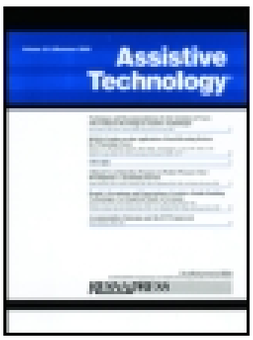

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William C. Mann OTR and PhD , Patrícia Belchior OT , Machiko R. Tomita PhD & Bryan J. Kemp PhD

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APPLIED RESEARCH

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Use of Personal Emergency Response Systems by Older Individuals With Disabilities

*William C. Mann, OTR, PhD, †Patrícia Belchior, OT, ‡Machiko R. Tomita, PhD, and §Bryan J. Kemp, PhD

**Department of Occupational Therapy, University of Florida, Gainesville, Florida;*
†Rehabilitation Science Doctoral Program, University of Florida, Gainesville, Florida;
‡Department of Rehabilitation Science, University at Buffalo, Buffalo, New York; and
§Rehabilitation Research and Training Center on Aging with Disabilities, University of California, Irvine, Program in Geriatrics, Irvine, California

This article describes how older persons perceive and use personal emergency response systems (PERSs), including issues related to device design, and report reasons for nonuse of PERSs. Data for this study were collected through a semistructured questionnaire that included fixed and open-ended response questions. Six hundred six participants 60 years and older were surveyed. Descriptive statistics were used to report sample characteristics. The most often-stated reason for using a PERS was related to concerns with falling (40% of responses). Asked how a PERS has been helpful, 75.6% of participants expressed an enhanced feeling of security with their PERS. Lack of perceived need (57.0% of responses), cost (37.0%), and lack of knowledge of the device (23.7%) were the most frequently stated reasons for not using a PERS. This study found that, while PERSs provide benefits for many elders, there appear to be many older persons who could benefit who do not have one. Only 16% of participants in this study, all of whom had disabilities, used a PERS.

Key Words: Personal emergency response system (PERS)—Aging—Disability.

By 2020, the elderly population will increase to 54 million persons. By 2050, it will increase to 79 million, more than double its present size (U.S. Census Bureau, 1995). Older persons experience more chronic illnesses and disabilities, which often require that relatives in their 50s and 60s care for them (Home Technology Systems, Inc., 2004). Just as the baby boom generation had an impact on the educational system and the labor market, in the future, they will strain services and programs for the elderly (Home Technology Systems, Inc., 2004). They will require more hospital services with resultant increases in Medicare expenditures (Hall & Owings, 2002). Persons 65 years and older accounted for almost 40% of all hospital discharges and used almost one half of all hospital days in 2000 (Hall & Owings, 2002).

Assistive technology can reduce the impact of chronic illness, disability, and dependency resulting from the aging process and age-related chronic conditions (Mann, Ottenbacher, Fraas, Tomita, & Granger, 1999). Personal emergency response systems (PERSs) are a relatively inexpensive assistive technology that assists elders in the event of emergencies (Berstein, 2000). One study demonstrated that use of PERSs reduced mortality rates nearly four times, reduced hospital utilization by 59%, and had a positive cost-benefit ratio. Every dollar spent on PERSs resulted in $7.19 in health care cost savings (Berstein, 2000).

Living alone is more common with increasing age (U.S. Census Bureau, 1995). PERSs also offer users a feeling of security, as they know they can easily call for help in an emergency (Roush, Teasdale, Murphy, & Kirk, 1995). PERSs provide a means for sending a call for help in the event of fall, a major cause of hospitalization. About one in three older persons fall each year and 40% result in hospitalization (Sattin et al., 1990). Falls can have a dramatic impact on function (Sherman,

Address correspondence and reprint requests to Dr. William C. Mann, Department of Occupational Therapy, University of Florida, P.O. Box 100164, Gainesville, FL 32610-0164.

2001). Most falls occur at home during periods of activity, especially walking and transferring (Resnick, 1999). Falls resulting in fractures pose major health-related costs. One study of the incremental cost of hip fracture estimated the cost in the range of $16,322–18,727 (Brainsky et al., 1997). Another study reported that hip fracture reduced life expectancy by close to 2 years while having a lifetime cost of $81,300, half of which is related to cost of nursing home stays (Braithwaite, Col, & Wong, 2003).

