A Randomized, Controlled Trial of a Group Intervention To Reduce Fear of Falling and Associated Activity Restriction in Older Adults

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A randomized, single-blind controlled trial was conducted to test the efficacy of a community-based group intervention to reduce fear of falling and associated restrictions in activity levels among older adults. A sample of 434 persons age 60+ years, who reported fear of falling and associated activity restriction, was recruited from 40 senior housing sites in the Boston metropolitan area. Data were collected at baseline, and at 6-week, 6-month, and 12-month follow-ups. Compared with contact control subjects, intervention subjects reported increased levels of intended activity (p < .05) and greater mobility control (p < .05) immediately after the intervention. Effects at 12 months included improved social function (p < .05) and mobility range (p < .05). The intervention had immediate but modest beneficial effects that diminished over time in the setting with no booster intervention.

Fear of falling is a serious consequence of falls that has not been addressed adequately in the medical literature. In addition to the physical consequences of falls (Baker, 1985; Kellogg International Work Group, 1987; Lamb, Miller, & Meradez, 1987; Tideiksaar, 1989), a number of investigators and clinicians have reported fear of falling following a fall (Murphy & Isaacs, 1982; Nevitt, Cummings, Kidd, & Black, 1989; Tinetti, Speechly, & Ginter, 1988). Results of several studies suggest that fear of falling is prevalent among community-dwelling older adults and may be independent of fall injuries (Maki, Holliday, & Topper, 1991). Investigations by Howland and colleagues (1993), Tinetti, deLeon, Doucette, and Baker (1994), and Arfken, Lash, Birge, and Miller (1994) indicate that from 30–50% of independently living elderly persons are afraid of falling. In the study by Howland and colleagues (1993), this fear ranked first when compared to the fear of being robbed in the street, forgetting an important appointment, losing a cherished item, or experiencing financial difficulties. The results of focus groups conducted to explore the etiology of fear of falling among elders suggested that many older adults do not discuss their fear of falling, or fall experiences, with support group members (family, friends, and health care providers) because they perceive the falls as sentinel events in precipitating nursing home admissions (Walker & Howland, 1992).

This restriction of activity might be due in part to fall-related injury. However, activity limitation due to fear of falling has also been noted as a consequence of falls, independent of injury, prior falls, age, gender, or health status (Howland et al., 1993; Kellogg International Work Group, 1987).

Fear of falling may itself become a risk factor for falls when this fear restricts activity to the point of causing deconditioning and associated muscle weakness (Hindmarsh & Estes, 1989). Indeed, Campbell, Borrie, and Spears (1989) have identified restricted activity as a risk factor for falls among older adults, and Maki and colleagues (1991) have shown an association between fear of falling and decreased postural performance, also a potential contributor to falls. In a cohort of community-dwelling elderly, Tinetti and colleagues (1994) found fear of falling marginally related to ADL–IADL functioning. However, falls-efficacy, or the degree of confidence in performing common daily activities without falling, was independently correlated with ADL–IADL functioning as well as higher order physical and social functioning. That is, persons who were afraid of falling or lacked confidence to perform activities without falling functioned at a lower level and were less active.

Thus, there is substantial evidence that fear of falling has a broad range of negative consequences for the physical, social, and mental health status of independently living older adults. Of the several fall prevention trials, including the FICSIT trials, previously reported in the literature (Alkalay, Alkalay, & Carmela, 1984; Buchner et al., 1993; Fiatarone et al., 1994; Hornbrook, Stevens, & Wingfield,
Given the prevalence and impact of fear of falling on older adults, intervention to reduce this fear is desirable. Programs that reduce the risk of falling may not always reduce fear of falling because this fear is, to some extent, independent of the risk of falling (Maki et al., 1991). Given that fear of falling can exist in the absence of a history or risk of falls, it is an important clinical problem for intervention. However, intervention for the fear of falling may be constrained because health care providers are not aware of the prevalence and intensity of this fear among their older patients and because older patients are reluctant to talk about falls and fear of falling with physicians and nurses (Vellas et al., 1987).

