased and the proportion that indicated they were undecided increased when the program days increased above 1 day of PA each week. This relationship existed when a once-a-week program was compared with a 2- ($\chi^2 = 114.1, p < .01$) or a 3- ($\chi^2 = 67.5, p < .01$) times-per-week program.

Pearson two-tailed bivariate correlations were calculated to determine the relationships between likelihood of joining a PA program and the participant’s gender, age, and self-efficacy (Table 1). Self-efficacy was significantly and positively related to each measure of likelihood. The composite measure of likelihood of attendance at a PA program had the strongest relationship with self-efficacy ($r = .30$). As perceptions of PA self-efficacy increased, so did the likelihood that participants would participate in a PA program offered in conjunction with their congregate meal. Age and gender did not show a significant pattern of relationships with likelihood or self-efficacy.

### SUMMARY OF STUDY 1

These results indicate that a substantial proportion of attendees would participate in a regular PA program that was offered before or after congregate meals. The largest proportion of participants would attend a program offered one time per week. Given the relationship between self-efficacy and likelihood of attendance, it is possible that self-efficacy enhancement strategies could motivate participants who were undecided to join a program.

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Study 2

An additional concern of the AoA partners was that such a program might not be feasible at the local sites. Specifically, a PA program might not be of interest to the diverse meal-site managers who oversaw the day-to-day running of the congregate-meal sites. Secondarily, the diverse physical structures where meals were offered might not support a PA program. As such, a second step was to collect data to determine individual meal-site managers’ perceptions of feasibility and whether the physical structures of the meal sites would be appropriate for PA programming. Our community partners indicated that if we could present data that demonstrated organizational feasibility and environmental support, this would provide critical information to develop agency-wide policy on PA programming at congregate-meal sites.

Policy approaches that include programmatic sustainability are critical to health-promotion activities (Brownson, Baker, Houseman, Brennan, & Bacak, 2001; King et al., 1995; McGinnis, Williams-Russo, & Knickman, 2002; Sallis, Bauman, & Pratt, 1998). Researchers have also suggested that an essential step in policy development is to determine the organizational feasibility of program delivery (Glasgow et al., 1999). Without organizational feasibility perceived by congregate-meal-site managers and the appropriate physical environment to conduct a regular PA class, the findings of Study 1—that a large proportion of meal-site users would join a PA program offered once a week at their meal site—become irrelevant. The purpose of Study 2 was to determine the organizational feasibility of providing a PA program in conjunction with congregate meals. Organizational feasibility was operationalized as managerial perceptions and the appropriateness of the physical environment for PA classes.

METHODS

Participants. Volunteer meal-site managers were recruited from 15 randomly selected congregate-meal sites in the 18-county region that received services from the AoA. Site managers were targeted for interview because of their status as the primary programmatic decision maker for congregate-meal sites. All meal-site managers (n = 15) who were contacted agreed to participate in the study and completed the informed-consent process. The sample comprised White women (100%) with an average age of 47 years (SD = 8.0).

Measures. In-depth, face-to-face interviews conducted by experienced personnel were used to elicit information regarding managers’ thoughts on PA, programming, and the meal-site users. An interview-guide approach was employed (Côté, Salmela, Baria, & Russell, 1993; Patton, 1990). This approach uses topics to be covered during the interview but does not specify the exact sequencing of the questions. This allows for the addition or elimination of questions and the introduction of new ideas as the interview progresses. Probing techniques were used in order to better understand the managers’ thoughts on each of the issues
queried. Each interview lasted between 30 and 60 min. The standard interview frame included the following questions:

- What programs are being offered at your congregate-meal site?
- Is there a PA program offered in conjunction with the meal?
  If there is an existing class, describe the leader with respect to credentials and demographic characteristics.
  How often does the class meet?
  How many people attend?
- How would you describe the population of people attending the meals—including their physical functioning and mode of transportation to and from the site?
- How feasible would a regular PA program at your meal site be?
- What methods would be effective in marketing such a class to the individuals going to the meals 3–5 days per week?

