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Community Relocation in Very Old Age: Changes in Housing Accessibility

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MeSH TERMS
- aged, 80 and over
- architectural accessibility
- environment
- housing for the elderly
- life change events

OBJECTIVE. The objective of this study was to compare environmental barriers, housing accessibility, and usability before and after relocation of very old, single-living people in the community. It also examined whether accessibility improved after relocation compared with a simulated scenario in which participants would have remained in their former dwellings.

METHOD. Data from the Swedish part of the longitudinal Enabling Autonomy, Participation, and Well-Being in Old Age: The Home Environment as a Determinant for Healthy Ageing database were analyzed with a before-and-after design ($N = 29$). Mean time from before to after data collection was 2.6 yr.

RESULTS. The number of environmental barriers was significantly reduced after relocation, especially barriers at entrances and in bathrooms. In addition, usability was stable and accessibility improved compared with the simulated scenario of remaining in the former dwelling.

CONCLUSION. Community-based moves to new dwellings may lead to fewer environmental barriers and stable levels of usability and accessibility. This relocation is a positive outcome, considering the expected functional decline in old age.

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Over the life course, housing needs often change, and a dwelling that once was perfect for raising a family may turn out to be less optimal for growing old. Typical features in most dwellings might become environmental barriers when functional decline sets in, limiting occupational performance. Growing evidence has shown that the prospect of relocation to skilled nursing facilities increases when older adults report that their dwellings present environmental barriers that restrict their indoor mobility (Stineman et al., 2012). In addition, the combination of inaccessible dwellings, cognitive deficits, and dependence in cooking were related to relocation to skilled nursing facilities among very old, single-living people in Sweden (Granbom, Löfqvist, Horstmann, Haak, & Iwarsson, 2014). Inaccessible home environments also seem to be related to dependence in activities of daily living (ADLs; Iwarsson, 2005) and mobility limitations, which are well-known predictors for relocation to skilled nursing facilities (Luppa et al., 2010; Miller & Weissert, 2000).

Extending the time people can live in their preferred home environments rather than move to skilled nursing facilities reflects a strong aging-in-place policy in many countries and also corresponds to the desires of the majority of older people (AARP, 2012, Löfqvist et al., 2013). Accordingly, most home and housing services offered to older people are related to aging in place. However, few, if any, services are available to help with the decision regarding older people moving within the community. In addition, as a result of rapid demographic changes, limited resources for long-term care, and the expectation that housing

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preferences will change when new cohorts grow old, community-based moves in very old age are expected to increase (Oswald & Rowles, 2007). Even so, little is known about the extent to which these moves involve fewer environmental barriers and improved accessibility.

Theoretically, housing modifications and relocation can be seen as *environmental adaptations,* that is, coping strategies to optimize the congruence or fit between the person and the social and physical environment (Golant, 2011; Lawton, 1989). *Accessibility,* one facet of person–environment (P–E) fit in the home environment, is the objectively assessed relationship between a person's functional limitations and a home's environmental barriers (Iwarsson & Ståhl, 2003). Thus, accessibility can change as a result of changes in functional capacity or environmental demand. Another important aspect of the home environment is *usability,* that is, the extent to which the physical environment supports occupational performance. *Usability* refers to the transaction among a person, the environment, and activity and is a perceived aspect of home.

The relocation decision-making process among older adults may occur over years and involve dwelling compatibility issues, such as maintenance of a large garden or house being too strenuous, intertwined with health, economic, and social issues (Sergeant & Ekerdt, 2008; Stimson & McCrea, 2004). To some extent, compensating for the consequences of age-related functional decline by providing improved housing options and home adaptations meets the needs and expectations of older adults. For example, accessible housing has proven to be instrumental in maintaining independence in older people (Wahl, Fänge, Oswald, Gitlin, & Iwarsson, 2009). Among the variety of supportive compensatory environmental strategies, moving to a more accessible dwelling is believed to be helpful in this regard, although little evidence exists. In addition, older people are often highly attached to their homes and do not want to move at all even if their present dwellings are not optimally designed. Because the number of single-living very old people is increasing and they are at high risk for relocation to skilled nursing facilities (Bharucha, Pandav, Shen, Dodge, & Ganguli, 2004; Hallberg & Lagergren, 2009), they are an important target group for research on consequences and outcomes of community-based moves. Thus, this study sought to determine whether very old people who move relocate to dwellings with fewer environmental barriers and accessibility problems compared with their previous dwelling.

Only a few studies have investigated the physical environments of dwellings that older people move into (Stoeckel, 2011). Findings have indicated that young-old adults move to dwellings with better amenities and environmental features than previous dwellings when making community-based moves. For example, in a German study of this population, the majority of participants reported good housing conditions in their former homes but still reported improvements in household amenities in new compared with former homes (Oswald, Schilling, Wahl, & Gäng, 2002). Nearly half (45%) of the participants in that study reported barrier-free environments in the former homes, and more than three-quarters (78%) reported such environments in their new homes. In a U.S. study, one-third of the movers relocated to dwellings with at least one out of five self-reported environmental improvements (Stoeckel, 2011). The most common improvements were bathroom safety features (26%) and wheelchair accessibility (17%). However, the results were based on self-reports, and to the best of our knowledge, studies using objective data on accessibility problems are lacking.