This article reports results of a randomized controlled trial of an intervention designed specifically to reduce the fear of falling among community-dwelling older persons who manifested this fear. The cognitive-behavioral intervention program was designed to reduce fear of falling by increasing self-efficacy and the sense of control over falling. This was accomplished by strategies for (a) restructuring misconceptions to promote a view of falls risk and fear of falls as controllable; (b) setting realistic goals for increasing activity; (c) changing the environment to reduce falls risk; and (d) promoting physical exercise to increase strength and balance. The primary aim of the intervention was to reduce fear of falling. The secondary aim was to increase physical, social, and functional activity. Three hypotheses were tested:

1. Fear of falling will decrease in intervention subjects as compared to control subjects.
2. Self-efficacy and a sense of control regarding risk of falling will increase in intervention subjects as compared to control subjects.
3. Physical and social activity will increase in intervention subjects as compared to control subjects.

Intervention effects at the 6-week (post-intervention), 6-month, and 12-month follow-ups are reported.

METHODS

Participants

Participants were recruited through public or publicly subsidized senior housing sites in the greater Boston area. This was done to facilitate participation by persons who, because of their fear of falling, might have restricted outside mobility. Eligibility criteria included: age ≥ 60 years; absence of any major physical or health condition that would preclude participation in the intervention; English-speaking; and self-reported restriction in activity due to fear of falling. This latter criterion was assessed by asking, “Are you worried or concerned that you might fall?” “As a result of this concern, have you stopped doing some of the things you used to do or like to do?” The word “fear” was not used in these questions based on pretrial focus group feedback that persons “worry” about falling but do not describe themselves as “afraid of falling.” This was confirmed by early recruitment efforts and is consistent with Bandura’s (1982) theory that self-reports of global states, such as fear, do not predict actual behavior.

The unit of randomization was the senior housing site. Forty sites were recruited for participation and pair-matched on the basis of number of units and percent minority residents, with one site in each pair randomly assigned to the intervention group and the other site to a placebo attention control group. Participants were recruited in-person through self-response to posted notices of the program and individual referrals by housing managers, social workers, and case managers for the state-funded home care program. Eligibility was determined and written informed consent obtained by the interventionist during home visits. The trial comprised 434 persons, with 216 assigned to the intervention group and 218 to the attention control group. The study was approved by the Institutional Review Boards at the New England Research Institutes and Boston University Medical Center.

The Intervention

The objective of the intervention (titled “A Matter of Balance”) was to promote activity (functional, physical, social) by reducing fear of falling. The intervention was a structured group program consisting of eight 2-hour sessions scheduled twice a week for 4 weeks. To diversify group activities, several techniques were used: videotape, lecture, group discussion, mutual problem solving, role playing, exercise training, assertiveness training, home assignments, and behavioral contracting. The early sessions focused on changing attitudes and self-efficacy prior to attempting changes in actual behavior. This cognitive restructuring (Lachman, Beaver, Bandura, Elliott, & Lewkowicz, 1992; Rodin, 1983) approach involved instilling adaptive beliefs such as greater perceived control, greater confidence in one’s abilities, and more realistic assessment of failures. This approach was used to educate participants about their self-conceptions regarding falls and risk of falling and to promote a realistic and adaptive view. The initial cognitive restructuring component of the intervention used a document-style video (produced specifically for the program) to present older adults expressing fears about falling in con-
trast to others expressing positive attitudes. Subsequent program content used varying activities to promote an adaptive conception of fear of falling with training exercises on how to shift from maladaptive (self-defeating) to adaptive (motivating) cognitions.

The cognitive restructuring approach to changing attitudes about activity restrictions related to fear of falling was reinforced by didactic material regarding incidence of falls and risks of falling, skill training in falls prevention, and what to do if one falls. The benefits of exercise to improve strength and balance in order to reduce falls risk as well as the physical and psychological costs of inactivity were emphasized. Strength training exercises (using wide elastic bands for resistance) were included in six of the eight sessions to instruct and encourage subjects to continue them independently. Approximately 30 minutes were devoted to these exercises in each of the six sessions. Assertiveness techniques were taught in the context of encouraging discussion with health care providers and family of concerns about falling and actual falls. Finally, in order to individualize the intervention, an additional approach was the use of behavioral contracts and goal-setting regarding desirable changes (e.g., correcting identified home hazards; engaging in physical exercise; resuming a formerly restricted activity).

