Attitudes of Postmenopausal Women toward Interactive Video Dance for Exercise

Marco Inzitari, M.D.,^{1,2,3} Adam Greenlee, B.S.,⁴ Rachel Hess, M.D.,¹
Subashan Perera, Ph.D.,¹ and Stephanie A. Studenski, M.D., M.P.H.¹

Abstract

Aims: Although physical activity (PA) is universally recommended, most adults are not regular exercisers. Interactive video dance is a novel form of PA in widespread use among young adults, but interest among adults is not known. Postmenopausal women are an appropriate target for interventions to promote PA because they have an increased risk of health problems related to sedentary behavior. We explored perceived advantages and disadvantages of video dance as a personal exercise option in postmenopausal women.

Methods: Forty sedentary postmenopausal women (mean age $\pm$ SD 57 $\pm$ 5 years), were oriented in eight small groups to interactive video dance, which uses a force-sensing pad with directional panels: the player steps on the panels in response to arrows scrolling on a screen, synchronized to music. Perceived advantages and disadvantages were elicited through a nominal group technique (NGT) process.

Results: Participants generated 113 advantages and 71 disadvantages. The most frequently cited advantages were "it's fun" and "improves coordination" (seven of eight groups), the fact that challenge encourages progress (five of eight groups), the potential for weight loss (four of eight groups), and the flexibility of exercise conditions (three of eight groups). Concerns were the potentially long and frustrating learning process, cost (six of eight groups), and possible technical issues (two of eight groups).

Conclusions: The recreational nature of interactive dance exercise was widely appealing to postmenopausal women and might help promote adherence to PA. Initial support to learn basic technical and movement skills may be needed.

Introduction

PHYSICAL ACTIVITY (PA) is widely recommended to maintain health in middle age and later life,¹ but adherence is a persistent problem.²⁻⁵ Postmenopausal women, whose prevalence of physical inactivity is high,⁶ are one appropriate target for interventions to promote PA because of their increased risk of health problems, such as obesity, cardiovascular disease (CVD), and osteoporosis and because exercise could reduce these risks. However, adherence, even in home-based programs, is low and decreases over time,⁷ mainly due to lack of motivation.

New forms of recreation offer novel strategies to promote PA. Video games are a widespread form of recreation for young people because they are engaging, give immediate feedback on performance, and reward continued practice

with opportunities to expand to new experiences within the game. Most video games in the past have been controlled by hands and tended to promote a sedentary lifestyle. Some newer video games require whole body activity. Interactive video dance, a dance-based videogame, combines the recreational nature of a videogame with the benefits of dance, such as energy expenditure, increased endurance, strength, flexibility, coordination, and balance.⁸ In older women, dance has been shown to promote weight loss⁹ and reduce the risk of falls.¹⁰ Adherence to dance-based aerobic exercise programs has been relatively high,¹⁰ with low injury rates.¹¹ Video dance is emerging as a strategy to promote PA in children and young adults and has been incorporated into school physical education programs.¹² Because video dance is intentionally engaging through its framework of rapid feedback and rewards, it might promote adherence to PA.

¹Department of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania.

²Department of Epidemiology, University of Pittsburgh, Pittsburgh, Pennsylvania.

³Pere Virgili Hospital and Institute on Aging, Autonomous University of Barcelona, Barcelona, Spain.

⁴School of Medicine, University of Pittsburgh, Pennsylvania.

Virtually nothing is known about potential interest among people in midlife or beyond. The aim of this study was to explore perceived advantages and disadvantages of video dance as a personal exercise option.

Materials and Methods

Design of study

Participants, in groups of about five, received an orientation to the dance system, observed a demonstration by our research staff, and were offered an opportunity to individually perform a simple dance lesson with supervision. The same day, after this 1-hour experience, perceptions and priorities were elicited through a structured group process using nominal group technique (NGT). The study was approved by the Institutional Review Board of the University of Pittsburgh, and participants signed informed consent statements.

Population

We enrolled postmenopausal women (at least 1 year since their last menstrual period), 45–75 years old, and not currently engaged in regular exercise, defined as at least 30 minutes three times per week of PA that increases the heart rate. Exclusion criteria were impaired mobility (self-reported inability to walk ½ mile or to climb one flight of stairs without an assistive device and without assistance from another person); recurrent falls; history of osteoporotic fractures; weightbearing pain limiting PA; current or past lung, cardiovascular, neurological, or neuromuscular diseases; and radiation or chemotherapy for cancer or nonelective hospitalization in the last 6 months. Any other condition contraindicating PA or possibly increasing the risk of injury from PA and reduced vision were also exclusion criteria. Participants were recruited through ongoing studies of midlife women, local research registries and fliers posted in the surrounding community.