Accordingly, the aim of this study was to compare environmental barriers, housing accessibility, and usability in dwellings before and after relocation among very old, single-living people in the community. It also explored whether participants were better off in terms of accessibility after relocation compared with a simulated scenario in which they remained in their former dwellings.

Method

Design and Study Context

Data were analyzed from the Swedish part of the European Enabling Autonomy, Participation, and Well-Being in Old Age: The Home Environment as a Determinant for Healthy Ageing (ENABLE-AGE) Project, which examined the home environment as a determinant for autonomy, participation, and well-being in very old age (Iwarsson et al., 2007). Baseline data were collected in 2002–2003 (Time 1 [T1], $N = 397$), with three subsequent follow-ups (Time 2 [T2], 2004–2005, $N = 314$; Time 3 [T3], 2007–2008, $N = 154$; Time 4 [T4], 2011, $N = 66$). Detailed data on health and objective and perceived aspects of housing were collected during home visits by trained, experienced occupational therapists. The Swedish part of the ENABLE-AGE Project was approved by the local ethics committee at Lund University (Ref No. LU 324, 2002).

Study Sample

Participants, recruited using the Swedish national population registry, were ages 80–89 yr and lived alone in urban communities. They were stratified for gender (25%

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men). Forty-one moves were registered in the sample. One participant had moved twice but was included on the basis of the first move. Participants were excluded if they had moved to apartments in skilled nursing or assisted living facilities lacking one or more basic dwelling functions (e.g., private cooking facilities, private entrance area; $n = 11$). Thus, the final sample included 29 participants: Thirteen had moved between T1 and T2, 11 between T2 and T3, and 5 between T3 and T4. For each participant, the data collected closest in time before relocation (i.e., prerelocation data collection) were used to describe dwelling and health status before the move. The data collected closest in time after relocation (i.e., postrelocation data collection) were used to describe the new dwelling and current health status. Mean time between prerelocation and postrelocation data collection was 2.6 yr (standard deviation [*SD*] = 1.6 yr).

Mean age of the 29 participants at baseline was 84 yr (*SD* = 3); 20 were women (69%). They did not significantly differ at baseline compared with the total Swedish sample for perceived health, number of symptoms, cognitive deficits, type of dwelling, or tenure. The vast majority moved within the same neighborhood or town ($n = 24$, 83%), and most moved to a one- or two-bedroom apartment in a multidwelling block. At prerelocation data collection, participants reported a median of seven physical or mental symptoms (range = 0–30; Tibblin, Tibblin, Peciva, Kullman, & Svärdsudd, 1990) and were independent in all five personal ADLs (PADLs) measured and in two out of four instrumental ADLs (IADLs; Sonn & Asberg, 1991) measured. At postrelocation data collection, the number of symptoms had not increased, but dependence in PADLs and IADLs had (PADL independence: median [*Mdn*] = 5, Quartile 1–Quartile 3 [Q1–Q3] = 4–5, $p = .02$; IADL independence: *Mdn* = 2, Q1–Q3 = 0–3, $p < .01$).

Data Collection and Assessments

Data on environmental barriers, functional limitations, and dependence on mobility devices were collected with the Housing Enabler instrument (Iwarsson & Slaug, 2001). This instrument assesses 188 environmental barriers, 61 of which—representing core environmental barriers for detecting accessibility problems (Carlsson et al., 2009)—were used in this study. Environmental barriers as defined by current standards for housing design were observed indoors, at the entrance, and in the closest outdoor surroundings and were recorded as either present or not present. Participants' functional limitations and mobility-device dependence were assessed by means of a combination of interviews and observations and were also recorded as either present or not present. The following 14 items were assessed: difficulty interpreting information, severe loss of sight, complete loss of sight, severe loss of hearing, poor balance, incoordination, limitations of stamina, difficulty moving head, difficulty reaching with arms, difficulty handling and fingering, loss of upper-extremity skills, difficulty bending and kneeling, dependence on mobility aids, and wheelchair user.

A measure of the magnitude of accessibility problems was obtained for each participant by combining data on the presence of environmental barriers with data on functional limitations and mobility-device dependence. Using instrument-specific software, we assigned predefined scores for problematic combinations on a scale ranging from 1 (*potential problem*) to 4 (*impossible problem*). The scores were summed to give a total accessibility score. For participants with no functional limitations or dependence on mobility devices, this score is always 0; higher scores indicate greater accessibility problems. In the current study, a difference of 1 point in the total score was considered to be a change. Using a weighted environmental barrier function for each environmental barrier, a subscore was also computed, referred to as the *P–E function* for each environmental barrier (i.e., accessibility score/barrier).