The intervention was conducted at 20 sites between October 1994 and July 1996. Each intervention program was conducted by one of two trained facilitators. Average group membership was 10.8 participants.

The social contact control.—To test for the effect of social contact on the outcomes, a single 2-hour group session was provided for subjects in the control group. This session consisted of a didactic presentation regarding incidence and risk factors for falls, a video (produced by AARP) on home hazards that increase fall risk, and steps that can be taken to reduce risk. The approach included group discussion but did not address fear of falling or any restricted activity related to this fear. No training was provided in cognitive restructuring techniques, exercise, assertiveness, or behavioral self-management.

Twenty attention control groups were conducted, also between October 1994 and July 1996, with average group size of 10.9 participants. The social contact control programs were conducted by the same facilitators who conducted the intervention programs.

Measures

Outcomes variables.—There were two outcomes of interest: the proximate outcome of fear of falling and the distal outcome of physical, social, and functional activities. Three scales were used to measure the subject’s fear or worry about falling. Because of the concern that subjects might not directly report their concerns about falling as fear, we used a modified version of the Falls Efficacy Scale developed by Tinetti, Richman, and Powell (1990) to measure fear of falling. This scale was based on Bandura’s (1987) theory of self-efficacy, which has been shown empirically to predict behavior (Bandura, 1982; Mischel, 1968). This instrument assesses confidence in performing, without falling, each of 10 activities considered essential to independent living: cleaning house, getting dressed and undressed, preparing simple meals, taking a bath or shower, simple shopping, getting in or out of a chair, going up and down stairs, walking around the neighborhood, reaching into cabinets or closets, and hurrying to answer the phone. Two additional items were included—carrying bundles from the store and exercising. Using a revised scoring procedure (Tinetti et al., 1994), subjects rated their degree of confidence from 1 (not at all sure) to 4 (very sure). The confidence score is the average level of confidence they have across all activities, ranging from 1–4, a higher score indicating greater confidence. Cronbach alphas for this modified scale ranged from .90 to .93 across waves. Perceived control over falling was assessed by a four-item scale developed for this study, consisting of items revised from existing control inventories that have focused on other domains such as fear of memory loss (Lachman et al., 1992).

Items focused on control over the environment and ability to do things to prevent falls and reduce fear of falling: “I can reduce my risk of falling”; “I can overcome my fear of falling”; “There are things I can do to keep myself from falling”; and “Falling is something I can control.” Responses ranged from (1) strongly disagree to (4) strongly agree. Item scores were averaged to obtain a scale score, with higher scores indicating a greater sense of control. Cronbach alphas ranged from .70 to .76 across waves. A five-item scale to measure subjects’ perceived ability to manage risk of falls or actual falls was also developed for the purposes of this study. On a 4-point scale with (1) being not at all sure to (4) very sure, subjects reported their perceived ability to: “find a way to get up if you fall”; “find ways to reduce falls”; “protect yourself if you fall”; “increase your physical strength”; and “get more steady on your feet.” Cronbach alphas ranged from .76 to .84 across waves. The number of falls was collected at baseline and each follow-up with the question, “How many times have you fallen all the way down to the floor or ground, or fallen and hit an object like a chair or stair?” (Kellogg International Work Group, 1987; Nevitt et al., 1991). At baseline, the reporting period was the previous 3 months; at each follow-up, the reporting period was the time interval since the previous interview.

