Long-Term Outcome for ADL Following the Health-Promoting RCT—Elderly Persons in the Risk Zone

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Purpose: To examine independence in activities of daily living (ADL) at the 1- and 2-year follow-ups of the health-promoting study Elderly Persons in the Risk Zone. Design and Method: A randomized, three-armed, single-blind, and controlled study. A representative sample of 459 independent and community-dwelling older adults, 80 years and older, were included. A preventive home visit was compared with four weekly multiprofessional senior group meetings including a follow-up home visit. Results: Analysis showed a significant difference in favor of the senior meetings in postponing dependence in ADL at the 1-year follow-up (odds ratio [OR] = 1.92, 95% confidence interval [CI] = 1.19–3.10) and also in reducing dependence in three (OR = 0.52, 95% CI = 0.31–0.86) and four or more ADL (OR = 0.40, 95% CI = 0.22–0.72) at the 2-year follow-up. A preventive home visit reduced dependence in two (OR = 0.40, 95% CI = 0.24–0.68) and three or more ADL (OR = 0.37, 95% CI = 0.17–0.80) after 1 year. Implications: A long-term evaluation of Elderly Persons in the Risk Zone showed that both senior meetings and a preventive home visit reduced the extent of dependence in ADL after 1 year. The senior meetings were superior to a preventive home visit since additional significant effects were seen after 2 years. To further enhance the long-term effects of the senior meetings and support the process of self-change in health behavior, it is suggested that booster sessions might be a good way of reinforcing the intervention.

Key Words: Frail elderly, Activities of daily living (ADL), Randomized controlled trial, Intention-to-treat analyses

Older adults typically desire to reside in their own homes for as long as possible (Thorslund & Silverstein, 2009). Research has shown that
independence in activities of daily living (ADL) is strongly linked to the possibility of aging in place since dependence in ADL predicts institutionalization (Friedman, Steinwachs, Rathouz, Burton, & Mukamel, 2005; Sonn, Grimby, & Svanborg, 1996) and also mortality (Jakobsson & Karlsson, 2011). In addition, it has been reported that independence is highly valued by older adults (Haak, Dahlin-Ivanoff, Fänge, Sixsmith, & Iwarsson, 2007), and another study (Johannesen, Petersen, & Avlund, 2004) found that lack of everyday life satisfaction in older adults was primarily associated with dependence on personal help and the use of home care services. It is therefore essential to support older people to continue performing daily activities. Finally, society might benefit economically if older adults can remain living in their own homes (Agree & Freedman, 2000), especially since the proportion of persons aged 80 years and older in the population is accelerating in Sweden and the Western world (Statistics Sweden, 2009).

ADL comprise personal activities of daily living (PADL), which include activities related to the care of one’s own body such as toileting, eating and showering, and instrumental activities of daily living (IADL), which are related to activities in one’s home such as cooking, cleaning, and shopping (Christiansen & Hammecker, 2001). The ability to independently manage everyday activities characteristically deteriorates with age, and decline in IADL is particularly high for persons aged 80 years and older (Holstein, Due, Almind, & Avlund, 2007). Early signs, such as experienced difficulties, uncertainty, and fatigue, are often followed by the need of assistance from someone else in order to manage daily activities (Avlund, Damsgaard, Sakari-Rantala, Laukkana, & Schroll, 2002; Reuben, 1998).

