Journal of Gerontology: MEDICAL SCIENCES
2000, Vol. 55A, No. 10, M578–M584

The Use of a Simulated Environment (Easy Street) to Retrain Independent Living Skills in Elderly Persons: A Randomized Controlled Trial

Julie Richardson,[1,2] Mary Law,[2,3] Laurie Wishart,[2] and Gordon Guyatt[3,4]

[1] Research Department, St. Peter's Hospital, Hamilton, Ontario, Canada.
[2] School of Rehabilitation Science, [3] Departments of Epidemiology and Biostatistics, and [4]Medicine, McMaster University, Hamilton, Ontario, Canada.

Background. Older adults who receive training for functional skills in contextually appropriate environments may show greater functional improvement than persons trained in a traditional environment. Functionally limited older adults receiving training in contextually appropriate environments (simulated home and community settings) may show greater improvement in activities of daily living (ADL) than persons trained in a traditional manner.

Methods. Eighty-eight patients from a day hospital, aged 65 years or older, were randomized to either receive rehabilitation in a simulated environment (Easy Street) or in a gymnasium setting. Rehabilitation focused on retraining functional skills in a contextually appropriate environment (Easy Street) or in a traditional setting (gymnasium) using motor learning principles for a period of 16 weeks. Outcome measures included the Structured Assessment of Instrumental Living Skills (SAILS), a performance measure with criterion and timed components; a self-report health status questionnaire, the Short Form-36 (SF-36); and the patient-orientated goal-directed Canadian Occupational Performance Measure (COPM).

Results. There were no group differences on any of the outcome measures: SAILS ($p = .3$); the SF-36 physical ($p = .83$) and mental ($p = .51$); and the COPM performance scale ($p = .94$) and satisfaction scale ($p = .40$).

Conclusions. Although we have not excluded benefits of contextually appropriate rehabilitation environments with different intervention approaches, at different stages of rehabilitation or with patients at higher functional levels, our results suggest the appropriateness of a moratorium on these expensive interventions pending demonstration of clear positive effects determined from further study.

FUNCTIONAL disability in elderly persons is a major problem that will grow as the population ages. Frail elderly patients suffering from chronic illness and functional deterioration face particular challenges maintaining or regaining the skills that permit their remaining in independent living environments.

Day hospital rehabilitation programs can facilitate frail elderly persons in readapting to the exigencies of independent living. A systematic review of 12 controlled clinical trials showed that patients receiving day hospital care had lower odds of death (0.72, 95% confidence interval [CI] 0.53–0.99, $p < .05$) and functional deterioration (0.61, 95% CI 0.38–0.97, $p < .05$) as well as trends toward reductions in hospital bed use and placement in institutional care than patients not receiving such care (1). Most larger communities make these programs available to elderly patients facing challenges in functioning.

Existing programs use a variety of approaches, and few studies have rigorously examined the alternatives. In most rehabilitation programs, therapists are limited in their ability to assess higher level functional activities required for daily living and patients are unable to practice these skills in a contextually relevant and safe environment. Home or community visits can provide these opportunities but are time and labor intensive.

Creating a simulated community environment in the rehabilitation setting may help overcome this problem. Easy Street (ES), developed at Phoenix Memorial Hospital by David Gynes Design, provides an example of such an environment. ES includes a number of modules that mimic both indoor and outdoor environments that challenge frail elderly persons. These modules provide the opportunity for participants to be assessed and to relearn everyday community living skills under professional guidance. ES may enable therapists and caregivers to more accurately assess abilities and preparations required prior to discharge, potentially increasing the confidence of both the participant and caregiver and facilitating a more successful reintegration into the community.

Despite its substantial cost (our institution purchased 13 modules for $600,000 Canadian in 1990), the theoretical rationale for the approach is sufficiently strong that at least 70 rehabilitation programs in North America have purchased simulated environments. As with many technological innovations, however, enthusiasm and financial outlay have preceded rigorous evaluation. Lawlor and Cada examined the process of ES use at 27 different rehabilitation centers where ES environments had been installed and found that few staff had participated in the decision to acquire ES and that only 38% felt the environments were appropriate (2). Although therapists reported that they had gained skills using the simulated environments, they felt that the environments were not fully utilized and that there was often redundancy with existing facilities.

A second study provides a more sanguine view of ES impact. Hecox and colleagues conducted a retrospective chart review comparing the outcomes of participants in a physical therapy program, soon after the introduction of ES, with another participant group, who were seen during the year prior to ES installation (3). After controlling for age, length of hospital stay, and baseline functional ability scores, the group who received treatment in ES had higher functional ability scores as measured by the Functional Independence Measure compared with the control group (66.4 vs 58.8; p = .016). This study was limited by its retrospective, observational design, and the unblinded assessment of outcome by the treating therapists.