PERSs can be purchased, leased, or rented. If purchased, PERSs range in price from $200 to more than $1,500. There is typically an installation fee and a monthly service fee of from $15 to $50 (Federal Trade Commission for the Consumer, 2001). In its simplest form, a PERS has three components: a help button, a base unit, and a central monitoring center. PERS users carry or wear a small portable radio transmitter with a button. Pressing the button sends the signal to a communicator, which is a base unit connected to the existing telephone line, which then automatically dials a 24-hour monitoring center. The response center calls the subscriber over the telephone or through a two-way speaker to determine the nature of the emergency (Levine & Tideiksaar, 1995).

There are many people who could use a PERS who do not have one, typically due to economic and psychosocial reasons (Mann, 1997). Although PERS costs are often covered by long-term care insurance policies, they are generally excluded by most acute-care options, including Medicare. As a consequence, users and family members typically pay out of pocket for PERSs (Berstein, 2000). Other reasons for nonuse include lack of perceived need for the device, feelings of invasion of privacy, and stigma (Mann, 1997).

METHODS

To explore how the elderly population has utilized PERSs, including issues related to device design, and to study the reasons for nonuse of PERSs, this study surveyed 606 older persons with disabilities, 93 of whom either currently had a PERS in their home or had one in the past. The purpose of this study was to describe how elderly individuals (60 years and older) living at home perceive their use of a PERS, their level of satisfaction, the level of importance, and their opinions about the device design. This study also aimed to describe the perceptions of older persons with disabilities who were not PERS users and their reasons for not using a PERS. The following research questions were addressed.

PERS users:

1. How many PERS users own their device?
2. How much do they use their PERS and do they have reasons for not using it more often?
3. What design for PERS control (wrist, necklace, pendant) do they most prefer?
4. How do users rate their level of satisfaction and importance with their PERS?
5. For what situations have they used their PERS and how has it helped them?
6. Who purchased their PERS?
7. How were participants trained on the use of their PERS?

PERS nonusers:

1. Are older persons with disabilities who do not use a PERS interested in owning or using one?
2. What prevents nonusers from using the device?

Sample

Six hundred six older persons with disabilities were surveyed in 2001–2002. For participants who used a PERS, 20 surveys were conducted face-to-face in the participant's home, 48 were completed by mail, and 25 were conducted by phone interview and/or home interview. For participants who did not use a PERS, 33 surveys were conducted face-to-face in their home, 338 were completed by mail, and 142 were conducted by phone and/or home interview. The phone and home interviews included elders from Western New York, Southern California, and Northern Florida. Several residents of a continuous-care retirement community participated in face-to-face interviews. The phone interviews and a majority of the face-to-face interviews were conducted with participants from the Rehabilitation Engineering Research Center's study participant core in Western New York and Northern Florida. The mailed survey included elders with disabilities from across the United States who participated in an assistive technology information dissemination program called Project Link.

Ninety-three participants (14.2%) had a PERS in their home. All PERS users were older than 60 years with a mean age of 79.3 ($\pm$9.3). Female participants represented 70.7% of the sample, 91.3% of participants were White, 48.9% had completed high school, 26.1% were married, 66.3% lived alone and, 45.0% owned their own home (Table 1).

TABLE 1. Description of study participants ($N = 606$)

	PERS users ($n = 93$)	PERS nonusers ($n = 513$)
Age: *M* (*SD*)	79.3 (9.3)	73.4 (7.9)
	n (%)	*n* (%)
Sex ($n = 599$)		
Female	65 (70.7)	344 (67.9)
Male	27 (29.3)	163 (32.1)
Race ($n = 601$)		
White	84 (91.3)	466 (91.5)
Black	6 (6.5)	29 (5.7)
Hispanic	1 (1.1)	3 (0.6)
Asian	1 (1.1)	2 (0.4)
Other		9 (1.8)
Education ($n = 601$)		
College degree (bachelor's or higher)	45 (48.9)	246 (48.3)
High school or less	30 (32.6)	179 (35.2)
Some college, no degree	17 (18.5)	84 (16.5)
Marital status ($n = 599$)		
Married	24 (26.1)	219 (43.2)
Not married	68 (73.9)	288 (56.8)
Living status ($n = 595$)		
Living alone	61 (66.3)	225 (44.8)
Living with someone	32 (34.7)	277 (55.2)
Housing status ($n = 586$)		
Own	41 (45.0)	367 (74.1)
Rent	31 (34.1)	102 (20.6)
Others	19 (20.9)	26 (5.3)
Type of house ($n = 573$)		
Single-family detached home	29 (31.9)	289 (60.0)
Senior apartment	13 (14.3)	38 (7.9)
Retirement community	17 (18.7)	31 (6.4)
Town house or condo	5 (5.5)	33 (6.8)
Walk-up apartment building	7 (7.7)	22 (4.6)
Elevator apartment building	6 (6.6)	21 (4.3)
Two-unit building	4 (4.4)	15 (3.1)
Mobile home in mobile park	1 (1.1)	9 (1.9)
Isolated mobile home	3 (3.3)	6 (1.2)
Other	6 (6.6)	18 (3.7)