The outcome of differently designed health-promoting interventions for community-dwelling older persons with regard to ADL has varied according to the design of the intervention and the health status of the participants (Bergman, Hogan, & Karunanathan, 2008; Beswick et al., 2008; Gustafsson, Edberg, Johansson, & Dahlin-Ivanoff, 2009; Huss, Stuck, Rubenstein, Egger, & Clough-Gorr, 2008). One review (Huss et al., 2008) of the effects of multidimensional preventive home visits found that intervention had a beneficial affect on ADL if it included a clinical examination. In contrast, a recent study conducted in the Netherlands (Bouman, van Rossum, Ambergen, Kempen, & Knipschild, 2008) found no significant effect of home visits in older adults whose health were poor. Few studies have evaluated health-promoting interventions in the form of group meetings for older adults. However, one review (Beswick et al., 2008) concluded that group education and counseling for older adults are advantageous in maintaining independent living. Finally, other researchers have concluded that health-promoting intervention for older adults has the greatest effect when implemented at an early stage, before the older person becomes too frail or disabled (Fried, Ferrucci, Darer, Williamson, & Anderson, 2004; Hardy, Dubin, Holford, & Gill, 2005).

Elderly Persons in the Risk Zone (Dahlin-Ivanoff et al., 2010) was a health-promoting intervention study with the overall aim to slow down the progression of frailty in older adults (80 and older), to maintain their health, quality of life, and minimize the need for use of medical care. The study consisted of two interventions: a preventive home visit and multiprofessional senior group meetings with one follow-up home visit (senior meetings), plus a control group. At the 3-month follow-up, the results showed that senior meetings postponed dependence in ADL (Gustafsson et al., 2012). This led to the question whether the interventions could delay dependence in ADL for an even longer time period. Accordingly, the aim of this study was to evaluate the 1- and 2-year effects of the interventions in Elderly Persons in the Risk Zone with focus on independence in ADL.

Design and Methods

Study Design

Elderly Persons in the Risk Zone was a randomized, single-blind, and three-study-arms trial with two intervention groups and one control group with a follow-up to 2 years (Dahlin-Ivanoff et al., 2010). It addressed independent community-dwelling older adults at risk of developing frailty. The overall hypothesis of the study was twofold: (1) it is possible to delay deterioration (i.e., increased dependence in ADL) if an intervention is made when the older adults are at risk of becoming frail and (2) a multiprofessional group intervention is more effective in delaying deterioration than a single preventive home visit. The study was conducted during the period November 2007–March 2011. This article concerns the 1- and 2-year evaluations completed in March 2010/2011. The Regional Ethical Review Board in Gothenburg approved the study (ref.nr. 650-07), and written informed consent was obtained from the participants.
Participants and Setting

Eligible persons for the study, adults 80 years and older, were drawn from official registers in two urban districts in Gothenburg, Sweden. Equal numbers of persons from the two urban districts were listed in random order. The persons were included until the intended sample size was reached. Criteria for inclusion were as follows: The participants should live in their ordinary housing, not be dependent on the municipal home help service or care, be independent of help from another person in ADL, and be cognitively intact (defined as having a score of 25 or higher, assessed with the Mini-Mental State Examination [MMSE; Folstein, Folstein, & McHugh, 1975]).

The two urban districts were situated outside the city centre but within the city limits, with a mix of self-owned houses and apartment blocks. The general educational level and income level of residents were slightly better, and the sickness rate somewhat lower, compared with Gothenburg as a whole.

Interventions

Preventive Home Visit.—Each participant received a single home visit by a specially trained professional in the intervention team, either a registered occupational therapist (OT), a registered physiotherapist (PT), a registered nurse (RN), or a qualified social worker (SW). The intervention included information and advice about what the municipality could provide in the form of local meeting places, activities run by local associations, physical training for seniors, etc. Information about available help and support of various kinds offered either by volunteers or by professionals employed by the urban districts, accessibility to assistive devices and housing modifications, was also offered. Additionally, environmental fall risks in the home were identified and advice on how to prevent falls was included. The preventive home visit was guided by a protocol (Table 1), which included an opportunity for individuals to further elaborate on certain elements and lasted between 1½–2 hr.