Testing the Housing Enabler and the Housing Enabler screening tool (based on the reduced list of environmental barriers used in this study) for interrater reliability showed satisfactory results when users were properly trained (Iwarsson, Haak, & Slaug, 2012; Iwarsson, Slaug, & Malmgren Fänge, 2012). Throughout the 20-yr development of the instrument, the content validity and validity of the scoring system have been systematically improved (Iwarsson, Haak, & Slaug, 2012). Construct validity testing has shown that accessibility and usability are different constructs with some overlap (Fänge & Iwarsson, 2003).

A perceived aspect of home was self-rated with the Usability in My Home (UIMH) Questionnaire (Fänge & Iwarsson, 1999, 2003). This assessment captured the degree to which participants perceived that the physical environment supported their performance of daily activities in the home. Previous psychometric analyses of the UIMH Questionnaire based on the ENABLE-AGE Project database showed a limited level of internal consistency in one subscale. Thus, following the recommendations of Oswald et al. (2006), the current study used only two subscales. The first captured aspects of activity (four items; e.g., "In terms of how you normally manage your cooking or preparation of snacks, to what extent is the home environment suitably designed for this?" [Cronbach's $\alpha = .67$]). The

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second captured aspects of the physical environmental (six items; e.g., "How usable do you feel that the interior of your home is?" [Cronbach's $\alpha = .75$]). In both subscales, each item was scored on a scale ranging from 1 (*not at all suitable*) to 5 (*very suitable*). Because some items were not applicable to all participants, a mean value based on the applicable items was calculated and imputed.

Statistical Analyses

Median and quartiles were calculated for the number of environmental barriers, functional limitations, accessibility scores, P–E functions of single environmental barriers, and usability ratings. The Wilcoxon signed-rank test was used to compare differences between former and new dwellings in the total sample. A simulated accessibility score (P–E fit^{sim}) was used to determine whether participants were better off regarding accessibility after relocation compared with a simulated scenario in which participants remained in their former dwellings. This score was calculated by combining the environmental barriers of the former dwelling (prerelocation data) with participant functional limitations at the new dwelling (postrelocation data). The P–E fit^{sim} was compared with the accessibility score from the new dwelling (postrelocation data collection) using the Wilcoxon signed-rank test. Housing Enabler software (Slaug & Iwarsson, 2001) and IBM SPSS Statistics (Version 21; IBM Corporation, Armonk, NY) were used for the analyses. Because of the exploratory nature of the study, the level for statistical significance was set at $p < .05$.

Results

Environmental Barriers

The number of environmental barriers was significantly lower in the new dwellings than in the former ones. New dwellings had a median of six fewer environmental barriers, a 20% decrease (Table 1). The largest reduction in prevalence of environmental barriers was observed at entrances and indoors. The following indoor environmental barriers were reduced in 34%–45% of new dwellings: bathtubs, apparatus or controls in inaccessible positions, thresholds or differences in levels between rooms, and toilets with standard height. The following barriers at entrances were reduced in 34%–41% of new dwellings: no level area in front of entrance doors, insufficient maneuvering space at doors, no handrails at stairs, stairs being the only route, narrow doors to outdoor spaces or balconies, and high thresholds or steps at entrances.

Functional Limitations

Participants had a median of three functional limitations before and after relocation (see Table 1). The most common functional limitations were difficulty in bending and kneeling and being dependent on mobility aids. Sixteen participants used mobility aids at prerelocation data collection and 23 used them at postrelocation data collection. Displayed differently, the number of functional limitations showed an increase from before to after relocation. For example, having one or two functional limitations was more common before the move than after and having more than six functional limitations was more common after relocation than before (Figure 1).

Accessibility, Person–Environment Function, and Simulated Accessibility Score

The magnitude of accessibility problems was reduced from *Mdn* = 96 (Q1–Q3 = 28–143) in the former dwelling to *Mdn* = 81 (Q1–Q3 = 51–130) after relocation but was not statistically significant ($p = .68$; see Table 1).

Table 1. Environmental Barriers, Housing Accessibility, and Usability Before and After Relocation (*N* = 29)

Housing Factor	*Mdn* (Q1–Q3) Former Dwelling	*Mdn* (Q1–Q3) New Dwelling	p^a	Dwellings With Positive Change After Relocation, *n* (%)
No. of environmental barriers[b]	31 (28–34)	25 (20–29)	<.001	22 (76)[g]
No. of functional limitations[c]	3 (1–4)	3 (2–5)	.046	—
Accessibility score[d]	96 (28–143)	81 (51–130)	.681	15 (52)[h]
Usability: activity factors[e]	4.7 (4.1–5.0)	4.8 (4.1–5.0)	.441	3 (10)[g]
Usability: physical environmental factors[f]	4.4 (3.9–5.0)	4.6 (4.0–4.8)	.421	3 (10)[g]

Note. — = not applicable; *Mdn* = median; Q = quartile. Because of internal missing, *N*s vary between 28 and 29.
[a]Related samples: Wilcoxon signed-rank test. [b]Possible range, 0–61 (Carlsson et al., 2009). [c]Possible range, 0–14 (Iwarsson & Slaug, 2001). [d]Higher scores indicate more accessibility problems; min–max in this sample, 0–306 (Iwarsson & Slaug, 2001). [e]Possible range, 1–5; higher scores indicate better usability (Fänge & Iwarsson, 1999, 2003). [f]Reduction of at least one barrier is considered a positive change. [g]Reduction of at least 1 point in accessibility score is considered a positive change. [h]Increase of 1 point or more is considered positive change.