The most common symptoms experienced by study participants who used a PERS were easily tired (73.1%), muscle weakness (63.4%), joint problems (62.4%), incontinence of bladder/bowel (58.1%), difficulty with hand tasks (50.5%), and back problems (48.4%) (Table 2). Activities reported as being most difficult to perform were climbing stairs (80.7%), walking (76.0%), doing housework (73.5%), shopping (61.4%), getting out of a chair (60.2%), driving (57.8%), and bending (49.4%) (Table 3).

Instrument

Data for this study were collected with a questionnaire. Table 4 lists the areas addressed by the questionnaire, which also included basic demographic information. The questionnaire included fixed and open-ended response questions and a series of items about PERSs that the participant rated on a scale. An illustration and information booklet with diagrams and pictures was given to the study participant to illustrate PERS features and accessories.

TABLE 2. Types of conditions reported by personal emergency response system users (n = 93)

	n (%)
Tire easily	68 (73.1)
Muscular weakness	59 (63.4)
Joint problems	58 (62.4)
Bladder/bowel control problems	54 (58.1)
Difficulty with hand tasks	47 (50.5)
Back problems	45 (48.4)
Poor hearing	44 (47.3)
Memory difficulties	41 (44.1)
Low vision	37 (39.8)
Paralysis of legs	21 (22.6)
Paralysis of arms	14 (15.1)
Speech difficulties	11 (11.8)
Learning disability	7 (7.5)
Blind	4 (4.3)
Deaf	3 (3.2)
Other	22 (23.7)

TABLE 3. Activities personal emergency response system users report difficulty performing (n = 83)[a]

	n (%)
Climbing stairs	67 (80.7)
Walking	63 (76.0)
Doing housework	61 (73.5)
Shopping	51 (61.4)
Getting out of chair	50 (60.2)
Driving	48 (57.8)
Bending	41 (49.4)
Writing	37 (44.6)
Preparing meals	33 (39.8)
Bathing	32 (38.6)
Getting on and off the toilet	32 (38.6)
Reading	27 (32.5)
Getting dressed	27 (32.5)
Using a computer	23 (27.7)
Using the telephone	21 (25.3)
Managing bowel/bladder tasks	17 (20.5)
Grooming	15 (18.1)
Holding eating utensils	11 (13.3)
Other	10 (12.0)

[a]Thirteen study participants did not respond to this section.

Data Collection

Experienced occupational therapists and nurses conducted the interviews, which required from 0.5 to 1.5 hours to complete. Appointments were scheduled at times convenient for study participants. Interviewers were trained in the use of the survey instruments to ensure consistency in the in-home and telephone interviews. The survey included questions on other types of devices in addition to the PERS. The length of the interview varied with the amount of experience participants had with the other devices.

Analysis

Descriptive statistics were used to report the sample characteristics. All analyses were completed using SPSS version 11.0. Frequencies for categorical variables and means, standard deviations, and ranges for noncategorical variables are reported for study participants with and without a PERS.

RESULTS

General Information on PERS Users

Table 5 addresses the questions for PERS users:

(1) How many PERS users own their device? Of those participants who had experience with a PERS, 6.6% owned a PERS in the past, and 93.4% owned a PERS at the time of the survey.

(2) How much do they use their PERS and do they have reasons for not using it more often? The majority of participants (52.9%) stated that they used their PERS less than once a week. A PERS was used by 29.9% of participants 1–3 times a week, while 17.1% used a PERS more than 3 hours a week. The most cited reason for not using the PERS was the lack of perceived need (55.6%).

(3) What design for PERS control (wrist, necklace, pendant) was most preferred, and why? The necklace style was the most desired design for the PERS control (71.9%). When participants were asked to give their opinions about PERS features, a relatively low number of participants (n = 67) provided responses. The majority of participants thought the style of the PERS (52.2%) and the size (77.6%) were adequate and did not require any change, and 79.1% thought that the PERS was easy to use.