Multiprofessional Senior Group Meetings with One Follow-up Home Visit (Senior Meetings).—The intervention comprised of 4 weekly, 2-hr group meetings involving 4–6 participants. Within the group meetings, the participants received information on and discussed the aging process and possible health consequences and were provided with strategies for solving the various problems that might arise in the home environment. A key intent of the intervention was to acknowledge older adults’ expertise and offer an arena for the exchange of knowledge rather than knowledge transfer (Adolfsson, Smide, Gregeby, Fernström, & Wikblad, 2004). The idea was also to encourage people to make their own decisions and, as far as possible, control their own lives (Tengland, 2007). A collaborative multiprofessional intervention team, an OT, a RN, a PT, and a qualified SW, each responsible for one occasion, administered the four

Table 1. Elements in the Protocol Used in the Preventive Home Visits in the Intervention Study, Elderly Persons in the Risk Zone

<table>
<thead>
<tr>
<th>Protocol elements</th>
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<tbody>
<tr>
<td>Information and advice about, and when appropriate instructions in, a basic home exercise program including balance exercises</td>
</tr>
<tr>
<td>Assessment of the fall prevention checklist, information and advice on how to prevent identified fall risks and continue to be active, and in adequate cases a “safety walk” in the home</td>
</tr>
<tr>
<td>Information and advice about technical aids and housing modifications, and, if necessary, where and whom to turn to for purchase or application</td>
</tr>
<tr>
<td>Information and advice about smoking alarms, and, if necessary, an offer to check the smoking alarm</td>
</tr>
<tr>
<td>Information about the range of help and support available in Gothenburg and in the urban districts (volunteers, churches, mission fellow human, health centers, etc.), and where to turn to for help with health problems and illness, opening hours, phone times, and phone numbers</td>
</tr>
<tr>
<td>Information on the possibility of an appointment with a pharmacist at the local pharmacy for review of and counseling on medicines</td>
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<tr>
<td>Information and advice about incontinence</td>
</tr>
<tr>
<td>Display and hand over a brochure with information on the Swedish legislation and possibilities for advise on and assessment of driving capacity by professionals</td>
</tr>
<tr>
<td>Information and advice about what the urban districts can provide in the form of local meeting places, activities run by local associations, physical training for seniors, walking groups for seniors, and possibility of receiving or providing volunteer interventions</td>
</tr>
<tr>
<td>Offer to register for “try-out” activities, a standalone group visit to local meeting places, a short introduction to computer sciences, petanque clubs for seniors, gyms for seniors, Nordic walking groups, and more</td>
</tr>
<tr>
<td>Information about public transportation, including busses adapted for older adults, and of mobility service for the disabled</td>
</tr>
<tr>
<td>Information on the Social Services Act, and on where and whom to contact in the urban districts in order to apply for home care services</td>
</tr>
</tbody>
</table>
meetings. Prior to the intervention, the professionals attended a course in how to direct groups and group process theory. The role of the leader was to encourage, and guide, the participants in the learning process. Themes from a booklet (Table 2), written in a popular style by researchers in the field and especially designed for the intervention, were used as a basis for the meetings (Vårdalinstitutet, 2009). In addition to taking part in the group sessions, each participant received an individually tailored follow-up home visit about 2–3 weeks after the meetings in which he or she had the opportunity to discuss group topics in more depth.

**Control Group.**—The participants in the control group had access to the ordinary range of community services offered by the municipal care for the aged, which they approached entirely on their own initiative whenever they felt the need. If the investigator discovered that a person in the control group had an urgent need of community or health care service, he/she informed him/her where to turn to receive help. After the end of the study, the participants were asked if they wished to take part in either of the two interventions, which, at that time, had been implemented in the common routines of the urban districts.

### Outcome Measure

Data collection was performed in the participant’s home by research assistants (OT, PT, or RN). They were trained in how to administer the assessments, and inter-rater reliability was tested, enhanced, and maintained through group discussions. To ensure as much standardization of the assessments as possible, study protocol meetings were held regularly throughout the study. In addition, data on municipal home help service and mortality were collected from municipality records. The outcome measure for this study was the change in ADL at the 1- and 2-year follow-ups.