The limited validity of previous assessments leaves the effectiveness of ES open to question. Given the potential as well as the expense and popularity of ES, we conducted a randomized trial to determine whether improvement in activities of daily living (ADL) and instrumental activities of daily living (IADL) skills is greater when elderly patients with compromised functional status that threatens their remaining in the community receive rehabilitation therapy in ES rather than in a traditional treatment setting.

Methods

Patients

A research assistant assessed consecutive referrals to the day hospital program at St. Peter's Hospital in Hamilton, Ontario, and obtained informed consent from those who met the study criteria and agreed to participate. Patients were included if they required treatment to improve independent living skill(s) or a community living skill(s) as identified by the Canadian Occupational Performance Measure (COPM) and were able to attend therapy during the study period (4). We excluded patients who were medically unstable or unable to take part in active rehabilitation, and because of their great difficulty relearning ADL skills, we also excluded those with cognitive impairment (a score of less than 7/10 using the Short Portable Mental Status Questionnaire for Assessment of Organic Brain Deficit in Elderly Participants [SPMSQ] [5–7]). The hospital's institutional review board approved the project.

Randomization

Figure 1 depicts the study design. We stratified patients according to age (55–75 years, 76–90 years) and instrumental ADL as measured by the Structured Assessment of Instrumental Living Skills (SAILS; scores of 0–117 and 118–135) (8). Using computer-generated random numbers and a within-stratum block size of 4, we randomized patients to ES or rehabilitation in a traditional setting in a gymnasium. An independent methods center at McMaster University held the code. When the research assistant identified an eligible patient, she contacted the methods center, which then confirmed eligibility and informed the research assistant of patient allocation.

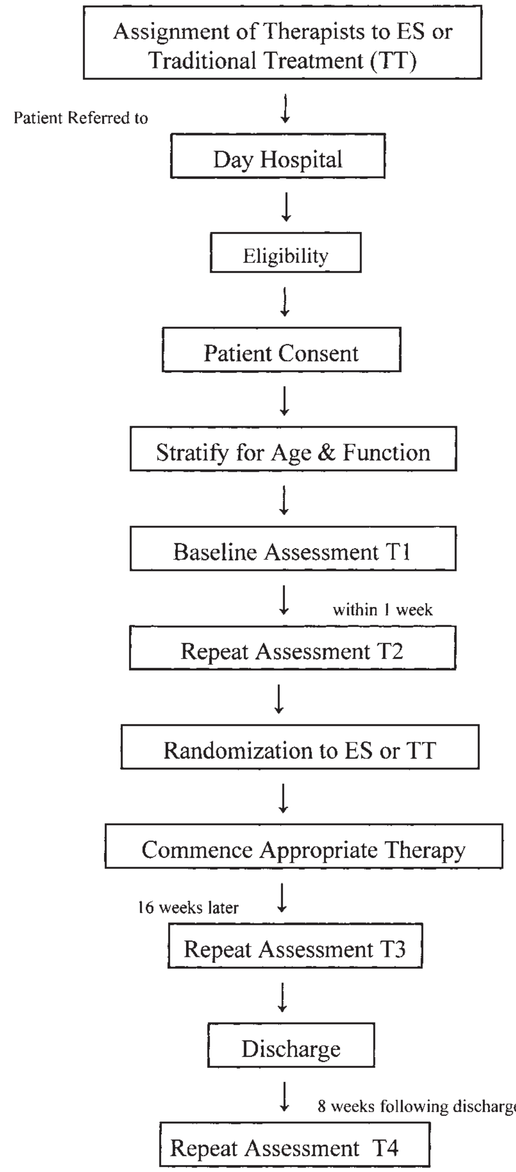

Figure 1. Easy Street study design.

Intervention

We randomized available therapists to ES and control groups, and therapists restricted their practice to the assigned settings for the duration of the study. Participants in both groups were scheduled to receive three 1-hour treatment sessions per week for the first 2 months and two per week for the 3rd and 4th months. Both groups received occupational and physical therapy based on current theories of motor learning, operationalized according to problem(s) presented by participants (9–14). The tenets of therapy included goal-directed training, active role of the participant in solving the motor problem, repetition as a part of practice, the manipulation of practice schedules, and the use of the knowledge of results to maximize motor learning (10–17).

The therapist provided feedback about the participant's performance. Participants in both treatment groups practiced at home between treatment sessions, were encouraged to practice by the therapist for 30-minute periods each day, and recorded the duration of daily practice at home in a diary.

Therapists trained the intervention group in the ES complex at St. Peter's Hospital, which consists of 13 modules spread over 4200 square feet. These modules include a bank, grocery store, bus, restaurant, theater, pharmacy, post office, putting green, car, department store, greenhouse, fitness club, kitchen, and an apartment with a living room, dining room, and bedroom. ES is connected by a street with curbs, signs, and obstacles. Therapists selected the modules used to practice the relevant skills. The traditional treatment group received therapy based on motor learning principles in a gymnasium or therapy room that did not resemble their living environment.