The distal behavioral outcome was measured with two scales, the abbreviated Sickness Impact Profile (SIP) (Bergner, Bobbit, Carter, & Gilson, 1981); and a seven-item scale measuring intended activity. The SIP indicates the changes in a person’s behavior because of health problems. The abbreviated SIP consists of 68 items covering behaviors involved in carrying out one’s life activities in six categories. Subjects respond affirmatively to those items that describe current dysfunction. Each of the items is assigned a utility weight based on estimates of the severity of each type of dysfunction. This allows for calculation of continuous scores expressed as a percent of the maximum dysfunctional score for each of six subscales and for an overall score. Two dimension scores for physical function (sum of 3 categories: somatic autonomy, mobility range, mobility control) and psychosocial function (sum of 3 cate-
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gories: social behavior, emotional stability, and psychological autonomy and communication) were also calculated as per Bergner and colleagues (1981). The Intended Activity scale, developed for this study, asks subjects to rate how sure they are that they will perform various activities in the coming week. Rated from (1) not at all sure to (4) very sure, the activities included light and heavy housework, home repairs, lawn or yard care, walking outside the home, light sport, and strenuous sport or recreational activities. Higher scores indicate higher activity levels. Cronbach alphas ranged from .59 to .64 across waves.

Predisposing variables.—Those predisposing characteristics of subjects that might influence their likelihood of participation in the intervention or the outcomes include the following sociodemographic and health characteristics: age, gender, marital status, years of education, race, and recent history of falls. Recent falls history was assessed by asking, "(H)ow many times have you fallen all the way down to the floor or ground, or fallen and hit an object like a chair or stair, in the past 3 months?"

Process variables.—Attendance as well as reason for absence or dropout was recorded by the interventionists for each subject to document intervention dose. Interventionists also kept detailed logs of each session as well as a record of falls reported by the subjects during the intervention period. To assess adherence by the interventionists to the standardized intervention protocol, the investigators selected intervention sessions for observation. Finally, other community-level activities regarding falls prevention were monitored as they might contribute to observed change in the outcomes.

Data collection.—Data were gathered at baseline, 6 weeks (i.e., 1–2 weeks following the intervention), 6 months, and 12 months. Interviews were conducted by telephone using computer-assisted telephone interviewing (CATI) by interviewers blinded to the intervention status of the subjects.

Analysis

Sociodemographic, health, and fall-related variables at baseline were compared, using chi-square and t tests as appropriate, to detect significant differences between subjects in the intervention and control groups. In addition, because 37% of intervention subjects were considered not compliant with the intervention (attended ≤ 4 sessions), baseline measures of compliant intervention subjects were compared to those intervention subjects considered noncompliant for significant differences.

Analysis of variance was used to examine the effect of the intervention on change in fall-related and activity measures immediately post-intervention (6 weeks), 6 months, and 12 months after the baseline interview. A mixed model was used to account for the possible dependence of observations within each housing site, with the treatment (intervention or social contact control) modeled as a fixed effect and the site as a random effect within treatment. Time and Treatment × Time interactions were also included as fixed effects. The effect of the intervention was measured by the interaction of Treatment and Time. Baseline scores were included to control for initial differences between subjects. When a significant treatment effect was seen, linear contrasts were created to measure short-term change (baseline to 6 weeks) and long-term change (baseline to 6 months and baseline to 12 months). Following the principle of intention-to-treat, effects are reported for the entire sample. Results of the analysis of treatment effects comparing treatment subjects considered compliant with control subjects are reported as well. When demographic covariates (age, gender, education, race, marital status) were included in the models, the results were not changed. Therefore, results of these models are not reported.

Sample size and power.—Logistical considerations determined that each group had approximately 12 participants. Power calculations were based on this number in 20 intervention and 20 control sites. This provided 80% power at alpha = .05 to detect differences between the control and intervention groups’ mean change scores of 7–8% for the attitude scales and differences of approximately 15% for the SIP and its subscales.

RESULTS

Sample Characteristics

The baseline characteristics of subjects enrolled in the trial are displayed in Table 1. There were no significant differences between subjects assigned to the intervention versus the control group. Consistent with characteristics of residents of senior housing, the participants were predominately female, not married, with a mean age of 78 years. Just over 9% were minorities, 3% lower than the 12% rate of minorities in the greater Boston area. On average, most had less than a high school education.