#### Activities of Daily Living

Independence of, or dependence on, another person in ADL was assessed according to a cumulative scale of well-defined personal and instrumental activities, the ADL staircase (Sonn et al., 1996; Sonn & Åsberg, 1991). Nine out of the ten original activities were used; Cleaning, shopping, transportation, cooking, bathing, dressing, going to the toilet, transfer, and feeding (0–9). Dependence was defined as another person being involved in the activity by giving personal or directive assistance. People living together were assessed as independent if they performed the activity when alone. In this article, both independence in ADL (all nine activities) and the increasing number of activities in which a participant has become dependent (two–four or more ADL) have been analyzed.

#### Sample Size, Randomization, and Blinding

The power calculation was based on the expected relative change in time of functional abilities between the study arms, a significance level of $\alpha = 0.05$, and a power of 80% in a two-sided test. Thus, at least 112 persons were required in each intervention group to be able to detect a difference of at least 15% between the groups. A comparison between the control group and the intervention groups would require 72 persons in the control group, assuming a difference of at least 20%. Accordingly, it was found that at least 300 persons were needed; a total of 459 persons were therefore included to allow for dropouts. An independent researcher, not involved in the enrolling of participants or in the interventions, organized the allocation system used. The study participants were consecutively and randomly assigned to one of the three study arms by a research assistant using opaque sealed envelopes. The research assistants who assessed the outcomes were blind to group assignment.
Statistical Analyses

All analyses were made on the basis of the intention-to-treat (ITT) principle (Altman, 1999). The basic assumption for imputing data was that older adults (80 and older) are expected to deteriorate over time as a natural course of the aging process. Therefore, the approach of data imputation in this study was replacement of missing values with a value based on the median change of deterioration (MCD) between two measuring points (baseline and the 3-month follow-up or between 2 follow-ups) of all who participated at both measuring points. The MCD is a conservative form of the worst change of deterioration, which, in turn, is related to the single imputation method of the worst case (Committee for Medicinal Products for Human Use, 2009). Consequently, the MCD for an outcome measure was subtracted from the last genuine individual value registered, and imputed, substituting missing data at the 1- and 2-year follow-ups. An exception was made for missing values due to death, which were imputed with the worst-case rank at respective follow-up. Sensitivity analyses comparing the results to complete cases analyses (Bennett, 2001) were performed, and showed aligned trends, but are not presented. Our stated basic assumption guided the final selection of the MCD as the preferred imputation method used in the analyses presented.

Baseline and dropout characteristics among the three groups were compared using Chi-square test or Fishers exact test for dichotomous variables (gender, living alone, academic education, and municipal home help), Mann–Whitney U test for ordinal data (sum of frailty indicators and balance score), and t-test for continuous variables (age and walking speed). In the final analyses, the outcome measure was analyzed using an overall Chi-square test, and thereafter compared group wise by the odds ratio (OR). A p value of .05 or less was considered significant and a 95% confidence interval (CI) is provided, using normal approximation of the log-OR, for each analysis presented in a table. Statistical analyses were performed using Predictive Analytics Software (PASW) Statistics, version 18.0 (IBM SPSS Inc, Chicago, IL, 2009).

Results

The flow of participants through the study is shown in Figure 1. Of the 546 persons who were assessed for eligibility, 459 persons met the inclusion criteria, consented to participate, and were included: 114 in the control group, 174 in the preventive home visit group, and 171 in the senior meetings group.

The baseline characteristics of participants are presented in Table 3. There were no statistically significant differences between the intervention groups and the control group in terms of demographic data, self-rated health, or a sum of six core frailty indicators.

The interventions were largely implemented according to plan. All participants, 100%, assigned to a preventive home visit participated in the intervention. Ninety-seven percent of the participants in the senior meetings (n = 165) attended all four meetings, whereas 2% (n = 4) attended three meetings, and 1% (n = 2) attended two meetings. No known organized co-intervention took place within the time period in question, and no adverse events were reported during the implementation of the interventions.