Interactive video dance system

The system includes a 3 foot by 3 foot mat with four 1-foot square arrow panels (pointing up, down, left, and right). The mat is connected to hardware (a computer or computer game system) and a monitor. The monitor instructs the dancer by four arrows scrolling from the bottom to the top of the screen, synchronized to the general rhythm or beat of a song chosen by the player. As the arrows scroll up, they cross over four silhouettes (pointing up, down, left, right). The dancer must step on the corresponding arrow of the mat as the scrolling arrow crosses its silhouette. The steps are set to a wide range of music and become more complex and frequent as the dancer masters the game. Beginning steps are at the frequency and intensity of usual walking. After each dance or lesson (90–150 seconds), the dancer gets feedback on the number of correct steps and gets an overall letter grade. As the dancer masters the required skills of the game, the grade improves, and the dancer has access to new songs. Based on our preliminary data, in which we measured oxygen consumption while performing video dance, we believe that dancers achieve a moderate level of exercise intensity (e.g., 3 or more METs and increased heart rate) at level 3 (of 10 levels in the game). Figure 1 shows two participants performing with the system. The total cost for a system, including hardware, a dance platform, and software, ranges from around US \$50 for

FIG. 1. Two women performing interactive video dance.

simple plug and play versions, to US \$700–800 for professional or arcade-style versions. There is also freeware that can be directly downloaded from the internet at sites, such as stepmania.com.

Assessment

We collected data on demographics, health, and history of participation in leisure physical activities.¹³ Self-efficacy for exercise was assessed as the expectation to continue exercising in the face of nine potential barriers,¹⁴ with a summary score ranging from 0 to 10 (low to high self-efficacy).

Modified NGT

NGT is a group technique that takes advantage of pooled judgment.¹⁵ This standardized method combines individual reflection and creativity, information sharing, and group prioritization. Two members of the team coordinated the group, a moderator and a research assistant to record participants' feedback and ranks on a flip chart. Prior to beginning the NGT, the moderator gave an opening statement to clarify group objectives, to explain the role of the participants, and to provide a sense of how the group's output was going to be used. In this study, the objective was to identify advantages and disadvantages of interactive video dance as a form of PA for postmenopausal women. The first step, called "silent generation of ideas in writing," is usually designed to guarantee adequate time for reflection and to avoid premature choices, premature influences across participants, or excess focus on a small number of ideas. In particular, each participant was asked to write up to five advantages (aspects that met participant's interests or needs) and five disadvantages (possible barriers to performance or adherence) of video dance as a form of PA. Then, in the round-robin recording of ideas, each participant in turn announced one of the ideas on her list, and the ideas were recorded by a staff member on a flip chart. This step is intended to provide equal participation in the presentation of ideas, an increase in problem-mindedness and creativity, depersonalization (the separation of ideas from

TABLE 1. ADVANTAGES AND DISADVANTAGES OF INTERACTIVE VIDEO DANCE REPORTED BY AT LEAST TWO OF EIGHT FOCUS GROUPS

<i>Advantages</i>		<i>Disadvantages</i>	
<i>Ideas</i>	<i>No. of focus groups</i>	<i>Ideas</i>	<i>No. of focus groups</i>
Mental implications			
Motivation		Motivation	
Fun	7	Frustrating to learn	6
Challenge encourages progression	5	Possibly boring over time	3
Set goals and work toward them (compete with self)	4		
Entertaining	3		
Cognitive health benefits			
Music is antidepressant	2		
Makes you concentrate	2		
Physical implications			
Physical health benefits		Physical health benefits	
Improves coordination	7	No upper body involvement	3
Weight loss	4	Might not get the health benefits you expect (weight loss, muscle toning)	2
Burns calories	2		
Dancing is a full body workout	2		
Muscle toning	2		
Easy method to increase heart rate/aerobic exercise	2		
Combined physical and mental benefits			
Combines mental and physical exercise	2		
Safety issues			
		Possible falls	2
Equipment			
		Technical aspects	
		Hard to set up	2
		Cost	
		Must purchase the system	6
		Access and feasibility	
		Cannot be done outdoors	2
Organization and practical implications			
Time		Time	
Flexible exercise times	3	Need time to do it	4
Environment		Environment	
Not dependent on weather	3	Noisy	2
		Pets may interfere	2
Social implications			
Easy to do alone	3		
Allows exercise with others	2		
Double with a partner	2		
Interactive Video Dance program			
		Music component	
		Music might not be to one's taste	2
		Dancelike movements	
		Lack of coordination can be a limitation	2