Training therapists at the beginning of the study and monitoring treatment throughout the study period to ensure they followed the study protocol facilitated quality control. Two videotapes and a treatment manual produced by the investigators (JR, LW), which demonstrated therapy incorporating the principles of motor learning in both ES and the traditional environment, facilitated training. Each group of therapists attended separate 1-day training workshops prior to commencing the study. Participant scenarios were used in the training period to demonstrate a standardized approach to treatment. Separate regular meetings of the therapists in each group and direct observation of individual therapists at periods during the study ensured compliance of the therapists.

Assessment Procedure and Outcome Measures

Four raters who were otherwise uninvolved in patient care, two of whom were physical therapists and two occupational therapists, all with more than 5 years of experience, conducted outcome assessments. One of the raters, who had participated in a pilot measurement study using the instruments, trained the other raters. Training took approximately 6 hours. Raters observed an assessment being administered and then completed supervised assessments on participants not in the study. To maintain rating consistency, the senior rater conducted duplicate SAILS ratings periodically throughout the study and provided feedback to the other raters, and we made a formal test of the reliability of the ratings.

The raters were unaware of the treatment that the patients were receiving. Blinding was achieved by having the ratings conducted at a location distant from where patients received the therapy. Participants followed instructions not to discuss the therapy they were receiving with the rater.

We assessed participants just prior to randomization, 1 week later, and at 4 months (immediately after completing therapy) and 6 months after randomization. We assessed functional level using the performance measures (18) SAILS and self-report, the SF-36, and the COPM.

SAILS.—The SAILS is a performance measure of IADL designed to assess the level of functioning in a number of self-care, instrumental, and communication areas. Patients perform five brief tasks in each of ten domains (fine motor skills, gross motor skills, dressing, eating, expressive language, receptive language, time and orientation, money-related skills, instrumental activities, and social interaction) for a total of 50 items. Raters evaluate patients' performance on each domain using a 0 to 3 scale with criteria for timing, accuracy, and need for assistance (8). We omitted the social interaction domain because it showed no change in a pilot study of patients receiving rehabilitation. In addition to scores for each of the domains, the instrument allows calculation of a combined motor score, a combined cognitive score, and a cumulative total score. Previous testing has found the internal consistency of the items in the overall score 0.90, interrater reliability of 0.99, and test-retest reliability of 0.87 (19). High correlations between subsections of the Weschler Adult Intelligence Scale and the SAILS support the instrument's validity.

SF-36.—The SF-36, which assesses patients' perceived health status (20) , includes 36 items measuring three major health attributes and eight health concepts. The first at-

Table 1. Baseline Characteristics

	Easy Street (Simulated Care) (n = 44)	Traditional Care (n = 44)	p Value
Age (y), mean (*SD*)	73.3	72.4	.55
Women	45.5%	50.0%	.83
Total household income			
Below $19,999	55.0	65.8	
$20,000–$39,000	35.0	31.6	
$40,000–$59,000	7.5	2.6	
$60,000–$79,999	2.5	0.0	
$80,000 and above	0.0	0.0	.47
Accommodations			
Apartment	33.3%	56.1%	
House	64.3%	39.0%	
Retirement home	2.4%	0%	
Nursing home	0%	4.9%	.06
Usually free of pain	41.5%	39.0%	.79
Short Portable Mental Status Questionnaire—no. incorrect, Mean (*SD*)	1.3	1.1	.50
Number of comorbid conditions	2.28%	2.59%	
Who do you live with			
Nonrelated paid help	2.3%	4.6%	
Friends	2.3%	0%	
Siblings	2.3%	0%	
Parents	0%	2.3%	
Spouse	69.8%	47.7%	
Children	9.3%	11.4%	
Lives alone	11.6%	34.1%	
Mobility device			
Cane	40.4%	35.9%	
Wheelchair	17.0%	26.4%	
Walker	23.4%	28.3%	
Electric wheelchair	0%	1.9%	
No assistance	14.9%	5.7%	
Receiving assistance from			
Household member	26.1%	23.1%	
Friend/neighbor	2.9%	4.6%	
Homemaker	24.6%	30.8%	
Disabled transit services	5.8%	3.1%	
Visiting nurses	17.4%	15.4%	
No assistance	10.1%	4.6%	
Other	13.0%	18.5%	