The research staff developed a 10-item physical-environment checklist, based on the experience of PA experts in the field, to determine whether the congregate-meal sites had an appropriate physical environment to host a PA program. Key issues in developing the checklist included identifying parameters that were necessary for the functional delivery of a program, could raise concerns about safety issues, and could make participation in the setting uncomfortable for the older adults. The research team included an ACSM-certified group leader with 3 years of experience delivering PA programs for frail older adults. This member of the research team also conducted all of the physical-environment data collection. Figure 2 includes the list of items and possible responses.

**Procedures.** Before the beginning of the interviews, the site managers received introductory comments concerning the rationale for the study, the use of the data, issues of confidentiality, issues and topics to be pursued, and, finally, the reasons for audiotaping and note taking. The Kansas State University IRB approved the study protocol. All site managers who agreed to participate signed an informed-consent form and were provided with a written description of the study plus the names and telephone numbers of the principal investigator and an IRB representative. A research assistant administered the qualitative interview at the congregate-meal sites. The interview was completed at a time convenient for the center manager, typically immediately before or after the meal. The session was taped to enable transcription and data reduction at a research location. An interpretational analysis—a form of inductive analysis in which meaning units and core themes emerge from the data—was conducted by two investigators (Côté et al., 1993). The raw interview data were divided into meaning units—a word, phrase, or paragraph containing one idea (Tesch, 1990). The meaning units were given labels for classification purposes. This process was performed independently by two investigators, followed by a consensus validation process that resulted in 100% agreement on number and labels of meaning units (Goetz & LeCompte, 1984).
1. Is there a multipurpose room large enough to allow for a physical activity program?  
Responses: yes or no  
“Large enough” was operationalized as enough space to have the total number of meal-site attendees sit on chairs in a semicircle, while the chairs are spaced at two arms’ lengths from one another.  
This definition was based on a chair-based program that meets the American College of Sports Medicine’s recommendations for physical activity programming for frail older adults.

2. Does the area have windows?  
Responses: yes and they open, yes but they don’t open, or no

3. Is the room temperature comfortable (70–75° F)?  
Responses: yes; no, too cold; or no, too hot

4. What is the type of flooring?  
Responses: carpet, wood, or tile

5. Is there adequate ventilation?  
Responses: yes or no  
“Adequate” was operationalized as a qualitative assessment of whether the air in the room circulated or was stagnant and musty.

6. How is the lighting?  
Responses: dim, good, or very good

7. Are there an adequate number of sturdy chairs to use for the physical activity program?  
Responses: yes or no  
“Adequate number” was operationalized as equal to the number of congregate-meal attendees.

8. Is there operational sound equipment?  
Responses: yes or no

9. Is there operational video and television equipment (for possible video-led physical activity sessions)?  
Responses: yes or no

10. What is the global usability of the facility for regular physical activity programming?  
Responses: Qualitative holistic opinion of quality based on the rater’s expertise in delivering physical activity programs to frail older adults.

**Figure 2.** Items, potential responses, and operational definitions for the physical-environment checklist.
Finally, meaning units were organized into the higher order themes presented in the Results section (Munroe, Estabrooks, Dennis, & Carron, 1999). The physical environment was assessed after the interview.

RESULTS OF STUDY 2

Manager Interviews. The need to make programming and activities available beyond simply providing a daily meal was apparent in virtually all of the manager interviews. With only one exception, each of the 15 site managers actively sought out and engaged community members to provide interesting and educational activities for the meal-site attendees. An exemplary quote from one manager is, “We’re all looking for the same goal: to provide fun opportunities, mental stimulation, socialization, and we’re wanting to go forward and keep all our folks [as] active as possible and hopefully in their own homes.”

The types of programming offered can be categorized into educational, entertainment, sedentary-social, and occasional physical activities. Educational activities across sites covered a wide array of topics including general health, nutrition, self-care, finances, and dealing with issues associated with death (e.g., planning for personal funeral arrangements). Entertainment activities included movie day, musical groups, youth plays, and poetry readings. Sedentary social activities such as bingo, cards, trivia games, and dominoes were the most frequently offered activities associated with congregate meals. Finally, many sites occasionally (once every few months) had active demonstrations of line dancing, gardening, and billiards.