personalities), an increase in ability to deal with a large number of ideas, and tolerance of potentially conflicting ideas. In a third step, discussing ideas phase, each idea was read aloud, and the group had an opportunity to clarify each idea's meaning, to potentially collapse similar items, and to consolidate ideas based on the group's preferences. This step avoids focusing unduly on any one idea or subset of ideas, provides an opportunity for clarification and elimination of misunderstanding, provides an opportunity to present the

logic behind an idea or disagreement, and allows for recording of differences of opinion without undue argumentation. The last step, voting on item importance, aggregated the judgments of individual members to determine the overall relative importance of individual items. Specifically, each individual listed her top five advantages and disadvantages on cards that were submitted and used for analysis. We held NGT groups until saturation was reached, defined as two groups without any new advantage or disadvantage items.

Data reduction and analysis

Descriptive techniques were used to characterize the sample. Advantages and disadvantages were classified by two blinded investigators (MI and S.A.S.) into categories and subcategories. In case of divergence, agreement was reached through open discussion. Priorities were summarized by group, and frequency of an item among the eight NGT groups was recorded. Because of the many ideas generated, we reported only items cited by two or more groups.

Results

In <3 weeks, >250 women asked to participate. Because the groups filled quickly, only 82 were screened, and the rest were placed on a waiting list for future studies. Of the 82, 40 met the inclusion criteria. Most exclusions were due to currently high levels of PA. We held NGT groups until criteria for saturation were reached. There were eight groups, including 40 women (age 57 ± 5 , 12.5% African Americans). Of the 40 participants, 8 were also participating in other studies. Almost all of the 40 reported prior periods of PA, especially walking for exercise (95%), bicycling (70%), bowling (60%), and jogging (55%). Half of the participants had danced or practiced aerobic dancing in the past. One third had previous experience with video games. Self-efficacy for exercise was modest (5.9 ± 2.1 on a 1–10 scale), with many women reporting that it was difficult to exercise when faced with such barriers as time or weather.

The eight groups generated a total of 113 advantages and 71 disadvantages. The two blinded investigators had consistent item assignments for 101 advantages (89.4%) and 59 disadvantages (83%) into six categories and a number of subcategories. The other items were classified after agreement was reached through open discussion. The advantages and disadvantages reported by at least two groups are shown in Table 1. The most frequently cited advantages were “it’s fun” and “improves coordination,” followed by the challenge and reward of progressing in skills, the fact that exercise goals were continuously changing, the potential weight loss, and the flexibility of exercise conditions (time, with or without partners). Common concerns were the potentially long and frustrating learning process, the cost, the need to have time to exercise, the possible lack of upper body involvement, and possible technical issues.

Discussion

Interactive video games, such as video dance, are emerging as a popular way to exercise and may be relevant to persons at midlife and beyond. This is the first study to report perceptions of postmenopausal women about such games. Especially intriguing is that these postmenopausal women most consistently prioritized “having fun” as an attractive element to promote exercise. They also identified potential physical and cognitive benefits, as well as opportunities for convenience and socialization. Fears about technical competence and ability to gain required skills mean that initial orientation and supervision might be needed.

In children and young adults, interactive video dance has been shown to be safe and to increase PA levels, energy expenditure, and oxygen consumption and to possibly promote weight loss.^{16–19} Public media have recently featured an in-

creasing interest among older adults in computer games for physical and mental exercise,²⁰ but to date, no formal studies have been reported.

The strengths of our study include the enrollment of a novel and relevant population, postmenopausal women, and the use of a structured technique to assess participants’ preferences. Our study has limitations. In particular, self-reported perceptions after only limited exposure to the game may not represent actual preferences after further exposure. As with all qualitative research, the results may not be generalizable beyond the population studied, so that attitudes of other populations, such as men, people of more advanced age, or people with health conditions, are still unknown and need to be assessed in future studies. Finally, as the participants were volunteers, they may have a more positive attitude toward PA than the general population of postmenopausal women.

Conclusions

Interactive computer games, such as video dance exercise, appear to be potentially appealing forms of exercise for some postmenopausal women. Further clinical trials of these novel forms of exercise are needed to assess adherence, safety, and health effects.