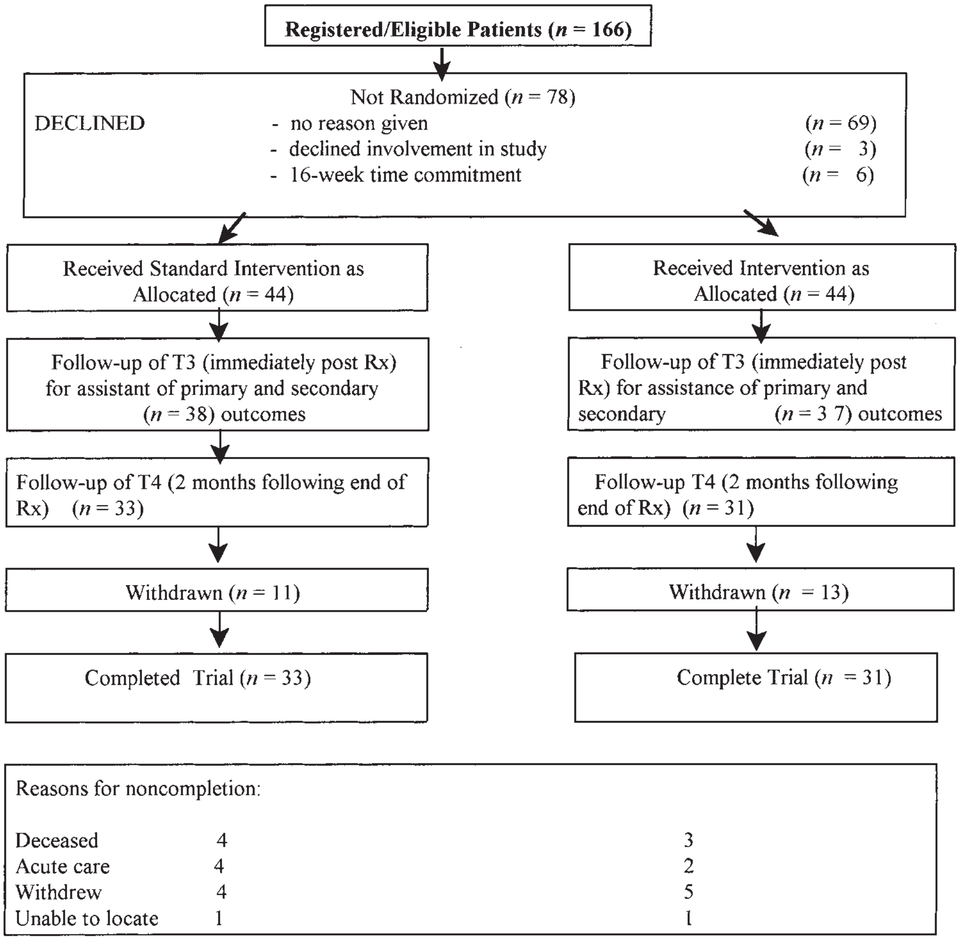

Figure 2. Progress through stages of trial (flow of participants, withdrawals, and timing of primary and secondary outcome measures).

tribute is functional status (physical functioning, social functioning, and role limitations); the second, well-being (mental health, energy or fatigue, and pain); and the third, overall perception of health. The SF-36 is reliable (reliability coefficients from 0.78 for general health to 0.93 for physical function) (21) and is responsive to at least large changes in health status (22).

COPM.—We used the COPM as a secondary outcome measure to determine problems and goals in the areas of self-care, productivity, and leisure, and the importance of each of these problems to the participants (4). The treating therapists in both groups had access to the results of this assessment to guide their treatment. The COPM is an individualized measure of a client's perception of his or her performance and satisfaction with performance on daily living activities. It enables the therapist and participant to identify problems in performance and set goals to correct these problems. The participant is asked to rate the importance of each of these problem activities on a 1–10-point scale. The participant rates his or her performance and satisfaction with his or her own performance using 1–10 scales. In a pilot study, we found a test-retest reliability for performance (0.70) and for satisfaction (0.86) (19).

Statistical Analyses

We assessed the reliability of SAILS ratings using an intraclass correlation coefficient that compares the between-person variance with the total variance. We calculated domain and overall scores for each instrument. The strata were recombined, and overall randomized groups were examined. We examined time and treatment effects and their interaction, using a repeated measures analyses of variance with baseline status, stratification variables, and other baseline variables that differed appreciably between groups at baseline as covariates

Table 2. Number and Duration of Therapy Sessions

	Simulated	Traditional
No. of therapy sessions	41.2, 14.5 [46(39–51)]**	49.8, 14.4 [54(44–58)]**
No. of times home program completed	70.5, 50.9 [58(32–100)]	86.0, 41.5 [84 (58–118)]
Average duration of home program (minutes)	998, 775 [860 (433–1477)]*	1565, 1101 [1335(830–2153)]*

Notes: Numbers correspond to mean, *SD*; [median(25th–75th percentile)]. *p* values based on Wilcoxon rank sum (nonparametric) test.