(4) How do PERS users rate their level of satisfaction with and importance of their system? Almost all of the participants (92.7%) were satisfied with their PERS (66.7%). Only 7.4% were not satisfied, while 84.3% of the participants rated their PERS as a very important device.

(5) For what situations have they used their PERS, and how has it helped them? The major reason cited for potentially using a PERS was related to risk of fall (40.0%). Other important reasons were possibility of feeling ill (21.1%) and dizziness (8.8%). The most cited way that their PERS helped them was an enhanced feeling of security (75.6%),

TABLE 4. Types of scales

For people who use a PERS	
Have you ever owned a PERS?	Single-response item
Do you use your PERS?	Yes/no item
Level of satisfaction	Likert scale item
Level of importance	Likert scale item
Who taught you how to use the PERS?	Single-response item
Who paid for the PERS?	Single-response item
PERS style?	Single-response item
How often worn?	Verbal frequency scale
Time used (past year)	Ordinal scale item
List purpose(s)	Multiple-choice item
If you do not own a PERS, would you be interested in owning one?	Yes/no item
What do you think about the following features? (style pendant, size, ease of use)	Open-ended item
Is there anything you would change about these features to make them easier to use? (style pendant, size, ease of use)	Open-ended item
Do you have any general suggestion to make the PERS easier to use?	Open-ended item
How do you think using a PERS has helped you?	Multiple-choice item
What prevents you from using the PERS more?	Multiple-choice item
For people who do not use a PERS	
Do you have an interest in using a PERS?	Yes/no item
What has prevented you in the past from using a PERS?	Multiple-choice item
What do you foresee preventing you from using a PERS in the future?	Multiple-choice item
Do you have an interest in owning a PERS?	Yes/no item
What has prevented you in the past from owning a PERS?	Multiple-choice item
What do you foresee preventing you from owning a PERS in the future?	Multiple-choice item
What do you think about the following features? (style, size, ease of use)	Open-ended item
Is there anything you would change about these features to make them easier to use? (style, size, ease of use)	Open-ended item
Do you have any general suggestion to make this product easier to use?	Open-ended item
How do you think a PERS could help you?	Multiple-choice items

Note: PERS = personal emergency response system.

and 69.2% reported that having the device also eased family members' worries.

(6) Who purchased their PERS? Almost half of participants (47.6%) purchased their own PERS.

(7) How were participants trained on the use of their PERS? Thirty-three participants (39.7%) were trained on how to use a PERS at the place of purchase and 19 participants (22.9%) were self-taught in PERS use.

PERS Nonusers

Table 6 addresses the questions for PERS nonusers: (1) Are participants who do not use the PERS interested in owning or using one? About 30% of participants were interested in using a PERS and 37.8% were interested in owning one. (2) What prevents nonusers from using the device? The most commonly cited reasons for not using a PERS were lack of perceived need (57.0%), cost (37.0%), and lack of knowledge of the device (23.7%). However, when asked "What do you foresee preventing you from using a PERS in the future," cost was the most cited reason (46.4%), followed by lack of perceived need (44.4%), lack of knowledge of device (17.0%), and lack of access (11.8%).

DISCUSSION

This study found that many elderly individuals with disabilities have benefited from using a PERS. PERSs enhance personal feelings of security for users and users' families. PERS users can receive immediate help in the event of a fall, the leading cause of hospitalization in the geriatric population (Sattin et al., 1990). An increased feeling of security may also increase independence and improve quality of life.

While a PERS provides benefits for many elders, it is an underused device. Only 16% of participants in this study, all of whom had disabilities, used a PERS. Cost and perceived lack of need were the most-often stated reasons participants did not use

TABLE 5. PERS use and satisfaction for PERS users (n = 93)