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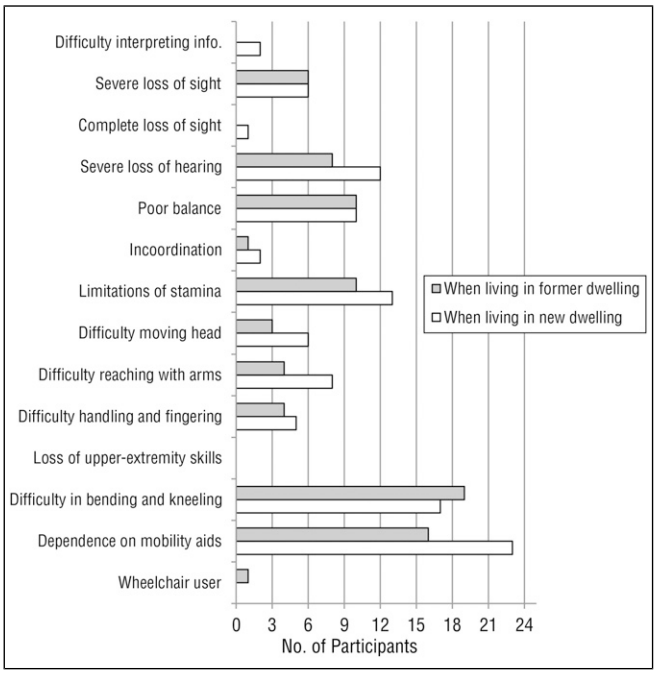

Figure 1. Functional limitations of participants when living in their former and new dwellings.

However, the P–E function changed for virtually all single environmental barriers after relocation. Environmental barriers with a significant decrease in P–E function (i.e., causing fewer accessibility problems) were found indoors, particularly in bathrooms. Environmental barriers that caused significantly greater accessibility problems after relocation were found in all housing areas (Figures 2 and 3). The P–E fit^{sim} for the total sample was $Mdn = 133$ (Q1–Q3 = 85–173) and thus was significantly higher than the actual accessibility score after relocation ($p < .001$).

Usability

Usability was rated as high in former and new dwellings and was stable before and after relocation (ps = .44 and .42; see Table 1).

Discussion

The main findings of this study are that very old people in Sweden seem to move to dwellings in their communities with fewer environmental barriers compared with former dwellings and that housing accessibility in new dwellings is improved compared with the simulated scenario of remaining in former dwellings. However, because the number of functional limitations tends to increase with advancing age and results in more complex functional profiles, actual accessibility does not improve even when very old people move to dwellings with fewer environmental barriers. In line with previous research, this finding can be explained by the fact that accessibility is highly dependent on each person's profile of functional limitations (Slaug, Nilsson, & Iwarsson, 2013). Therefore, the functional decline that often occurs in very old age increases the demands for barrier-free housing options. This knowledge is imperative for providers of housing interventions for older people.

Comparisons of participants' former and new dwellings showed that the environmental barriers that decreased the most were at entrances and indoors, especially in bathrooms. This finding is congruent with the results from Stoeckel's (2011) study of older Americans who moved to new dwellings. Our study provides a detailed picture based on objectively assessed norm-based environmental barriers. Some barriers decrease in prevalence after relocation and others increase. However, because changes in accessibility are related to both the environment and the person, the results based on analyses using the P–E