In terms of falls, the majority (75.1%) reported no falls in the previous 3 months; 9.4% reported two or more falls in the previous 3 months. Whereas rates of falling in most studies of community populations (e.g., Blake et al., 1988; Lord, Ward, Williams, & Anstey, 1994; Reinsch et al., 1992; Tinetti et al., 1994) are reported on an annualized basis, this rate is similar to a 3-month rate reported by Cummings, Nevitt, and Kidd (1988). On average, participants expressed being “slightly” to “somewhat afraid” that they might fall and hurt themselves. In contrast, however, they were more reserved in their reported confidence to perform common activities without falling. They reported similar levels of confidence in being able to manage an actual fall and in the control they had over reducing fall risk or their fear of falling.

In respect to activity and functional status, subjects on average expressed reservation (i.e., “a little sure”) that they would perform a range of daily activities. Based on the total SIP score, these subjects were more functionally disabled than adult populations with a variety of clinical conditions (de Bruin, Diederiks, de Witte, Stevens, & Philipsen, 1994; Deyo & Centor, 1986; MacKenzie, Charlson, DiGioia, & Kelley, 1986) yet, as might be expected, less disabled than nursing home residents (Gerety et al., 1994).
Table 1. Baseline Sample Characteristics, n = 434

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value</th>
<th>Range</th>
<th>Coding</th>
</tr>
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<tbody>
<tr>
<td>Age: mean (± SD) years</td>
<td>77.8</td>
<td>60–100</td>
<td>years</td>
</tr>
<tr>
<td>Gender: female</td>
<td>389</td>
<td>0 = female, 1 = male</td>
<td></td>
</tr>
<tr>
<td>Marital status: married</td>
<td>33</td>
<td>0 = married, 1 = not married</td>
<td></td>
</tr>
<tr>
<td>Race: White</td>
<td>394</td>
<td>0 = non-White, 1 = White</td>
<td></td>
</tr>
</tbody>
</table>
| Education mean (± SD) years       | 10.7  | 0–18
| Fall-related                      |       |        |                |
| Falls efficacy scale              | 2.62  | 1–4    | 4 = greater confidence |
| Falls control                     | 3.44  | 1–5    | 5 = higher perceived ability |
| Falls management                  | 2.15  | 1–4    | 4 = higher ability to manage falls |
| No. of falls in past 3 months: 1  | 63    | 0–100  | number of falls |
| ≥2                                | 38    | 0–100  |                |
| Function                          |       |        |                |
| SIP total score                   | 30.0  | 0–100  | higher = more dysfunction |
| Physical subscale                 | 29.2  | 0–100  | higher = more dysfunction |
| Mobility range                    | 47.0  | 0–100  | higher = more dysfunction |
| Mobility control                  | 53.4  | 0–100  | higher = more dysfunction |
| Somatic autonomy                  | 11.1  | 0–100  | higher = more dysfunction |
| Psychosocial                      | 31.4  | 0–100  | higher = more dysfunction |
| Social behavior                   | 50.8  | 0–100  | higher = more dysfunction |
| Psychological autonomy            | 26.1  | 0–100  | higher = more dysfunction |
| Emotional stability               | 19.4  | 0–100  | higher = more dysfunction |
| Intended activity                 | 1.78  | 1–4    | 4 = high      |

Focusing on the Social Behavior and Mobility Range scores of the SIP as indicators of activity level, subjects generally reported moderate levels of restricted activity. In contrast, the Somatic Autonomy score indicated that subjects reported minimal restriction with self-care activities, but the mean score for the Mobility Control subscale indicated a moderate level of mobility limitations such as walking inside and outside the house; duration of standing; and transfer or kneeling, stooping, or bending without support.