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

Table 3. Mean (*SD*) Scores on all SAILS by Group and Visit (All Data)

	Easy Street Simulated Care				Traditional Care			
	1 (n = 44)	2 (n = 42)	3 (n = 34)	4 (n = 31)	1 (n = 44)	2 (n = 44)	3 (n = 35)	4 (n = 33)
Instrument								
Overall SAILS score	101.2 (17.0)	101.6 (18.8)	103.1 (18.3)	103.5 (17.9)	98.3 (17.5)	100.7 (17.7)	102.3 (19.3)	102.5 (17.4)
Overall SAILS time	521.6 (174.3)	521.7 (186.6)	549.7 (186.1)	521.3 (171.1)	571.9 (188.3)	556.6 (177.7)	523.1 (180.7)	526.3 (187.7)
Domain scores								
Motor score	40.1 (9.5)	39.3 (10.4)	39.6 (10.5)	39.8 (10.3)	37.6 (10)	38.4 (10)	39.1 (10.2)	40.1 (9.6)
Cognitive score	49.8 (8.1)	50.7 (8.7)	51.6 (8.1)	50.8 (8.5)	49.6 (8)	50.7 (7.8)	51.6 (8.2)	50.9 (7.3)
Instrumental activities	11.4 (3.3)	11.8 (3.1)	11.9 (2.8)	12.1 (2.9)	11.3 (3.3)	11.7 (3.4)	11.9 (3.3)	11.6 (3.4)

Notes: Range of possible scores is 0 to 145. SAILS = Structured Assessment of Instrumental Living Skills.

in the analysis. Because of the multiple comparisons being made, we used a p value of .01 for statistical significance.

Results

A total of 166 participants proved eligible, 53% of whom agreed to participate. Among the participants, hemiplegia was the primary diagnosis in 50, followed by Parkinson's disease in 10, falls in 9, diabetes in 4, osteoarthritis in 4, peripheral neuropathy in 3, hip fracture in 3, transient ischemic attacks in 2, and myocardial infarction, osteoporosis, and postpolio syndrome in 1 participant each. Table 1 demonstrates that the 44 participants randomized to the intervention group and 44 participants randomized to the control group were similar with respect to age, sex distribution, income, living arrangements, disability, and comorbidity.

Follow-Up

The first participant entered the study in September 1993, and the final participant entered in April 1996 and completed the final assessment in September 1996. Twenty-four patients did not complete all four assessments, 13 from the simulated group and 11 from the traditional group (see Figure 2). The participants in the simulated group attended an average of 41 therapy sessions, standard deviation (*SD*) = 14.5, and the participants in the traditional group attended an average of 49 sessions, SD = 14.4, $p < .01$ (Table 2). The dose planned for each participant was 40 treatment sessions over the length of the trial, and most of the sample received this dose. The assessors of the outcome measurements remained blinded to the treatment allocation of the participants throughout the trial.

Reliability Assessments

Reliability checks for the SAILS were performed throughout the study and showed good to excellent reliability between raters (intraclass correlation [ICC] = 0.99, ICC = 0.95 and 0.78).

Primary Results

Tables 3–5 provide means and standard deviations for the SAILS, the SF-36 and the COPM, respectively, by group and visit. Table 3 also shows the overall time scores for the SAILS. Table 6 provides the results of the repeated analysis of covariance, group, time (i.e., time of assessment), and a group/time interaction. We found no statistically significant time by treatment interactions in any analysis. We found no statistically significant time or treatment effects for the overall SAILS or any of the SAILS domains. We found no significant treatment effects for the SF-36 overall score or the individual domains and no time effect for the mental function domain. The trend toward an improvement of SF-36 physical function in both groups results in a time effect that approached statistical significance ($p = .02$). The COPM also showed no treatment effects, but strong time effects ($p <$ .0001) reflecting improvement in both performance and satisfaction domains. Table 7 shows the mean difference in change scores between treatment and control groups and

Table 4. Mean (*SD*) Score on SF-36 by Group and Visit (All Data)