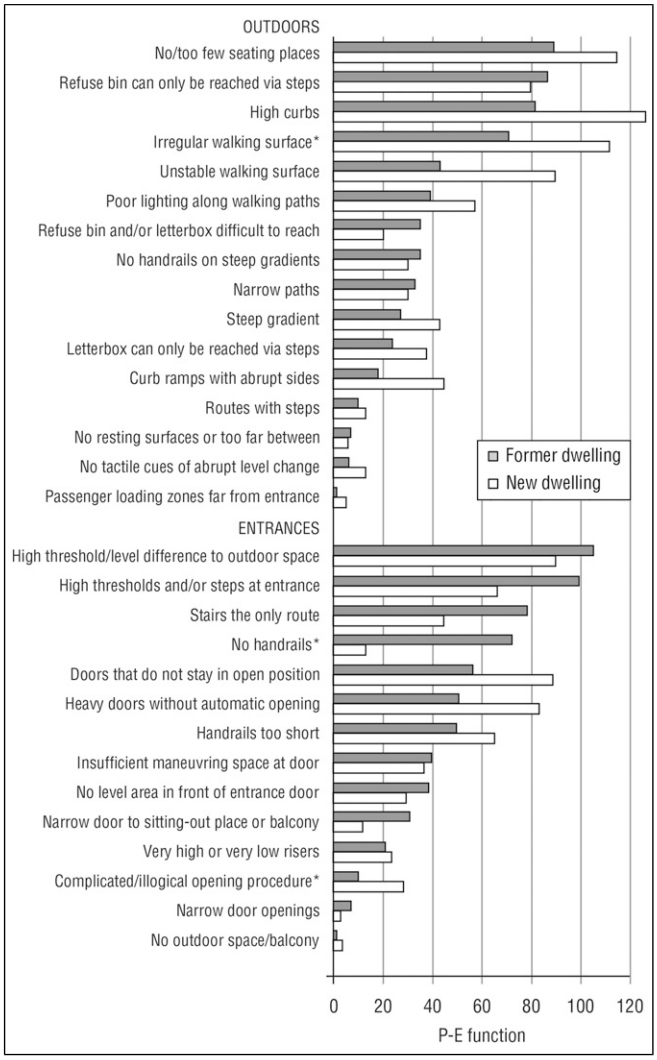

Figure 2. P–E function of single environmental barriers outdoors and at entrances in former and new dwellings, ranked in descending order based on former dwelling.

Note. P–E = person–environment.

$*p < .05$.

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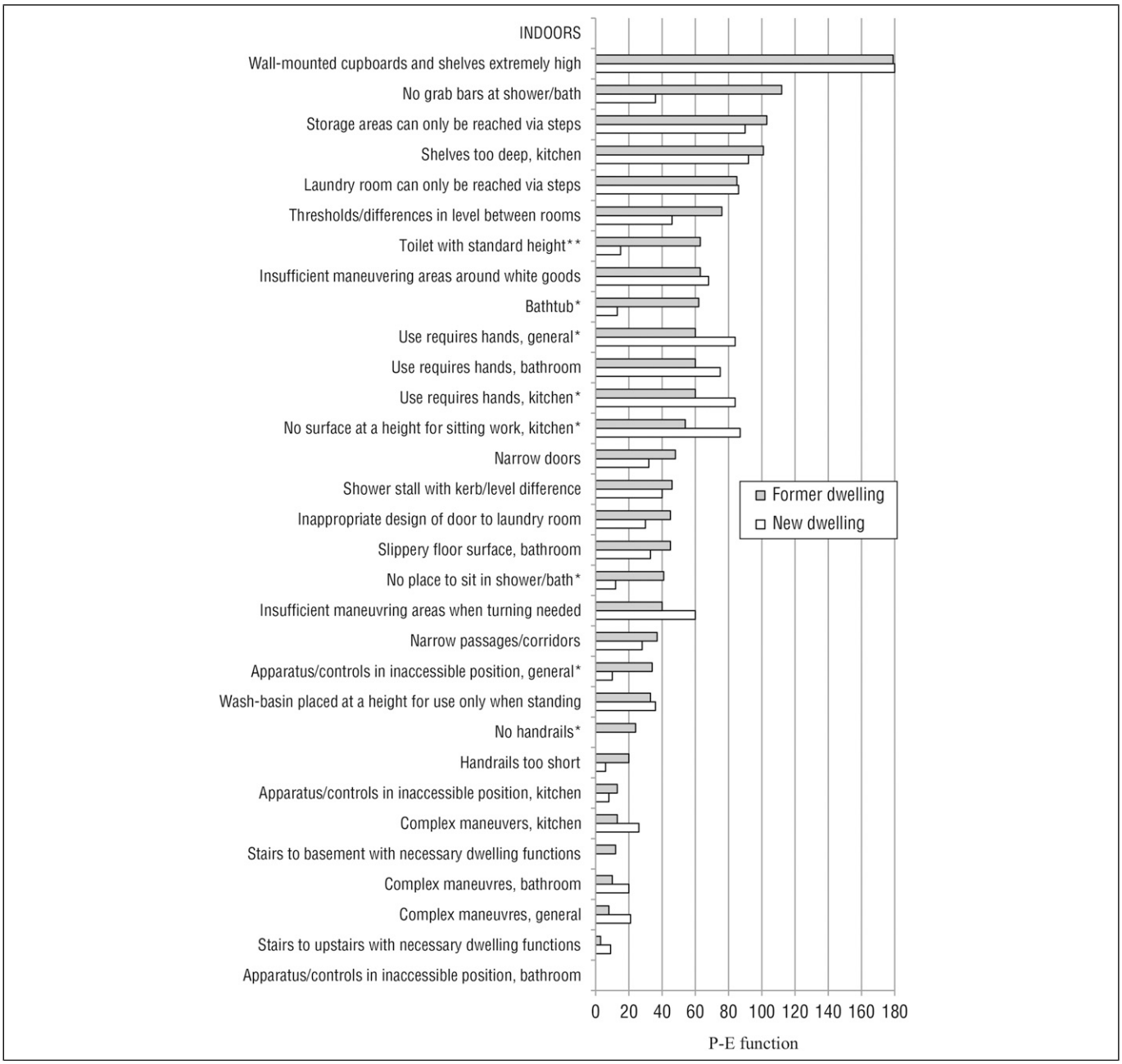

Figure 3. P–E function of single environmental barriers indoors in former and new dwellings, ranked in descending order on the basis of former dwelling.