Exclusive of the occasional demonstrations, only two sites indicated that they offered regular PA sessions (regular is defined as at least once per week). Of these two sites, one offered hour-long PA sessions 3 days per week to approximately 10 participants (about 65% of the regular meal-site users at that site). The second site offered more informal programming by providing exercise videotapes, Thera-bands®, and space for PA. In this site, few meal-site users (<20%) participated on a regular basis.

Meal-site managers universally described their participants as functional but frail. The following quote reflects a common theme related to participant status and transportation:

Quite a few of them still live in their own homes or low-income housing. If you were going to take an average of people who were on walkers or canes—I’d say you were probably looking at a lot of people, and we have one that comes in quite often that’s in a wheelchair, but we go get her, we transport her.

Based on the manager interviews, the majority of meal-site users were still able to operate a vehicle, and many drove themselves to and from the meal site. The site managers indicated that they arranged transportation for those who did not own a vehicle or were unable to drive. There were functional drivers who attended each site and volunteered to provide transportation for other meal-site attendees. In many
cases, the meal-site participants used community transportation such as bus or van services for individuals with special needs.

About three quarters (73%) of the meal-site managers interviewed indicated that starting a PA program in conjunction with congregate meals was a feasible idea. These managers indicated that feasibility would hinge on having a volunteer to help deliver the program, making the program interesting, and not offering it too often. “The volunteers have to take part too; I have two volunteers that come in every day, not counting the delivery drivers, and then we have one Green Thumb worker. They all participate in the activities that we have.” The remaining quarter of the sample thought that they did not have the time to offer a PA program, they did not have the resources or volunteer base to support such a program, or the participants would not be interested.

When considering marketing a new PA program, one site manager summed up all of the channels in a single statement: “I always feel like you need to hit all the senses, so I’m thinking, okay, you need posters, a place mat, you need word of mouth, on the radio, in our ‘Second 60’ (local newspaper for older adults), which is an excellent resource tool.” Word of mouth was the most frequently endorsed form of advertising for any congregate-meal-site program. A number of managers suggested that they were very successful motivators and could “fill the seats” for most presentations and activities.

Physical-Environment Checklist. A summary of the physical-environment evaluation is provided in Table 2. With only two exceptions, all sites had a large room available for participation, sturdy chairs, and video equipment available. One site did not have a large multipurpose room, but the tables used for mealtime could be moved easily to free up enough space for a PA group. Plastic chairs at one site were not sturdy and could potentially be a safety problem. As a result, this site was rated as unsuitable to host a PA program. In general, the results provide evidence that a vast majority of sites could support a PA program.

Study 3

Four generalizations from the findings of Studies 1 and 2 provide support for the feasibility of offering a PA program in conjunction with congregate meals. First, a large proportion of meal-site users were willing to attend a PA program offered in conjunction with their lunch. Second, this proportion would likely increase as the number of days the program was offered decreased. Third, there was organizational support from congregate-meal-site managers to provide programming that was beneficial to the health of the participants. Specifically, most managers thought that a PA program would be an excellent addition. Fourth, the vast majority of meal sites had appropriate physical environments in which to offer a PA program. Given these promising findings, our community partners were interested in developing and testing a physical-activity-promotion program that could be delivered at the meal sites.
A growing body of research has focused on developing interventions for older adults to enhance the initiation and maintenance of moderate PA (King et al., 1998; van der Bij et al., 2002). King and associates (1998) provided a critical review of PA interventions for older adults. Twenty-nine community-based studies that used an experimental or quasiexperimental design and targeted PA change were identified for inclusion. The results of the review can be summarized as (a) participation rate (the number of sessions attended or reported divided by the number of sessions prescribed) during intervention was promising (mean rate across studies of 75%), (b) interventions that used theory-based behavioral strategies were more effective than those that did not, and (c) those that combined the theory-based strategies with a supervised home-based structure or a combination of group- and home-based formats resulted in higher participation rates than those that used only a group-based setting (King et al., 1998).