Compliance and Attrition

A measure of compliance with the intervention protocol was attendance at the group sessions. Based on the content of the program, attendance at 5 or more sessions was considered necessary for achieving a treatment effect. Of the 216 intervention subjects, 137 (63.4%) attended 5–8 sessions, 44 (20.4%) attended 1–4 sessions, and 35 (16.2%) subjects attended no sessions. Self-reported reasons for absence were typically illness or conflicting appointment or activity—usually health care-related. A comparison of subjects who attended fewer than 5 sessions with those who attended 5 or more sessions (see Table 2) revealed that subjects who attended fewer than 5 sessions had a higher total SIP score as well as higher scores for the Physical subscale and Social Behavior score of the Psychosocial subscale indicating greater limitations in behavior. Consistent with this, a lower score on the Intended Activity scale also indicated lower activity level. That is, these subjects were generally less active than those who participated more fully in the intervention program. This greater restriction in activity, however, was not attributed to recent falls or a lower falls efficacy, nor to gender or age, which did not differ by compliance status.

Of the 434 subjects enrolled in the trial, 388 (89.4%) completed the 6-week follow-up interview, 333 (76.7%) completed the 6-month follow-up, and 341 (78.6%) completed the 12-month follow-up. Forty-seven (10.8%) sub-

Table 2. Comparison of Subjects Who Attended ≥5 Sessions With Subjects Who Attended <5 Sessions

<table>
<thead>
<tr>
<th></th>
<th>≥5 Sessions (n = 137)</th>
<th>&lt;5 Sessions (n = 79)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: male</td>
<td>7.3%</td>
<td>15.2%</td>
<td>NS*</td>
</tr>
<tr>
<td>Age: years</td>
<td>77.8</td>
<td>77.2</td>
<td>NS</td>
</tr>
<tr>
<td>Any recent falls: yes</td>
<td>24.1%</td>
<td>35.4%</td>
<td>NS</td>
</tr>
<tr>
<td>Falls efficacy</td>
<td>2.70</td>
<td>2.52</td>
<td>NS</td>
</tr>
<tr>
<td>Intended activity</td>
<td>1.84</td>
<td>1.63</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sickness Impact Profile (SIP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>28.1</td>
<td>33.6</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Physical subscale score</td>
<td>26.8</td>
<td>33.0</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Somatic autonomy</td>
<td>8.9</td>
<td>13.8</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Mobility range</td>
<td>44.0</td>
<td>54.7</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Mobility control</td>
<td>51.2</td>
<td>55.6</td>
<td>NS</td>
</tr>
<tr>
<td>Psychosocial subscale score</td>
<td>30.5</td>
<td>34.7</td>
<td>NS</td>
</tr>
<tr>
<td>Social behavior</td>
<td>49.5</td>
<td>57.6</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Emotional stability</td>
<td>19.7</td>
<td>21.1</td>
<td>NS</td>
</tr>
<tr>
<td>Psychological autonomy and communication</td>
<td>24.6</td>
<td>28.0</td>
<td>NS</td>
</tr>
</tbody>
</table>

*NS = not significant.
jects died during the trial. Lack of follow-up for other reasons was similar in each group.

**Effect of Intervention on Outcomes**

The mean change scores in fall-related and activity outcome measures for the intervention and control subjects are displayed in Table 3. Looking first at the entire intervention group versus the social contact control group, subjects in the intervention group reported increased levels of intended activity and less health-related dysfunction with mobility control immediately after the intervention period. In addition, in contrast to control subjects, those in the intervention group had reductions in total dysfunction and general physical dysfunction that were of borderline significance. Data from the 12-month follow-up show intervention effects of improved mobility range, although of borderline significance. The unadjusted mean change scores for all of these SIP scores are small, however, and probably do not represent clinically meaningful change (MacKenzie et al., 1986).

The mean change scores for compliant intervention subjects compared to control subjects indicate more extensive effects of the intervention (also shown in Table 3). Some differences in change score that were insignificant for the full intervention sample are statistically significant for the sample of compliant intervention subjects. Those intervention subjects who attended 5 or more sessions of the program reported a significant increase in falls efficacy and perceived ability to manage falls immediately after the intervention. Increases in falls efficacy and ability to manage falls were significant at the 12-month contact as well. In addition, subjects who complied with the intervention had slight (not clinically important) reductions in physical and total dysfunction SIP scores and larger reductions in mobility range and social behavior dysfunction at the end of 12 months, whereas control subjects showed increased dysfunction in all of these areas. The 12-month change scores for mobility range and social behavior indicate change sufficient to represent clinically important improvement (MacKenzie et al., 1986).