Note. P–E = person–environment.

$*p < .05$. $**p < .01$.

function show that some barriers cause significantly more accessibility problems after relocation. For example, we found that complicated or seemingly illogical door-unlocking procedures cause more accessibility problems after relocation, which may be the result of more advanced technology for such procedures in newer versus older dwellings. Additionally, wall-mounted kitchen cupboards and shelves placed too high was the barrier that caused the largest accessibility problem both before and after relocation, which suggests that some problematic features in the home environment are dependent on current building practices and not easily avoided by a move. Therefore, besides using the traditional individual intervention perspective, occupational therapy research can inform stakeholders at the societal level, in this case, to influence and change standards for housing design.

At first glance, it may be surprising that the total accessibility score was not significantly improved in the new dwelling compared with the former one. However, taking into account the expected decline in functional capacity in very old age, stable accessibility could be

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considered a positive outcome. This positive outcome is further demonstrated by comparing participants' actual accessibility score in the new dwellings with their P–E fit^{sim} and recognizing that their functional profiles become increasingly complex over time. In other words, in terms of accessibility, the dwellings the participants moved to were more appropriate for growing older in than those they had lived in previously. Nonetheless, when planning for community-based relocation, older people must be prepared for future functional decline. When they assess a new dwelling, they must consider both current functional limitations and possible future functional declines and choose a home that will provide appropriate accessibility in the years to come.

This study does not explain whether participants moved for housing-related or other reasons. The fact that usability was rated high in the previous dwellings possibly indicates that participants did not move solely for housing-related reasons. Moreover, the high usability ratings in new dwellings indicate that participants adjusted well to their new circumstances after moving.

Our decision to consider a change to have occurred when there was a 1-point accessibility score difference after relocation (see Table 1) may seem questionable. As yet, no studies have been done on practically relevant or meaningful changes for Housing Enabler scores; therefore, such studies are an important goal for future research. Detailed longitudinal data are quite rare regarding functional health and objective and perceived aspects of housing among people relocating after age 80. Using new analysis methods to describe P–E fit dynamics, our study serves as a first description of P–E-related outcomes of community-based relocation and paves the way for further studies that could generate important knowledge to support older people in their residential decision-making processes.

For more than 40 yr, relocation has been described as a stressful life event (Holmes & Rahe, 1967) that may negatively affect aspects of health such as ADLs, morbidity, and mortality. However, no studies have validated these negative effects of community-based relocation (Bradley & Van Willigen, 2010; Chen & Wilmoth, 2004; Danermark, Ekstrom, & Bodin, 1996), including this study, which shows stable usability and some improvement of the physical environment after relocation after age 80. Moreover, to increase the possibility of positive outcomes after relocation, the interactions among older people, their environments, and their daily life activities must be better understood. Additional knowledge in this field would benefit older people and their families, and occupational therapy practitioners could benefit from broadening their scope of practice to include more home modification services and also relocation counseling.

Study limitations included the risk for mass significance given the large number of statistical tests performed on environmental barriers. However, for exploratory reasons, all environmental barriers were tested and the level of significance was set at $p < .05$. In addition, a Bonferroni correction would not be instrumental for the interpretation of the results (in this situation, $p < .0008$) and would also mean an increased risk for false negative results (Altman, 1991).

Results based on a small sample of people, with the majority being women living alone in urban districts in Sweden, cannot be generalized to other populations or contexts. Moreover, this study was based on data collected in a country where close to 100% of the housing stock fulfills basic housing standard requirements. However, a high housing standard is not equal to barrier-free housing design (Helle, Iwarsson, & Brandt, 2013), and many older people in Sweden live in dwellings with inaccessible entrances and other obvious challenges (Iwarsson, Nygren, Oswald, Wahl, & Tomsone, 2006). If, as suggested by Oswald and Rowles (2007), community-based relocation will increase as new generations grow older, the availability of barrier-free dwellings is crucial to enable community-based independent living well into advanced age.

Implications for Occupational Therapy Practice

Occupational therapy practice would benefit from an ongoing process to improve existing housing interventions and develop new approaches to meet the demands of the aging population. It is also important for practitioners to recognize that the demands for barrier-free housing options are higher than most people realize. This study's implications for occupational therapy practice are that its methodologies and results can be used to

- Enable older people to choose appropriate dwellings regarding accessibility and usability,
- Widen the scope of housing modification services to housing counseling to support and optimize the residential decision making of older people,
- Understand stable accessibility against the background of increasing functional limitations among community-living very old people as a positive outcome of relocation, and
- Demonstrate the value of using standardized assessments with the capacity to analyze the personal and environmental components of accessibility to plan for efficient interventions that enhance occupational performance in the home.