	n (%)
Have you ever owned a PERS (n = 91)	
Presently	85 (93.4)
In the past	6 (6.6)
Number of times used per week (n = 87)	
Zero	46 (52.9)
1–3 hours	26 (29.9)
4–6 hours	7 (8.0)
7–10 hours	3 (3.4)
More than 10 hours	2 (2.3)
Other	3 (3.4)
What prevents you from using the PERS more often or for greater lengths of time? (n = 63)	
Lack of perceived need	35 (55.6)
Cost	4 (6.3)
Lack of access	2 (3.2)
Cognitive impairment	2 (3.2)
Mobility	2 (3.2)
Others	35 (55.6)
Type of PERS (n = 89)	
Necklace	64 (71.9)
Wristwatch	15 (16.9)
Chest strap	2 (2.2)
Belt attachment	1 (1.1)
Other	7 (7.9)
Opinion about PERS	
Style of pendant (n = 67)	
Is adequate	35 (52.2)
Not adequate	7 (10.4)
Other	25 (37.3)
Size (n = 58)	
Is adequate	45 (77.6)
Too big	5 (8.6)
Other	8 (13.8)
Ease of use (n = 67)	
Easy to use	53 (79.1)
Very sensitive	4 (6.0)
Other	10 (14.9)
Satisfaction level (n = 81)	
Very satisfied	54 (66.7)
Somewhat satisfied	21 (26.0)
Not satisfied	3 (3.7)
Not at all satisfied	3 (3.7)
Importance level (n = 83)	
Very important	70 (84.3)
Somewhat important	7 (8.4)
Not important	5 (6.0)
Not at all important	1 (1.2)
Purpose for using PERS (n = 90)	
Fall	36 (40.0)
Feeling ill	19 (21.1)
False alarm	11 (12.2)
Dizzy	8 (8.8)
Intruder	4 (4.4)
Other	12 (13.3)
How do you think using a PERS has helped you? (n = 78)	
Enhancing feeling of security	59 (75.6)
Ease family's worries	54 (69.2)
Ease worries	51 (65.4)
Increases activity	6 (7.7)
Other	10 (12.8)
Purchased by (n = 84)	
Self	40 (47.6)
Community agency	14 (16.7)
Gift	6 (7.1)
Other	24 (28.6)
Initial training (n = 83)	
Place of purchase	33 (39.7)
Self	19 (22.9)
Community center	10 (12.1)
Family member	7 (8.4)
Other	14 (16.9)

Note: PERS = personal emergency response system.

a PERS. In this study, 6.6% of participants had used a PERS in the past but were no longer using it. While not asked in the survey, the most likely reason for study participants to no longer use a PERS relates to a change in the type of residence. There were 17 study participants living in a continuous-care retirement community where emergency help was nearby. Elders living in more isolated types of housing, often alone, have an even greater need for some type of system, such as a PERS, to call for help when needed.

Over one third of participants who did not use a PERS expressed an interest in owning one and using one. These findings support an earlier report that the underutilization of a PERS might be explained by economic and psychosocial reasons (Mann et al., 1999). Another potential barrier in using a PERS is lack of knowledge about the device. Participants in this study did not raise any complaints of poor response relative to maintenance, nor did they state any concerns with their leasing contracts. Style of the device and training were not found to be problems related to PERS use. Study participants found their PERSs easy to use,

TABLE 6. Responses from PERS nonusers (n = 513)

	n (%)
Do you have an interest in using a PERS? (n = 457)	
No	288 (63.0)
Yes	169 (37.0)
Do you have an interest in owning a PERS? (n = 426)	
No	265 (62.2)
Yes	161 (37.8)
What has prevented you in the past from using a PERS? (n = 409)	
Lack of perceived need	233 (57.0)
Cost	151 (37.0)
Lack of knowledge of device	97 (23.7)
Access	40 (9.8)
Mobility	17 (4.2)
Too complicated or confusing for me	11 (2.7)
Too hard/too much work to learn	10 (2.4)
Training not available	13 (3.2)
Hearing impairment	10 (2.4)
Visual impairment	10 (2.4)
Privacy and trust	7 (1.7)
Cognitive impairment	7 (1.7)
Pain	4 (1.0)
Lack of user's manual	3 (0.7)
Other	36 (8.8)
What do you foresee preventing you from using a PERS in the future? (n = 390)	
Cost	181 (46.4)
Lack of perceived need	173 (44.4)
Lack of knowledge of device	68 (17.4)
Access	46 (11.8)
Mobility	17 (4.4)
Too complicated or confusing for me	14 (3.6)
Training not available	14 (3.6)
Hearing impairment	11 (2.8)
Too hard/too much work to learn	10 (2.6)
Visual impairment	10 (2.6)
Privacy and trust	7 (1.8)
Cognitive impairment	6 (1.5)
Lack of user's manual	4 (1.0)
Pain	3 (0.8)
Other	66 (17.0)

Note: PERS = personal emergency response system.

were satisfied with the size, and almost 75% preferred the necklace style.

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