More recently, van der Bij and associates (2002) reviewed randomized controlled trials of interventions that targeted the promotion of PA among healthy older adults and were published between 1985 and 2000. Fifty-seven interventions were identified for review. The results of their review suggested that PA programs were very successful in the short term (DeBusk, Stenestrand, Sheehan, & Haskell, 1990; Gillett, White, & Caserta, 1996; Jette et al., 1999) but decreased in effectiveness as the duration of the intervention increased (Campbell et al., 1997; Preisinger, Alacamlioglu, Pils, Saradeth, & Schneider, 1995, 1996). Group interventions in

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nursing or residential homes also achieved very high participation rates (Hamdorf & Penhall, 1999; McMurdo & Rennie, 1993, 1994). Although there were few long-term group-based interventions, those that did last longer than 1 year on average maintained a 75% participation rate (Bassey & Ramsdal, 1995; Chow, Harrison, & Notarius, 1987). This finding led van der Bij and colleagues to conclude that group-based interventions might—in certain populations—achieve high and sustainable participation in the long term. In particular, group-based interventions can be extremely effective for older adults who can and prefer to attend group sessions on a regular basis (e.g., congregate-meal-site users).

The findings of Studies 1 and 2 and recent literature reviews suggested that an intervention that targeted PA in both the group and the home environment would lead to increased PA of congregate-meal-site users. Therefore, the primary purpose of Study 3 was to determine the reach and effectiveness of a 3-month group-based social-cognitive intervention to increase moderate-intensity PA of older adults who use USDHHS Elderly Nutrition Program congregate-meal sites. A secondary purpose was to examine the processes that underlie any changes in PA. A large body of literature has suggested that adherence to group-based PA is positively related to increased perceptions of task cohesion (Carron, Hausenblas, & Mack, 1996; Estabrooks, 2000). Specifically, the level of participants’ perceptions of group integration around the task of regular PA is positively related to sustained PA (Estabrooks & Carron, 1999). Similarly, perceptions of self-efficacy are consistently and positively related to PA in both younger and older populations (Garcia & King, 1991; McAuley & Mihalko, 1998). The group-based social-cognitive intervention specifically targeted these perceptions, and it was hypothesized that changes in task cohesion and self-efficacy would mediate the effect of the intervention on PA.

METHODS

Participants. At the time of this study, 43 congregate-meal sites were active in the AoA service region and were identified as potential delivery sites. From the 43 sites, we randomly selected 15 sites to be contacted for potential participation, with a goal of recruiting four sites. The first four sites contacted agreed to participate in the study, and no further attempts to market the program were made. Each site offered meals 5 days a week and operated out of a local community center for older adults. Regular meal-site attendees from the four sites were recruited to participate in the study. Given that the group component of the intervention would be offered one day per week, “regular” attendees were operationalized as those who attended at least 1 day per week over the month before recruitment.

Intervention Arms. Participants in the group-based condition participated in one 45-min session each week for 12 weeks and received three supportive telephone calls delivered monthly to reinforce group and individual PA goals. The group sessions offered at the congregate-meal sites were based on Carron and Spink’s (1993) conceptual framework for the application of group-dynamics principles in PA classes. The model provided strategies to facilitate increased group
interaction and communication around PA, a sense of group identity, strong group norms for PA, and feelings of responsibility to the group. All are deemed important for developing a positive social environment that will support regular PA (Carron & Spink, 1993). This framework has been effective for increasing PA in samples of healthy young adults (Carron & Spink) and healthy older adults (Brawley, Rejeski, & Lutes, 2000; Estabrooks & Carron, 1999).

Early group sessions focused on facilitating group interaction and communication around PA. These sessions were aimed at increasing the participants’ positive outcome expectations toward PA by creating an enjoyable social atmosphere that was associated with PA. Participant similarities and common successes (e.g., living unassisted), barriers to PA (e.g., fatigue or lack of motivation), and goals (e.g., maintaining functional independence) were highlighted to increase participant self-efficacy. Sessions during the second month introduced strategies to develop stronger group norms for PA (e.g., group goal setting). Finally, during the third month, participants’ sense of responsibility to the group was targeted (e.g., providing roles for group members).