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Conclusion

The results of this explorative study indicate that very old people making community-based moves in Sweden relocate to dwellings with fewer environmental barriers and stable levels of usability and accessibility. Stable levels of accessibility in very old age should be considered a positive outcome of relocation, which was confirmed when we compared new dwelling accessibility with the scenario of remaining in former dwellings. In other words, increasing functional limitations that occur with age would have caused more accessibility problems in former dwellings than in the new ones. Further investigations with larger samples, different age segments, and other national contexts are warranted to confirm our findings. ▲

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Susanne Iwarsson and Björn Slaug are copyright holders and owners of the Housing Enabler methodology, provided as a commercial product (http://www.enabler.nu). The other authors have no competing interests.

References

AARP. (2012). *2011 Boomer housing survey.* Washington, DC: Author.

Altman, D. (1991). *Practical statistics for medical research.* London: Chapman & Hall.

Bharucha, A. J., Pandav, R., Shen, C., Dodge, H. H., & Ganguli, M. (2004). Predictors of nursing facility admission: A 12-year epidemiological study in the United States. *Journal of the American Geriatrics Society, 52,* 434–439. http://dx.doi.org/10.1111/j.1532-5415.2004.52118.x

Bradley, D. E., & Van Willigen, M. (2010). Migration and psychological well-being among older adults: A growth curve analysis based on panel data from the Health and Retirement Study, 1996–2006. *Journal of Aging and Health, 22,* 882–913. http://dx.doi.org/10.1177/0898264310368430

Carlsson, G., Schilling, O., Slaug, B., Fänge, A., Ståhl, A., Nygren, C., & Iwarsson, S. (2009). Toward a screening tool for housing accessibility problems: A reduced version of the Housing Enabler. *Journal of Applied Gerontology, 28,* 59–80. http://dx.doi.org/10.1177/0733464808315293

Chen, P.-C., & Wilmoth, J. M. (2004). The effects of residential mobility on ADL and IADL limitations among the very old living in the community. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 59,* S164–S172. http://dx.doi.org/10.1093/geronb/59.3.S164

Danermark, B. D., Ekstrom, M. E., & Bodin, L. L. (1996). Effects of residential relocation on mortality and morbidity among elderly people. *European Journal of Public Health, 6,* 212–217. http://dx.doi.org/10.1093/eurpub/6.3.212

Fänge, A., & Iwarsson, S. (1999). Physical housing environment: Development of a self-assessment instrument. *Canadian Journal of Occupational Therapy, 66,* 250–260. http://dx.doi.org/10.1177/000841749906600507

Fänge, A., & Iwarsson, S. (2003). Accessibility and usability in housing: Construct validity and implications for research and practice. *Disability and Rehabilitation, 25,* 1316–1325. http://dx.doi.org/10.1080/09638280310001616286

Golant, S. M. (2011). The quest for residential normalcy by older adults: Relocation but one pathway. *Journal of Aging Studies, 25,* 193–205. http://dx.doi.org/10.1016/j.jaging.2011.03.003

Granbom, M., Löfqvist, C., Horstmann, V., Haak, M., & Iwarsson, S. (2014). Relocation to ordinary or special housing in very old age: Aspects of housing and health. *European Journal of Ageing, 11,* 55–65. http://dx.doi.org/10.1007/s10433-013-0287-3

Hallberg, D., & Lagergren, M. (2009). Moving in and out of public old age care among the very old in Sweden. *European Journal of Ageing, 6,* 137–145. http://dx.doi.org/10.1007/s10433-009-0111-2

Helle, T., Iwarsson, S., & Brandt, Å. (2013). Validation of housing standards addressing accessibility: Exploration of an activity-based approach. *Journal of Applied Gerontology, 33,* 848–869. http://dx.doi.org/10.1177/0733464813503042

Holmes, T. H., & Rahe, R. H. (1967). The Social Adjustment Rating Scale. *Journal of Psychosomatic Research, 11,* 213–218. http://dx.doi.org/10.1016/0022-3999(67)90010-4

Iwarsson, S. (2005). A long-term perspective on person–environment fit and ADL dependence among older Swedish adults. *Gerontologist, 45,* 327–336. http://dx.doi.org/10.1093/geront/45.3.327

Iwarsson, S., Haak, M., & Slaug, B. (2012). Current developments of the Housing Enabler methodology. *British Journal of Occupational Therapy, 75,* 517–521. http://dx.doi.org/10.4276/030802212X13522194759978

Iwarsson, S., Nygren, C., Oswald, F., Wahl, H.-W., & Tomsone, S. (2006). Environmental barriers and housing accessibility problems over a one-year period in later life in three European countries. *Journal of Housing for the Elderly, 20,* 23–43. http://dx.doi.org/10.1300/J081v20n03_03

Iwarsson, S., & Slaug, B. (2001). The Housing Enabler: An instrument for assessing and analysing accessibility problems in housing. Nävlinge and Staffanstorp, Sweden: Veten & Skapen HB and Slaug Data Management.