These analyses were repeated with covariates including gender, age, education level, race, and marital status. Although certain covariates were significantly related to some of the scores, the treatment effects were the same as reported here.

Table 4 contains effect sizes for the significant mean change scores reported in Table 3. In general, the effect sizes are small (Cohen, 1988). The largest intervention effect was achieved for perceived ability to manage falls across all three follow-up periods.

**Safety Monitoring**

Because of concern that potentially increased activity levels among intervention subjects might result in increased incidence of falls, the number of falls reported by subjects in both the intervention and control groups was monitored. There was no statistically significant difference either in the number of subjects who reported a fall or in the mean number of falls reported by intervention subjects versus control subjects during the interval between baseline and 6-week follow-up (.25 vs .19) baseline and 6-month follow-up (.58 vs .52), or baseline and 12-month follow-up (1.03 vs 1.07). Subjects who reported multiple falls in the 3 months prior to baseline were more likely than subjects reporting no falls (64% vs 16%) to report multiple falls between baseline and 12-month follow-up (p = .001). However, there was no statistically significant difference in the number of falls reported by multiple fallers in the intervention group versus the control group.

**Discussion**

In contrast to previous trials that attempted to reduce falls or the risk of falls, this intervention trial was directed

<table>
<thead>
<tr>
<th>Table 3. Mean Change Scores: Comparing Intended and Compliant Intervention Subjects to the Attention Control Group</th>
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<tbody>
<tr>
<td><strong>6-Week Follow-up</strong></td>
</tr>
<tr>
<td><strong>N =</strong></td>
</tr>
<tr>
<td>Number of falls</td>
</tr>
<tr>
<td>Falls efficacy</td>
</tr>
<tr>
<td>Falls management</td>
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<tr>
<td>Control fear of falling</td>
</tr>
<tr>
<td>Intended activity</td>
</tr>
<tr>
<td>SIP: Total score</td>
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<tr>
<td>SIP Physical score</td>
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<tr>
<td>Somatic autonomy</td>
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<tr>
<td>Mobility control</td>
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<tr>
<td>Mobility range</td>
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<tr>
<td>SIP Psychosocial score</td>
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<tr>
<td>Psychological autonomy</td>
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<tr>
<td>and communication</td>
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<tr>
<td>Social behavior</td>
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*p < .075; *p < .05; **p < .01; ***p < .001.
at reducing fear of falling and associated restrictions in physical and social activity. Using a cognitive-behavioral approach, the 8-session intervention showed an immediate effect on increasing the level of intended activities and mobility control. These effects decayed by the 6-month follow-up.

Consistent with the rules of clinical trials, intervention effects were analyzed in the entire sample. These analyses revealed modest, if not minimal, immediate effects and no maintenance of effects over time. However, because of the rate of noncompliance with the intervention and the fact that the noncompliant subjects were less active (both current and intended activities) than compliant subjects, we were interested in whether the results would differ when the analysis was restricted to compliant subjects. The results of that analysis show more extensive immediate intervention effects, particularly on falls efficacy and attitudes toward managing falls. Further, these effects were maintained at the 12-month follow-up. In addition, subjects who attended five or more sessions also reported improvements in mobility and social behavior. Therefore, although all subjects reported lower levels of intended activity at the 12-month follow-up, subjects attending the intervention program reported improved functioning. In comparison, the control subjects reported increased dysfunction at 12 months. These 12-month intervention effects are entirely consistent with the approach of cognitive restructuring (Lachman et al., 1992; Rodin, 1983) that have used a cognitive restructuring approach as generally of a higher educational level than the subjects in this trial. Likely associated with their lower educational level, these subjects were less introspective and less experienced with cognitively oriented exercises. The interventionists reported that the cognitive restructuring exercises were the most challenging components of the intervention, whereas the behavioral exercises and skill training components were the easiest to conduct. Yet the changes in the cognitive outcomes (i.e., falls efficacy, ability to manage falls) showed the greatest immediate and sustained effect of the intervention for persons attending five or more sessions.