Telephone contacts were completed once per month by a trained research assistant. The 10- to 15-min calls were based on the protocol developed by King, Haskell, Taylor, Kraemer, and DeBusk (1991) but modified to include references to the previous month’s group sessions. Each call included an assessment of current health status and a review of recent PA. Recent PA was then compared with previous goals for activity, and strategies to stick with PA (or, if necessary, to increase activity) were discussed. Participants also discussed group activities, responsibilities, and goals. Finally, the participants set new personal PA goals for the upcoming month.

An educational program developed to increase knowledge about the benefits and necessity of PA for older adults was used as a standard-care control condition. The program, developed by the local cooperative extension system, included six biweekly presentations. A trained research assistant delivered the 45-min presentations immediately before the congregate meal. Presentation titles included PA and the Aging Process, PA and Disease Prevention and Management, PA and Fall Prevention, PA and Bone Strength, PA and Activities of Daily Living, and PA, Energy, and Mental Health.

**Measures.** The self-reported and validated CHAMPS Physical Activity Questionnaire for Older Adults was selected to assess PA (Stewart et al., 2001). The CHAMPS was designed specifically for evaluating interventions that aim to increase levels of PA among older adults. The measure includes activities that are typical for older adults in terms of modes of exercise (e.g., walking, general conditioning, stretching), physical activities completed during a normal day (e.g., working in the garden), and leisure activities that provide exercise (e.g., golf). As a result, the measure assesses the type and intensity levels of PA that are meaningful for older adults. The CHAMPS is also formatted to minimize recall errors and socially desirable responding. The questionnaire format provides a list of activities
that stimulate participants’ recognition of activities and the short time frame for recall (typical week during the previous 4-week period). Finally, it has been shown to be sensitive to typical changes in PA (Stewart et al.). The questionnaire includes 41 questions and takes 10–15 min to complete. For the purpose of analysis, participant responses were used to determine caloric expenditure from all PA and for moderate PA only. The measure has demonstrated adequate test–retest reliability, good validity, and good sensitivity to change with a range of older adult samples (Stewart et al.).

The Physical Activity Group Environment Questionnaire (PAGE-Q) is a 21-item survey that was used to assess the participants’ perceptions of the task and social cohesion of members at their congregate-meal sites (Estabrooks & Carron, 2000). The PAGE-Q was developed specifically for frail older adults and is based on the conceptual framework of group cohesion developed by Carron, Brawley, and Widmeyer (1998). The measure includes four scales that reflect individual attractions to the group’s task (ATGT) and social (ATGS) aspects, as well as the group’s integration around task (GIT) and social (GIS) aspects. The task is operationalized to represent PA. Items on the scales were rated on a nine-point Likert-type scale ranging from strongly disagree to strongly agree. The responses to each item are averaged to provide a composite score for each scale. The scales of the PAGE-Q have shown strong predictive, concurrent, and factor validity (Estabrooks & Carron, 2000). Furthermore, the internal consistency of the scales is excellent (Estabrooks & Carron, 2000).

Self-efficacy, which reflects an individual’s belief about her or his ability to complete a given behavior, was assessed using eight items that reflect the common barriers to PA for older adults (McAuley & Mihalko, 1998). To avoid confusion, the self-efficacy items were rated on a nine-point scale, similar to that used in the PAGE-Q. Anchors on the nine-point scale were not at all confident and completely confident. This measure has been validated and is reliable (DuCharme & Brawley, 1995).

Procedures. Because of the group-based nature of the intervention, meal sites rather than individuals were randomized to the intervention (n = 2) and standard-care control (n = 2) arms. Each of the four sites had equal opportunity to be assigned either to intervention or to control. The Kansas State University IRB approved the study protocol. Trained research assistants presented the study aims and procedures at each site and highlighted the fact that the programs would be fun, free, and voluntary. All who agreed to participate signed an informed-consent form and were provided with a written description of the study plus the names and telephone numbers of the principal investigator and an IRB representative. To ensure that all participants could safely complete the PA program, the individuals who consented to participate were also required to obtain a physician’s approval for participation. To reduce the burden on participants, each was given the opportunity to sign a release that would allow the research team to seek physician’s approval on behalf of the participant. All participants who indicated that they wanted to
participate were successful in acquiring physician approval. Measures of PA, group cohesion, and self-efficacy were collected before and at the completion of the 12-week study.