The dropout rates at the 1- and 2-year follow-ups were, respectively, 15% and 24% (n = 67/112), with dropouts in all groups but with a significantly larger proportion in the control group, 23% and 34% (p = .008/.036), compared with the preventive home visit, 10% and 20%, and the senior meetings, 14% and 22%. “Not interested” was the main reason for declining participation at both follow-ups in the preventive home visit and the control groups, whereas the main reasons for declining participation in the senior meetings were more varied (Figure 1). No significant differences were found between participants and dropouts concerning gender, marital status, education, or living conditions. However, the dropouts at the 1-year follow-up had significantly worse self-rated health (fair or poor), 28% (p = .03) compared with 18% among the participants, and a higher proportion of municipal home help service (n = 21) compared with participants (n = 54, 14%; p = .002). In addition, the dropouts at 2 years were significantly older (p = .001), had lower balance scores (p = .02), and lower walking speed (p = .03). Finally, at 1 year, a total of 11 persons (2%) had died, and at 2 years, the number had risen to 28 persons (6%).

All participants were independent in ADL at the baseline of the study. Forty-five percent of the participants in the control group remained independent at the 1-year follow-up compared with 53% in the preventive home visit and 61% in the senior meetings groups. The proportions at the 2-year follow-up were 35% in the control group, 39%
in the preventive home visit, and 36% in the senior meetings groups. All three groups followed the same general pattern of dependence in ADL with the largest proportion of dependence in cleaning followed by shopping, cooking, and transportation at both follow-ups. The analysis at the 1-year follow-up showed a statistically significant difference between the senior meetings in postponing dependence in ADL compared with the control group with an OR of 1.92 (95% CI = 1.19–3.10; Table 4). In the case of the preventive home visit group, the OR for postponing dependence in ADL was 1.42 (95% CI = 0.88–2.28) compared with the control group, but this difference was not significant. There was, however, a statistically significant difference between both interventions and the control group in reducing dependence in two and three or more activities, with ORs between 0.27 and 0.40 (Table 4). The analysis at the 2-year follow-up showed a significant difference in favor

Table 3. Baseline Characteristics and \( p \) Values for Differences Between any of the Three Study Arms in the Study Elderly Persons in the Risk Zone

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Control group ( (n = 114) )</th>
<th>Preventive home visit ( (n = 174) )</th>
<th>Senior meetings ( (n = 171) )</th>
<th>( p ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age, (range)</td>
<td>86 (80–97)</td>
<td>86 (80–94)</td>
<td>85 (80–94)</td>
<td>.24</td>
</tr>
<tr>
<td>Female, ( n ) (%)</td>
<td>70 (61)</td>
<td>111 (64)</td>
<td>113 (66)</td>
<td>.63</td>
</tr>
<tr>
<td>Living alone, ( n ) (%)</td>
<td>55 (48)</td>
<td>99 (57)</td>
<td>103 (60)</td>
<td>.10</td>
</tr>
<tr>
<td>Academic education(^a), ( n ) (%)</td>
<td>25 (22)</td>
<td>40 (23)</td>
<td>32 (19)</td>
<td>.69</td>
</tr>
<tr>
<td>Self-rated health(^b), ( n ) (%)</td>
<td>90 (79)</td>
<td>139 (80)</td>
<td>142 (83)</td>
<td>.63</td>
</tr>
<tr>
<td>Median sum of frailty indicators(^c), (range)</td>
<td>1 (0–5)</td>
<td>1 (0–5)</td>
<td>1 (0–5)</td>
<td>.89</td>
</tr>
</tbody>
</table>

Notes. \(^a\)Tertiary education (university or college).  
\(^b\)Excellent/very good/good (in contrast to fair/poor; Ware, Snow, Kosinski, & Gandek, 1993).  
\(^c\)The sum of six core frailty indicators: weakness, fatigue, weight loss, low physical activity, poor balance, and gait speed (Dahlin-Ivanoff et al., 2010).
of the senior meetings in reducing dependence in three or more ADL (OR = 0.52, 95% CI = 0.31–0.86) and in four or more ADL (OR = 0.40, 95% CI = 0.22–0.72; Table 4).