	Easy Street (Simulated Care)				Traditional Care			
Domain	1 (n = 44)	2 (n = 42)	3 (n = 35)	4 (n = 31)	1 (n = 44)	2 (n = 44)	3 (n = 35)	4 (n = 31)
Physical functioning	26.9 (23.8)	24.9 (23.5)	35.3 (25.8)	36.0 (24.4)	22.7 (17.8)	22.8 (17.6)	29.6 (19.7)	28.3 (20.7)
Role—physical	24.4 (30.7)	17.3 (26.8)	37.1 (31.7)	27.4 (31.9)	18.8 (27.0)	20.5 (27.1)	30.7 (36.4)	28.8 (31.3)
Bodily pain	57.8 (31.6)	57.5 (33.2)	62.0 (26.7)	60.5 (27.5)	58.5 (29.5)	64.5 (26.3)	61.8 (28.2)	73.6 (30.9)
General health	53.5 (18.5)	50.5 (18.8)	51.9 (19.2)	51.3 (18.7)	54.5 (20.7)	54.4 (20.6)	59.0 (20.7)	56.7 (20.5)
Vitality	31.5 (19.6)	30.0 (21.4)	38.6 (20.4)	36.1 (20.6)	35.5 (24.0)	37.0 (22.3)	41.0 (23.5)	42.6 (26.2)
Social Functioning	58.0 (34.1)	53.9 (35.8)	57.5 (32.1)	64.9 (24.2)	53.7 (31.4)	47.4 (33.9)	57.5 (27.2)	58.0 (37.5)
Role—emotional	63.6 (43.0)	61.1 (42.9)	64.8 (40.4)	62.4 (44.5)	57.6 (42.8)	68.2 (37.3)	69.5 (39.1)	68.7 (44.8)
Mental health	55.7 (24.8)	59.5 (21.9)	67.0 (20.4)	67.6 (19.0)	61.2 (22.2)	66.0 (21.5)	69.9 (22.0)	68.2 (22.9)
Change in health during past year	32.4 (27.8)	33.3 (24.5)	57.1 (38.6)	57.3 (24.3)	36.4 (29.8)	37.5 (34.3)	57.9 (34.7)	55.3 (32.3)

Note: SF-36 = Short Form-36.

Table 5. Mean (*SD*) Scores on COPM, by Group and Visit (All Data)

	Easy Street (Simulated Care)				Traditional Care			
Instrument	1 (*n* = 44)	2 (*n* = 42)	3 (*n* = 36)	4 (*n* = 32)	1 (*n* = 44)	2 (*n* = 44)	3 (*n* = 37)	4 (*n* = 34)
Performance	3.6 (1.4)	3.7 (1.4)	5.3 (1.7)	5.5 (2.0)	3.5 (1.4)	3.6 (1.4)	5.1 (1.8)	5.3 (1.8)
Satisfaction	3.1 (1.6)	3.3 (1.7)	5.2 (1.8)	5.5 (2.0)	2.8 (1.5)	3.0 (1.5)	4.7 (1.9)	4.9 (2.2)

Note: COPM = Canadian Occupational Performance Measure.

confidence intervals around those changes for the overall scores for the three main outcomes.

Discussion

The results provide no support for the use of simulated environments in retraining functional skills in older adults. The participants who received therapy in the ES environment showed no statistically significant improvement compared with participants in the traditional environment on any of the outcome measures (SAILS, SF-36, COPM), nor did we find appreciable trends in favor of ES participants. Indeed, participants in either group demonstrated little change over the four measurement times.

Strengths of our study include the concealed randomization and intention-to-treat analysis, our administration of a well-constructed rehabilitation program that participants generally accepted well, the care we took in conducting blinded outcome assessments, and our demonstration of the reliability of these assessments. Our study also has several limitations. First, we were unable to prevent a loss to follow-up in both treatment and control groups. Second, although our two groups were similar with respect to the prognostic factors we recorded, we did not measure cognition or depression. Both of these variables can influence response to rehabilitation (23), and therefore, a study of this sample size remains vulnerable to prognostic imbalance. Third, participants in the traditional group received more therapy, although the dose differences were not great, and both groups received doses that clinicians involved in rehabilitation would expect to create a treatment response. Fourth, the motor learning principles used require active involvement of the participant. Older patients tend to be more passive recipients of therapy. Therefore, the engagement with the therapy in the ES environment may have been too difficult for them and incongruent with their expectations about therapy. Thus, it is possible that we would have found differences using an alternative rehabilitation approach or an alternative population.

It is possible that our instruments may have been insufficiently responsive to detect small but important changes. Although this is particularly true for the SF-36 (24), there are reasons why instrument unresponsiveness is an unlikely explanation of our negative findings. First, we chose the SAILS as our primary outcome because it provides a comprehensive measure of function and because it has timed components for fine motor, gross motor, dressing, and eating skills measures that may be more responsive to change in older persons than the task criteria. Second, the COPM detected appreciable change over time across groups, but no difference between groups.

It is also possible that we failed to detect an effect because of the small sample size. This limitation is reflected in the wide 95% CI around the difference in mean change estimate between the groups for the three measures (Table 7). For example, for the SAILS, although the mean difference is extremely small (mean difference = 2.68), the variance is large (*SD* = 14.23), and there the 95% CI includes a deleterious effect of −10.83 and a benefit of 16.19. If it were true that treatment led to a 17-point difference in favor of ES, this could be an important effect from patients' point of view (25). On the other hand, our inability to show substantial trends in favor of ES in any measure makes it less likely that we missed important ES-mediated effects.