RESULTS OF STUDY 3

Program reach was evaluated by determining the representativeness of the study participants and by dividing the total number of program participants by the eligible total number of regular meal-site users. Sixty individuals were identified as regular attendees, and of those, 40 agreed to participate in the study (66% participation rate). Although it is unusual in studies of older adults, we did not lose any participants to illness or death. Furthermore, no participants were lost to follow-up during the intervention. The mean age of the participants was 77 (± 7.1) years, and 78% were women. All participants were White and were identified as low-income based on the data collected by the local AoA. The study participants were representative of the greater population of site users and did not differ from the population of meal-site users on demographic variables of age, socioeconomic status, gender, or race. Forty individuals agreed to participate in the study, and 9 additional meal-site attendees requested permission to take part in the PA program independent of participating in the study. All 9 were given permission to participate, and all received their physician’s approval. Each also attended the sessions regularly and completed the 3-month program. Hence, program participation rate (80%) was higher than the study participation rate (67%).

A summary of the PA, group cohesion, and self-efficacy descriptive statistics and change scores is provided in Table 3. Cronbach’s alpha coefficients are also presented in Table 3 and demonstrate that each psychosocial measure was internally consistent. Repeated-measures ANOVAs were used to determine whether participants in the group-based social-cognitive intervention differed from control participants in PA, task cohesion, and self-efficacy changes relative to baseline. Because of the small sample size and pilot nature of the study, a probability value of .10 was set a priori as an indicator of statistical significance.

A significant condition-by-time interaction, $F(1, 37) = 4.15, p < .05$, was found for weekly caloric expenditure in all PA (Figure 3). Group-based-intervention participants increased caloric expenditure in all PA from 1,610.9 to 2,676.3 kcal, whereas control participants did not (1,597.6 to 1,317.1 kcal). A similar condition-by-time interaction was significant, $F(1, 37) = 3.15, p < .10$, for weekly caloric expenditure in moderate-intensity PA (intervention, 888.5–1,574.2 kcal; control, 886.6–618.2 kcal). Computation of standardized effect sizes (mean difference in change between groups/SD of the pooled baseline scores) revealed that the magnitude of the effect of the group-based social-cognitive intervention was large when compared with the standard-care control (total caloric expenditure $ES = .79$, moderate activities $ES = .78$).
Table 3  Descriptive Statistics for Caloric Expenditure, Social Environmental Variables, and Self-Efficacy

<table>
<thead>
<tr>
<th></th>
<th>Group-Based Intervention (n = 23)</th>
<th>Standard-Care Control (n = 17)</th>
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<tbody>
<tr>
<td></td>
<td>Baseline (SD)</td>
<td>3 months (SD)</td>
</tr>
<tr>
<td>Mean CE all activities (kcal)</td>
<td>1,610.9 (1,830.5)</td>
<td>2,676.3 (2,351.7)</td>
</tr>
<tr>
<td>Mean CE moderate activities (kcal)</td>
<td>888.5 (1,363.6)</td>
<td>1,574.2 (1,707.0)</td>
</tr>
<tr>
<td>ATGT (α = .96)</td>
<td>7.8 (1.2)</td>
<td>7.7 (1.3)</td>
</tr>
<tr>
<td>ATGS (α = .83)</td>
<td>8.0 (1.2)</td>
<td>7.8 (0.9)</td>
</tr>
<tr>
<td>GIT (α = .87)</td>
<td>7.1 (1.2)</td>
<td>7.3 (1.2)</td>
</tr>
<tr>
<td>GIS (α = .77)</td>
<td>7.2 (1.0)</td>
<td>7.0 (1.4)</td>
</tr>
<tr>
<td>Self-efficacy (α = .96)</td>
<td>6.9 (1.6)</td>
<td>6.5 (1.3)</td>
</tr>
</tbody>
</table>

*Note.* CE = caloric expenditure; ATGT = individual attractions to the group task; ATGS = individual attractions to the group social; GIT = group integration task; GIS = group integration social.
Significant condition-by-time interactions were also found for the ATGT, $F(1, 37) = 3.19, p < .10$, and GIT, $F(1, 37) = 3.23, p < .10$, dimensions of group cohesion. In each case, participants in the group-based PA intervention maintained consistent levels of task cohesion, whereas those in the standard-care control condition decreased in these perceptions. Computation of standardized effect sizes revealed that the magnitude of the effect of the group-based social-cognitive intervention was moderate to large when compared with the standard-care control (ATGT $ES = .62$, GIT $ES = .67$). There were no significant condition, time, or condition-by-time effects for social cohesion or self-efficacy.