Discussion

The long-term evaluation of Elderly Persons in the Risk Zone showed that older adults who participated in senior meetings during the first year postponed their dependence in ADL and that their dependence in ADL after 2 years was less extensive than that of the participants in the control group. The 1-year follow-up showed that participation in a preventive home visit also reduced the extent of dependence in ADL, but the 2-year follow-up did not show any reduction here. This implies that the senior meetings had the most beneficial long-term effects, which is in line with the positive effect obtained in the short term, which was already noted at the 3-month follow-up (Gustafsson et al., 2012).

Our findings indicate that dependence in ADL was less extensive 1 year after the interventions for participants in both interventions. For participants in the senior meetings, the benefit of that intervention continued for a further year (as shown at the 2-year follow-up). These results are likely to have a positive effect on the participants’ lives. First, the extent of dependence in ADL can play a major role since there are correlations between dependence in everyday activities and decreased life satisfaction in older adults (Bilotta et al., 2010; Low & Molzahn, 2007). Second, research has established that older adults’ need of help in daily activities is closely correlated with their health status (Millán-Calenti et al., 2010). Accordingly, this may imply that intervention participants, particularly participants in the senior meetings, experienced a higher degree of life satisfaction, had fewer admissions to care units, and lower morbidity and mortality rates than participants in the control group. Naturally, these assumptions need to be thoroughly investigated in future studies. Further, the lower degree of severity in dependence in ADL for intervention participants, above all those in the senior meetings, would rationally lead to less use of municipal home care services or informal help. Such an assumption also needs examination. Finally, the lower demand on municipal home care services hypothesized may also be economically beneficial to the urban districts. This last postulation supports the interest in an ongoing study evaluating the cost of, and the health economic value in, the results obtained in Elderly Persons in the Risk Zone.

One aspect of the senior meetings, possibly explaining their advantage over preventive home visits, is that they are group based and offer a forum for the exchange of knowledge rather than knowledge transfer (Adolfsson et al., 2004). The group setting may provide an opportunity for learning from each other and a forum for meeting people in similar situations (Nilsson & Nygård, 2003). The approach of the senior meetings was also to encourage people to decide for themselves and, as far as possible, take and maintain control over their own lives. Other studies have confirmed that this approach has a positive effect on health outcomes (Kiesler & Auerbach, 2006). Moreover, as stated earlier, independence is highly valued by older adults and they strive to maintain independence in their daily lives (Haak et al., 2007; Häggblov-Kronlöf, Hultberg, Eriksson, & Sonn, 2007). This inherent desire for independence could have been enhanced by the approach in the senior meetings, forming a motivator for behavioral...
change, and providing another explanation for the difference between participating in senior meetings and a preventive home visit.

A recently published article (Behm, Zidén, Dunér, Falk, & Dahlin Ivanoff, 2012) investigating participants’ experience of the senior meetings in the Elderly Persons in the Risk Zone study supports the earlier assumptions. It was found that the group discussions were perceived as a “key to action” in the older person’s life. The authors speculate that the senior meetings initiates a process of self-change, moving participants from being in a “precontemplative” stage of taking 1 day at a time to one in which they are more aware, “the contemplative” stage, where the benefits of making a behavioral change, seeing solutions, and planning to take action are more apparent. In turn, the results in this study may be seen as initial proof that the third and fourth process stages of the transtheoretical model (TTM) have taken place (Prochaska & DiClemente, 1983). The third stage is “preparation,” where the person prepares to take action through small changes in his/her life, and the fourth stage is definite “action.”