Acknowledgments

This study was supported by the Pepper Older Americans Independence Center of the University of Pittsburgh (P30 AG024827). M.I.’s work was supported in part by an educational grant from the “Gianandrea Pugi” Foundation (Florence, Italy). S.A.S. was supported in part by grant K07 AG023641, and R.H. was supported in part by grant K23 (AG024254).

Disclosure Statement

The authors have no conflicts of interest to report. R.H. previously received grant funding from Bionovo, which was completely unrelated to this article and to the topics of this article.

References

1. Pate RR, Pratt M, Blair SN, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273:402–407.
2. Adult participation in recommended levels of physical activity—United States, 2001 and 2003. *MMWR* 2005;54:1208–1212.
3. Booth ML, Bauman A, Owen N, Gore CJ. Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. *Prev Med* 1997;26:131–137.
4. Jaffee L, Lutter JM, Rex J, Hawkes C, Bucaccio P. Incentives and barriers to physical activity for working women. *Am J Health Promotion* 1999;13:215–218.
5. Nies MA, Vollman M, Cook T. Facilitators, barriers, and strategies for exercise in European American women in the community. *Public Health Nurs* 1998;15:263–272.
6. Trends in leisure-time physical inactivity by age, sex, and race/ethnicity—United States, 1994–2004. *MMWR* 2005;54:991–994.

7. Mayoux-Benhamou MA, Roux C, Perraud A, Fermanian J, Rahali-Kachlouf H, Revel M. Predictors of compliance with a home-based exercise program added to usual medical care in preventing postmenopausal osteoporosis: An 18-month prospective study. *Osteoporos Int* 2005;16:325–331.
8. Hopkins DR, Murrah B, Hoeger WW, Rhodes RC. Effect of low-impact aerobic dance on the functional fitness of elderly women. *Gerontologist* 1990;30:189–192.
9. Shimamoto H, Adachi Y, Takahashi M, Tanaka K. Low impact aerobic dance as a useful exercise mode for reducing body mass in mildly obese middle-aged women. *Appl Human Sci* 1998;17:109–114.
10. Shigematsu R, Chang M, Yabushita N, et al. Dance-based aerobic exercise may improve indices of falling risk in older women. *Age Ageing* 2002;31:261–266.
11. Powell KE, Heath GW, Kresnow MJ, Sacks JJ, Branche CM. Injury rates from walking, gardening, weightlifting, outdoor bicycling, and aerobics. *Med Sci Sports Exerc* 1998;30:1246–1249.
12. Konami's Dance Dance Revolution provides health benefits to children of West Virginia. West Virginia University Today. Available at wvutoday.wvu.edu/news/page/5213/ Accessed June 05 2008.
13. Kriska AM, Sandler RB, Cauley JA, LaPorte RE, Hom DL, Pambianco G. The assessment of historical physical activity and its relation to adult bone parameters. *Am J Epidemiol* 1988;127:1053–1063.
14. Resnick B, Jenkins LS. Testing the reliability and validity of the Self-Efficacy for Exercise scale. *Nurs Res* 2000;49: 154–159.
15. Van de Ven AH, Delbecq AL. The nominal group as a research instrument for exploratory health studies. *Am J Public Health* 1972;62:337–342.
16. Chin APM, Jacobs WM, Vaessen EP, Titze S, van Mechelen W. The motivation of children to play an active video game. *J Sci Med Sport* 2008;11:163–166.
17. Lanningham-Foster L, Jensen TB, Foster RC, et al. Energy expenditure of sedentary screen time compared with active screen time for children. *Pediatrics* 2006;118:e1831–e1835.
18. Tan B, Aziz AR, Chua K, Teh KC. Aerobic demands of the dance simulation game. *Int J Sports Med* 2002;23:125–129.
19. Warburton DE, Bredin SS, Horita LT, et al. The health benefits of interactive video game exercise. *Appl Physiol Nutr Metab* 2007;32:655–663.
20. Walker L. Keep your brain power up. Special to The Washington Post, HE09. September 12, 2007. Available at www.washingtonpost.com/wpdyn/content/article/2007/09/10/AR2007091001879.html Accessed June 6, 2008.

Address correspondence to:

Marco Inzitari, M.D.

Department of Medicine

Division of Geriatric Medicine

University of Pittsburgh

130 N. Bellefield Street, Room 512

Pittsburgh, PA 15213

E-mail: inzitarim@edc.pitt.edu
and minzitari@perevirgili.catsalut.net