To test the hypotheses that self-efficacy and task cohesion mediated intervention effectiveness, we used Baron and Kenny’s (1986) procedures and criteria. According to that method a variable is a mediator when it meets the four following conditions. (a) Variation in the intervention conditions must be related to variation in the presumed mediator. Although self-efficacy and task cohesion were hypothesized to be mediators of intervention effectiveness, based on the repeated-measures ANOVAs, only task cohesion meets this first criteria and will be used in our tests of mediation. (b) Variations in the intervention condition must be related to variations in the dependent variable (i.e., PA). This criterion was also supported through the repeated-measures ANOVAs. (c) Variations in the mediator must be related to variation in the dependent variable. Changes in task cohesion were significantly related to changes in caloric expenditure in all physical activities, $R^2 = .18$, $F(2, 36) = 3.81, p < .05$, and in moderate-intensity physical activities, $R^2 = .13$, $F(2, 36) = 2.57, p < .10$. In each regression, changes of participant perceptions

![Figure 3. Self-reported physical activity by intervention condition and time of assessment. GB-ALL = group-based, all activity; CON-ALL = control, all activity; GB-MOD = group-based, moderate activity; CON-MOD = control, moderate activity.](image-url)
of GIT (all activity $\beta = 0.43, p < .05$; moderate activity $\beta = 0.36, p < .06$) were significant predictors, whereas perceptions of ATGT were not (all activity $\beta = 0.02, p > .10$; moderate activity $\beta = 0.02, p > .10$). Because of the nonsignificant standardized beta coefficients, ATGT was not used in subsequent analyses.

The fourth and final criterion for mediation is that a relationship that once existed between the intervention conditions and PA no longer exists or is significantly reduced when you statistically control for the potential mediator. The intervention condition was positively related to changes in both moderate, $R^2 = .08, F(1, 37) = 3.15, p < .10$ ($\beta = 0.28, p < .10$), and total, $R^2 = .10; F(1, 37) = 3.15, p < .05$ ($\beta = 0.31, p < .05$), PA. When controlling for GIT for moderate, $R^2 = .16, F(2, 36) = 3.32, p < .05$, and total, $R^2 = .22, F(2, 36) = 5.11, p < .01$, PA, however, the relationships between intervention condition and moderate ($\beta = 0.18, p > .10$) and total ($\beta = 0.22, p > .10$) PA were reduced and statistically nonsignificant.

**Discussion**

Three studies were completed, in collaboration with a local AoA and congregate-meal-site users, to determine the feasibility and effectiveness of offering a PA program in conjunction with congregate meals. Study 1 results suggest that a large proportion of meal-site users in rural areas of the Midwest would attend such a program and that participant perceptions of self-efficacy are related to likelihood of initiation. Study 2 results suggest that PA programming would be supported by the site management in three quarters of the cases evaluated and would be feasible in almost every congregate-meal site. Study 3, using a randomized controlled design, demonstrated that a group-based social-cognitive intervention was successful in increasing PA over a 3-month period.