Iwarsson, S., Slaug, B., & Malmgren Fänge, A. (2012). The Housing Enabler Screening Tool: Feasibility and interrater

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agreement in a real estate company practice context. *Journal of Applied Gerontology, 31,* 641–660. http://dx.doi.org/10.1177/0733464810397354

Iwarsson, S., & Ståhl, A. (2003). Accessibility, usability and universal design—positioning and definition of concepts describing person–environment relationships. *Disability and Rehabilitation, 25,* 57–66. http://dx.doi.org/10.1080/dre.25.2.57.66

Iwarsson, S., Wahl, H. W., Nygren, C., Oswald, F., Sixsmith, A., Sixsmith, J., Tomsone, S. (2007). Importance of the home environment for healthy aging: Conceptual and methodological background of the European ENABLE-AGE Project. *Gerontologist, 47,* 78–84. http://dx.doi.org/10.1093/geront/47.1.78

Lawton, M. P. (1989). Environmental proactivity and affect in older people. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of aging* (pp. 135–164). Newbury Park, CA: Sage.

Löfqvist, C., Granbom, M., Himmelsbach, I., Iwarsson, S., Oswald, F., & Haak, M. (2013). Voices on relocation and aging in place in very old age—a complex and ambivalent matter. *Gerontologist, 53,* 919–927. http://dx.doi.org/10.1093/geront/gnt034

Luppa, M., Luck, T., Weyerer, S., König, H.-H., Brähler, E., & Riedel-Heller, S. G. (2010). Prediction of institutionalization in the elderly: A systematic review. *Age and Ageing, 39,* 31–38. http://dx.doi.org/10.1093/ageing/afp202

Miller, E. A., & Weissert, W. G. (2000). Predicting elderly people's risk for nursing home placement, hospitalization, functional impairment, and mortality: A synthesis. *Medical Care Research and Review, 57,* 259–297. http://dx.doi.org/10.1177/107755870005700301

Oswald, F., & Rowles, G. D. (2007). Beyond the relocation trauma in old age: New trends in today's elders' residential decisions. In H.-W. Wahl, C. Tesch-Romer, & A. Hoff (Eds.), *New dynamics in old age: Environmental and societal perspectives* (pp. 127–152). New York: Baywood.

Oswald, F., Schilling, O., Wahl, H.-W., Fänge, A., Sixsmith, J., & Iwarsson, S. (2006). Homeward bound: Introducing a four-domain model of perceived housing in very old age. *Journal of Environmental Psychology, 26,* 187–201. http://dx.doi.org/10.1016/j.jenvp.2006.07.002

Oswald, F., Schilling, O., Wahl, H.-W., & Gäng, K. (2002). Trouble in paradise? Reasons to relocate and objective environmental changes among well-off older adults. *Journal of Environmental Psychology, 22,* 273–288. http://dx.doi.org/10.1006/jevp.2002.0255

Sergeant, J. F., & Ekerdt, D. J. (2008). Motives for residential mobility in later life: Post-move perspectives of elders and family members. *International Journal of Aging and Human Development, 66,* 131–154. http://dx.doi.org/10.2190/AG.66.2.c

Slaug, B., & Iwarsson, S. (2001). *Housing Enabler 1.0: A tool for housing accessibility analysis* [Computer software]. Nävlinge and Staffanstorp, Sweden: Veten & Skapen HB and Slaug Data Management.

Slaug, B., Nilsson, M. H., & Iwarsson, S. (2013). Characteristics of the personal and environmental components of person–environment fit in very old age: A comparison between people with self-reported Parkinson's disease and matched controls. *Aging Clinical and Experimental Research, 25,* 667–675. http://dx.doi.org/10.1007/s40520-013-0165-z

Sonn, U., & Asberg, K. H. (1991). Assessment of activities of daily living in the elderly. A study of a population of 76-year-olds in Gothenburg, Sweden. *Scandinavian Journal of Rehabilitation Medicine, 23,* 193–202.

Stimson, J. R., & McCrea, R. (2004). A push–pull framework for modelling the relocation of retirees to a retirement village: The Australian experience. *Environment and Planning A, 36,* 1451–1470. http://dx.doi.org/10.1068/a36206

Stineman, M. G., Xie, D., Streim, J. E., Pan, Q., Kurichi, J. E., Henry-Sánchez, J. T., . . . Saliba, D. (2012). Home accessibility, living circumstances, stage of activity limitation, and nursing home use. *Archives of Physical Medicine and Rehabilitation, 93,* 1609–1616. http://dx.doi.org/10.1016/j.apmr.2012.03.027

Stoeckel, K. J. (2011). *The role of home environments in residential adjustment decision making in later life* (Doctoral dissertation). Boston: University of Massachusetts.

Tibblin, G., Tibblin, B., Peciva, S., Kullman, S., & Svärdsudd, K. (1990). "The Göteborg quality of life instrument"—an assessment of well-being and symptoms among men born 1913 and 1923. Methods and validity. *Scandinavian Journal of Primary Health Care, 1*(Suppl. 1), 33–38.

Wahl, H.-W., Fänge, A., Oswald, F., Gitlin, L. N., & Iwarsson, S. (2009). The home environment and disability-related outcomes in aging individuals: What is the empirical evidence? *Gerontologist, 49,* 355–367. http://dx.doi.org/10.1093/geront/gnp056

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