Table 6. Repeated Measures Analysis of Variance

	Adjusted *F* Values† (*p* values)			Unadjusted *F* Values		
	Group	Visit	Group† Visit	Group	Visit	Group† Visit
SAILS	1.10 (.30)	1.84 (.14)	0.74 (.53)	2.60 (.11)	1.89 (.13)	0.35 (.79)
SAILS—motor skills	0.12 (.73)	2.01 (.11)	0.50 (.68)	2.19 (.14)	1.72 (.17)	0.31 (.82)
SAILS—motor time	0.83 (.37)	0.72 (.54)	0.42 (.74)	0.69 (.14)	0.60 (.62)	0.23 (.88)
SAILS—cognitive skills	5.65 (.02)	1.00 (.40)	0.72 (.54)	0.69 (.41)	1.27 (.29)	0.32 (.81)
SAILS—instrumental activities	0.01 (.92)	1.11 (.35)	0.40 (.75)	2.41 (.13)	1.11 (.35)	0.22 (.88)
SF-36—physical	0.05 (.83)	3.53 (.02)	1.16 (.33)	0.57 (.45)	4.7 (.004)	0.61 (.61)
SF-36—mental	0.44 (.51)	1.49 (.22)	0.73 (.53)	0.88 (.35)	1.04 (.38)	0.23 (.87)
COPM performance	0.01 (.94)	18.04 (.0001)	0.11 (.96)	0.00 (.97)	20.62 (.0001)	0.07 (.98)
COPM satisfaction	0.74 (.40)	28.77 (.0001)	0.54 (.66)	1.13 (.29)	31.98 (.0001)	0.72 (.54)

Notes: SAILS = Structured Assessment of Instrumental Living Skills; SF-36 = Short Form-36; COPM = Canadian Occupational Performance Measure.

†Adjusted for the following variables: age (<75/>75), baseline SAILS score (<117/>117), income (<$20,000/other), who lives with (spouse/other), type of accommodation (house/other), receiving assistance (yes/no), mobility device used (yes/no).

Table 7. Mean Change in Scores (Visit 4 − Visit 1) Between Groups (All Data)

Instrument/Domain	Mean	*SD*	95% CI
SAILS			
Overall SAILS score	2.68	14.23	−10.83, 16.19
Subscores			
Fine motor skills	−0.42	2.92	−0.96, 0.12
Gross motor skills	0.18	3.35	−0.53, 0.89
Dressing skills	1.35	2.8	0.85, 1.85
Eating skills	0.36	2.23	0.04, 0.68
Expressive language	−0.1	2.21	−0.41, 0.21
Receptive language	0.45	2.64	0.01, 0.89
Time and orientation	0.94	4.02	−0.07, 1.95
Money-related skills	0.59	3.09	−0.03, 1.21
Instrumental activities	0.12	3.32	−0.58, 0.82
SF-36 scores			
Physical	1.62	11.33	−6.61, 9.85
Mental	1.35	15.95	−14.99, 17.69
General health	6.66	28.78	−45.86, 59.18
COPM			
Performance	0.03	2.58	−0.38, 0.44
Satisfaction	−0.7	3.19	−1.32, −0.08

Notes: CI = confidence interval; SAILS = Structured Assessment of Instrumental Living Skills; SF-36 = Short Form-36; COPM = Canadian Occupational Performance Measure.

It may be that the simulated environments do not facilitate more effective rehabilitation but may be of use as a check for safety reasons prior to discharge. If this were its only use, however, justification of the expense would be difficult. Indeed, our results suggest that a moratorium on purchase of simulated environments would be appropriate. Rehabilitation in simulated environments is intuitively appealing; however, the lack of any evidence of benefit, coupled with the high costs, suggests that they are likely a poor use of limited resources. Although we have not excluded the possibility that ES may improve rehabilitation with different types of therapy or different types of patients, studies of these alternative patients and interventions should precede further claims of the usefulness of simulated environments.

Acknowledgments

The authors wish to acknowledge the effort and support of the program director of the St. Peter's day hospital, Donna Cripps; the study coordinator, Nancy Plews; and the therapists and patients involved in the study. This study was supported by the Canadian Ministry of Health (Grant 04463). Julie Richardson held a Community Researcher Award from Health and Welfare, Canada, at the time of the study, and Laurie Wishart holds a Career Scientist Award with the Canadian Ministry of Health.