The fact that decay of intervention effect in changes in attitude and self-efficacy was detected at 6 months argues for a booster session, possibly at 3 months after the intervention. At least one, perhaps two, sessions are indicated to reinforce the desired changes in attitude and self-efficacy regarding falls and fall management. Also focusing on the desired behavioral changes in the booster sessions might reduce decay of increased intended activity as well as have an earlier effect on social and physical functioning.

This intervention was not designed to decrease falls per se. However, by decreasing activity restriction, which is associated with physical deconditioning, the intervention might reduce risk of falls. There was no significant difference between intervention and control subjects in the number of falls for up to 12 months. This might be interpreted as the intervention having no effect on reduction in falls or falls risk. However, if indeed the intervention participants increased their activity levels, they might have increased their risk of falls as well. Therefore, the fact that their incidence of falls was not greater than that for control subjects suggests that perhaps there is some secondary impact of the intervention on reducing falls risk. This study relied on self-report to collect data on numbers of falls for intervals ranging from 6 weeks to 12 months, as compared to other studies that have used monthly calendars (Tinetti et al., 1994) or weekly return postcards (Cummings et al., 1988). Recognizing the limited accuracy of recall regarding falls, the cognitive changes in attitudes and self-efficacy observed in the compliant intervention group are particularly noteworthy given the study population. The subjects in cognitive training trials (Lachman et al., 1992; Rodin, 1983) that have used a cognitive restructuring approach are generally of a higher educational level than the subjects in this trial. Likely associated with their lower educational level, these subjects were less introspective and less experienced with cognitively oriented exercises. The interventionists reported that the cognitive restructuring exercises were the most challenging components of the intervention, whereas the behavioral exercises and skill training components were the easiest to conduct. Yet the changes in the cognitive outcomes (i.e., falls efficacy, ability to manage falls) showed the greatest immediate and sustained effect of the intervention for persons attending five or more sessions.

The fact that decay of intervention effect in changes in attitude and self-efficacy was detected at 6 months argues for a booster session, possibly at 3 months after the intervention. At least one, perhaps two, sessions are indicated to reinforce the desired changes in attitude and self-efficacy regarding falls and fall management. Also focusing on the desired behavioral changes in the booster sessions might reduce decay of increased intended activity as well as have an earlier effect on social and physical functioning.

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as reported by Cummings et al. (1988), the number of falls in this study might be underreported. However, there is no evidence to suggest differential reporting by intervention versus control subjects that might change the interpretation of results.

The absence of any meaningful change in targeted outcomes for control subjects provides further support of the efficacy of the intervention. However, the design limitation of the one-session attention control condition did not make it possible to control entirely for the effect of social contact on attitudinal and behavioral changes in the intervention group. It is possible that the supportive atmosphere and interaction of the group intervention contributed to the observed changes in fears about falling. Yet, because of the carefully constructed design of the content of the attention control session (i.e., nothing regarding fear of falling, restricted activity, or changing maladaptive attitudes), it is reasonable to conclude that the cognitive restructuring approach and skill training of the intervention made a substantial contribution to the observed effects.

In summary, the results of this study and others (Campbell et al., 1989; Howland et al., 1993; Maki et al., 1991; Reinsch et al., 1992; Tinetti et al., 1994) have established the importance of fear of falling as a targeted outcome for intervention. The results of this trial indicate that short-term changes can be achieved in maladaptive attitudes and beliefs about falling and in activity levels and functioning. The results indicate the need for a booster session a few months after the intervention to maintain the changes in attitude and self-efficacy and to foster quicker change in behavior and activity levels. Further, the fact that this intervention was conducted with a vulnerable population suggests that it could be conducted with similar effectiveness and efficacy with healthier, more functional—yet still afraid of falling—populations.

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REFERENCES


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