Our findings need to be evaluated taking into account the fact that 2 years have passed since the interventions, a time interval during which a great deal can happen for a person aged 80 years and older. Considering this wide time span, it is encouraging that the senior meetings still showed beneficial effects after 2 years. This raises the question whether the long-term effects of the senior meetings could be further improved to also include postponed dependence in ADL (all nine activities). Improvements could entail further support of the third and fourth stages of self-change in the TTM, “preparation” and “action,” in the hope that this would lead to the desired fifth stage of behavioral change; “maintenance” (Prochaska & DiClemente, 1983). A potential modification might be to intensify the senior meetings, for instance, by increasing the number of meetings. In our study, four weekly senior meetings with one follow-up home visit were implemented. Two other studies (Clark et al., 2011; Scott et al., 2004) evaluating group interventions for older adults have attained positive outcomes by, in the first case, holding weekly sessions for 6 months and, in the second, monthly group meetings for 2 years. However, the positive outcomes in these studies concerned other outcomes than reduction of ADL dependence. On the other hand, a beneficial impact on ADL and an improved level of perceived security in ADL were demonstrated in a health promotion program for visually impaired older adults (Eklund, Sonn, & Dahlin-Ivanoff, 2004). This program applied an 8-week long intervention with group meetings once a week, twice as many group meetings as in this study. In contrast, a recent review (Beswick, Gooberman-Hill, Smith, Wylde, & Ebrahim, 2010) found an overall benefit of complex interventions for older people but little to suggest improved outcomes in those interventions with highest intensity. Even so, an overview of the number of meetings used in our intervention may prove beneficial. Another alternative would be to include a small number of senior meetings, one or possibly two, as “booster sessions” on specific occasions after the original intervention. A possible approach could be to impose one booster meeting 3 months after the original intervention and yet another one after an additional 3 months. Booster sessions have proven successful in reinforcing and extending the affect of other interventions (Cherry, Hawley, Jackson, & Boudreaux, 2009; Metz, Flöter, Kröger, Donath, Piontek, & Gradl, 2007). Finally, in one study (Metz et al., 2007), individual telephone booster sessions were used, a conceivable option for the senior meetings as well since they are practical and less expensive.

The decision to impute substitute values for missing data in our study was based on the use of the ITT analysis where all subjects are included in the analysis (Altman, 1999). The choice of the imputation method was guided by our basic assumption that older adults (80 years and older) are expected to deteriorate over time and by the analysis of the dropouts at the 1- and 2-year follow-ups, which showed that they had significantly worse baseline measures than participants. Similar results for dropouts were found at the 3-month follow-up in Elderly Persons in the Risk Zone (Gustafsson et al., 2012), which led to the conclusion that missing data were not a random occurrence (Little & Rubin, 1987). That dropouts in intervention studies aimed at older adults are more likely to show worse outcomes than participants is confirmed by others (Hardy, Allore, & Studenski, 2009), and our imputation method is further justified by this selection effect. We therefore applied the MCD as an imputation method although other methods might also have been appropriate, for instance, using different prespecified imputation techniques for each different reason for withdrawal, not only for death (Committee for Medicinal Products for Human Use, 2009). In considering the results of this study,
it is important to be conscious of the fact that there is no universally applicable method of handling missing values and that different approaches may lead to different results. However, it is important to base an approach on clear assumptions, which we did, and the conservative choice of the imputation method used in this study rather underestimated than overestimated the intervention effects. Given that research on health-promoting interventions for older adults is a growing area of research, a more in-depth discussion on how to handle missing data in this field is welcome.

Conclusion

A long-term evaluation of Elderly Persons in the Risk Zone showed that senior meetings postponed dependence in ADL during the period up to the 1-year follow-up. This follow-up also showed that both senior meetings and a preventive home visit reduced the extent of dependence in ADL. However, the senior meetings were superior to a preventive home visit since additional significant effects were seen after 2 years. To further enhance the long-term effects of the senior meetings, and support the process of self-change in health behavior, it is suggested that booster sessions might be a good way of reinforcing the intervention.

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