In a recent review of community-based health-behavior interventions, Dzewaltowski, Estabrooks, Klesges, Bull, and Glasgow (2004) found that study participation rate varied based on the style of recruitment. Studies that used active recruitment (e.g., random-digit dialing) averaged participation rates that were less than 40%. In contrast, studies that used passive recruitment (e.g., advertised in a newspaper and asked interested people to contact the research team) reported participation rates of over 90%. In each case, the sample representativeness of the target population is questionable (Dzewaltowski et al.). Studies 1 and 3 employed active recruitment strategies and in both cases exceeded the average participation rate of studies using similar methods. In Study 1, 58% of congregate-meal-site participants indicated that they would not join an on-site PA program, and an additional 11% were undecided. When a program was actually offered in Study 3, however, 67% of the target population did participate. An additional 13% of the target population chose to participate in the program but not the research project. Furthermore, the participant demographic characteristics matched those of the greater target population (i.e., regular site attendees). These findings indicate that on-site PA programming can result in potentially strong proportional and representative reach into the target population (Glasgow et al., 1999).
Practicality and sustainability of delivery are critical if an intervention is to make a public health impact (Glasgow et al., 1999). Study 2 demonstrated that the physical environments of congregate-meal sites are well suited to PA programming. First, one setting had an ongoing and well-attended PA program already in place—demonstrating feasibility and potential for sustainability. Second, the meal-site managers reported a strong history of volunteer-delivered programs. Although the intervention in Study 3 was delivered by trained research assistants, there are examples in the literature that provide evidence that well-trained lay leaders can effectively deliver group-based self-management interventions to older adults (e.g., Von Korff et al., 1998). Third, in every case, transportation and support were available for meal-site users who could not drive or walk to the setting, thereby removing a major barrier to participation. Fourth, most meal-site managers reported that it would be possible to sustain a PA program on-site.

In Study 3, CHAMPS baseline scores for PA caloric expenditure were slightly lower for congregate-meal-site users than those reported previously for other sedentary older adults (Stewart et al., 2001). This finding replicates previous research that identified congregate-meal-site users as primarily inactive (AOA, 1996) and highlights the need for PA programs that target this population. Furthermore, the group-based social-cognitive intervention had a reasonably large effect on increasing PA in this population. Postintervention caloric expenditure of participants in the group-based social-cognitive intervention fell between scores previously reported for older adults who were considered somewhat active or meeting recommended guidelines (Stewart et al.). The mean change of 1,000 kcal expended in PA per week equates to an increase of approximately 20 min of mild- to moderate-intensity PA performed 5 days a week, which is roughly equal to the ACSM (1998) guidelines for frail or very old older adults.

The findings of Study 3 also support the use of Carron and Spink’s (1993) model for team building in PA promotion. Similar effect sizes were found for older adults who attended community programs that used team-building principles (Brawley et al., 2000; Estabrooks & Carron, 1999). These effect sizes are larger than those found when targeting younger adults (Carron & Spink, 1993; Spink & Carron, 1993), suggesting that the model might be particularly appropriate for older adults. This study also adds to the body of literature by demonstrating that the group-based social-cognitive intervention was related to changes in task cohesion that in turn were related to changes in PA. In addition, similar to a previous prospective study, the group-integration task dimension of cohesion was primarily responsible for the explained variance (Estabrooks & Carron, 1999).

Although the findings of Study 3 are promising, there are limitations that should be noted. First, the sample size for this first-generation study was small, thereby reducing the power to identify small to moderate magnitudes of effects and potentially limiting generalizability of the findings to other meal-site settings. The sites included in this study were, however, representative of the greater population of sites located in this region of the country, and participants were representative of the attendees within each site, providing some support for the potential of generalizability. Second, the sample size of four congregate-meal sites did not allow for
multileveled analyses to address issues of participant clustering. Third, the primary outcome measure was self-reported. The CHAMPS measure, however, reflects the state of the art for assessment of PA in older adults, and inclusion of a control group that also targeted increased PA provided a control for biases based on behavioral demand characteristics, time, assessment exposure, and related factors. Fourth, the duration of the study only allowed for an examination of the short-term effectiveness of the program. Future research should expand the magnitude of Study 3 to include multiple groups, a larger sample size, and a 6-month follow-up to determine issues of organization- and individual-level maintenance of the program.

We conclude that the group-based social-cognitive intervention model developed for use in congregate-meal sites holds promise for future research and application. The findings of Studies 1–3 demonstrated that the program is feasible, supported by the organizational structure, and effective when delivered over a 3-month period. Study 3 also provided evidence that task cohesion is potentially an underlying mechanism of program effectiveness. Finally, the research questions, design, and data collected in these studies were strongly influenced by the use of a participatory method with a local area AoA. As a result, at the time of submission of this paper, local health educators across the region are being trained on the intervention program to facilitate a translation of this work into regular practice.

Acknowledgments

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References