Address correspondence to Julie Richardson, School of Rehabilitation Science, Institute of Applied Health Sciences (IAHS), McMaster University (Rm 443), 1400 Main Street West, Hamilton, ON, Canada, L8S 1C7. E-mail: jrichard@fhs.mcmaster.ca

References

1. Forester A, Young J, Langhorne P. Systematic review of day hospital care for elderly people. *Br Med J.* 1999;318:837–841.
2. Lawlor MC, Cada EA. Evaluation of an innovative product: Easy Street Environments. *Occup Ther Pract.* 1993;4:1–18.
3. Hecox R, Roach KE, DasVarma JM, Giraud JE, Davis CM, Neulen K. Functional Independence Measurement (FIM) of patients receiving Easy Street—a retrospective study. *Phys Occup Ther Geriatr*. 1994; 12:17–31.
4. Law M, Baptiste S, McColl M, Opzoomer A, Polatajko H, Pollock N. The Canadian Occupational Performance Measure: an outcome measure for occupational therapy. *Can J Occup Ther.* 1990;57:82–87.
5. Schuman JE, Beattie EJ, Steed DA, Merry GM, Kraus AS. Geriatric patients with and without intellectual dysfunction: effectiveness of a standard rehabilitation program. *Arch Phys Med Rehabil.* 1981;62: 612–618.
6. Pfeiffer EA. Short Portable Mental Status Questionnaire for the assessment of organic brain deficits in the elderly. *J Am Geriatr Soc.* 1975; 23:433–441.
7. Smyer MA, Hofland BF, Jonas EA. Validity study of the Short Portable Mental Status Questionnaire for the elderly. *J Am Geriatr Soc.* 1979;27:263–269.
8. Mahurin RK, Bettignies BH, Pirozzolo FJ. Structured assessment of independent living skills: preliminary report of a performance measure of functional abilities in dementia. *J Gerontol Med Sci.* 1991;46:M58–M66.
9. Schmidt RA. Motor learning principles for physical therapy: in contemporary management of motor control problems. *Proceedings of the II Step Conference*. 1991:49–63.
10. Swanson LR, Sanford JA. Motor learning concepts applied to rehabilitation. In: Pickles B, ed. *Physiotherapy with older people*. London, England: W.B. Saunders; 1995:107–115.
11. Tse DW, Spaulding SJ. Review of motor control and motor learning: implications for occupational therapy with individuals with Parkinson's disease. *Phys Occup Ther Geriatr.* 1998;15:19–36.
12. Willingham DB, Peterson EW, Manning C, Brashear R. Patients with Alzheimer's disease who cannot perform some motor skills show normal learning with other motor skills. *Neuropsychology*. 1997;11:261–271.
13. Dean CM, Shepherd RB. Task-related training improves performance of seated reaching tasks after stroke. A randomized controlled trial. *Stroke*. 1997;28:722–728.
14. Hanlon RE. Motor learning following unilateral stroke. *Arch Phys Med Rehabil.* 1996;77:811–815.
15. Lee TD, Swanson LR, Hall AL. What is repeated in a repetition? Effects of practice conditions on motor skill acquisition. Movement science. *An American Physical Therapy Association Monograph*. Alexandria, VA; 1991:191–197.
16. Winstein CJ. Designing practice for motor learning: clinical implications. In: Lister MJ, ed. *Contemporary management of motor control problems: Proceedings of the II Step Conference*. Fredericksburg, VA: Foundation for Physical Therapy; 1991:65–76.
17. Winstein CJ. Knowledge of results and motor learning—implications for physical therapy. *Phys Ther.* 1991;71:140–149.
18. Guralink JM, Branch LG, Cummings SR, Curb D. Physical performance measures in aging research. *J Gerontol Med Sci.* 1989;44: M141–M146.
19. Sanford J, Guyatt GH, Law M, Swanson L. *Assessing clinically important change as an outcome of rehabilitation in older adults*. San Francisco: American Society on Aging; 1994.
20. Ware JE, Sherbourne CD. The MOS 36-item short-term health survey (SF-36). *Med Care.* 1992;30:472–482.
21. Garrat AM, Ruta DA, Abdulla JI, Russell IT. SF-36 health survey questionnaire: II. Responsiveness to changes in health status in four common clinical conditions. *Qual Health Care.* 1994;3:186–192.
22. McHorney CA, Ware J, Rachael Lu JF, Sherbourne CD. The MOS 36-item short form health survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med Care*. 1994;32:40–66.
23. Rozzini R, Frisoni G, Ferucci L, Barbisoni P, Trabucchi M. Who are the older patients failing to recover mobility after rehabilitation? *J Am Ger Soc*. 1997;45:250–258.
24. Lyons RA, Perry HW, Littlepage B. Evidence for the validity of the short-form 36 questionnaire (SF-36) in an elderly population. *Age Ageing*. 1994;23:182–184.
25. Sim J, Reid N. Statistical inference by confidence intervals: issues of interpretation and utilization. *Phys Ther.* 1999;79:186–195.

Received September 30, 1999
Accepted December 12, 1999
Decision Editor: William B. Ershler, MD