

Exergaming Through the Eyes of Patients with Heart Failure: A Qualitative Content Analysis Study

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Abstract

Objective: Exergaming appears to be a promising tool to increase exercise capacity in patients with chronic heart failure (HF). Therefore, it is important to obtain more in-depth knowledge about preferences, attitudes, use, and abilities in regard to exergaming. The aim of this study was to describe the experiences of patients with HF when using an exergame platform at home.

Materials and Methods: A qualitative descriptive study using content analysis was conducted on interviews with 14 patients with HF (6 women, ages ranging between 56 and 81 years). The patients were recruited from three centers in Sweden included in a randomized controlled study. These patients had access to an exergame platform at home and were advised to exergame for 30 minutes per day.

Results: The analysis resulted in three categories describing patients' experience of exergaming: (1) making exergaming work, (2) added value of exergaming, and (3) low appeal of exergaming.

Conclusion: This is the first study that explores how patients with HF experience using an exergame platform at home. The study provided important information on what aspects to discuss when initiating an exergame platform at home and following patients who may want to use an exergame platform at home. The results also revealed that this technology may be suitable for some patients, while others prefer other kinds of physical activity.

Keywords: Content analysis, Experiences, Exergame, Heart failure, Wii

Introduction

BEING PHYSICALLY ACTIVE is beneficial to patients with chronic cardiac disease and therefore finding novel rehabilitation options for patients with heart failure (HF) is important.^{1,2} In a meta-analysis of exercise training in patients with chronic HF, patients who were physically active on a daily basis were found to be less likely to be admitted to hospital,¹ had a modest improvement in exercise capacity, and showed decreased all-cause mortality.² Unfortunately, only 30% of patients were found to be adhering to their exercise recommendation after 3 years² and this may limit the effect of exercise on clinical outcomes.³⁻⁵

It has been concluded that it is not enough for practitioners to simply tell patients to exercise, since adopting exercise adherence is a complex process for an individual, and is influenced by both internal (e.g., mental health) and external factors

(e.g., social support).^{3,6} Alternative formats for exercise programs, which are better tailored to patients' needs, are needed in cardiac patients.⁷ This is especially important for those not attracted by the choice of programs currently offered.⁸

One novel approach to increasing physical activity, exercise, and daily activities is to use exergames.⁹⁻¹² Exergaming can be defined as playing a videogame using full body movement to control on-screen action, and it requires the player to expend a significantly greater amount of energy compared with resting levels.¹³ In older adults, playing exergames has been found to increase heart rate, oxygen uptake, and energy expenditure compared to resting, and may facilitate the promotion of light to moderate physical activity.¹² One advantage of exergaming is that it provides an option for patients to engage in physical activity in their homes.

Until now, most studies on exergaming among adults have focused on individuals with neurological conditions, for

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example stroke¹³ and multiple sclerosis.¹⁴ Despite the high prevalence of cardiac disease in the older population, there is only one pilot study on the effects of exergaming in patients with HF.¹⁵ In that study, our group found that, although exergaming did not increase the daily physical activity over time, exergaming might have the potential to increase exercise capacity in elderly patients with HF.¹⁵ Exergaming was found to be feasible and might be an option for cardiac rehabilitation in patients with HF.¹⁵

To our knowledge, only three studies have examined the experiences of exergaming in adults from the patient's perspective. One study¹⁶ reported experiences of exergaming in patients with multiple sclerosis. That study reported that exergaming helped patients to build confidence in abilities and to achieve goals related to engagement in leisure activities, and it also removed barriers associated with going to a gym to exercise. However, exergaming also induced initial reactions of intimidation and worries about falling, and feedback during game play reminded participants of their impairments.

Another study¹⁷ looked at the experiences with exergaming of older adults with depression. They found that some participants started out feeling very nervous about how they would perform in exergaming and whether they would be able to understand the technical aspects of exergaming. After learning to exergame, most participants reported that they were satisfied with their ability to play. They found games to be fun and varied and were challenged to do better when they saw progress.

The third study¹⁸ looked at the experiences of older adults with impaired balance. This study found that the participants enjoyed playing the exergames and they experienced the games as motivating. Since pilot data have shown that exergaming is a promising tool to increase exercise capacity in patients with HF,¹⁵ it is important to obtain more in-depth knowledge about the preferences, attitudes, use, and abilities of exergaming. Therefore, the aim of this study was to describe the experiences of patients with HF when using an exergame platform at home.

Materials and Methods

Design

A qualitative descriptive study using content analysis was conducted as part of an international multicenter project entitled the "HF-Wii study."¹⁹ The main study is a randomized controlled trial (RCT) where patient recruitment is ongoing. The main study has a broad aim to test the concept of exergaming. For a broader perspective on the description of the experience in using an exergame platform, in this study interviews were conducted with a subgroup of patients in the HF-Wii study. The HF-Wii study has been approved by the Linköping Local Ethical Committee (DNR 2012/247-31). The trial is registered in clinicaltrials.gov, identifier: NCT01785121.

Patients and recruitment

The inclusion criteria for this qualitative study were as follows: being part of the intervention group of the HF-Wii¹⁹ study and had access for more than 6 months to an exergame platform (Nintendo Wii™) at home. Further inclusion criteria were as follows: being diagnosed with HF of New York Heart Association (NYHA) class I–IV, being older than 18

years of age, and being in a stable condition. Exclusion criteria were as follows: documented problems with mobility, balance, or sight, severe cognitive dysfunction or other severe psychiatric illness, anticipated short-term survival, and difficulties understanding or reading the Swedish language. All patients provided informed consent before taking part in this qualitative study.

Patients were introduced to the exergame platform (Nintendo Wii) with the games Wii sports in an introductory session in the outpatient clinic in the hospital. Wii sports contain the games boxing, bowling, tennis, golf, and baseball. Thereafter, the exergame platform was installed at the patients' home, where patients learned to move the remote control in a way similar to how these sports are played in real life. The patients were advised to exergame 30 minutes per day for 12 weeks.

Patients were recruited from three of the five Swedish research sites participating in the HF-Wii study.¹⁹ These three centers were the first centers that enrolled patients. Therefore, there were more eligible patients, who finished at least 6 months in the study, than the other centers in HF-Wii study.

A purposive sample of 14 patients was chosen to include sufficient variation to represent the group of patients with HF with access to an exergame platform in the RCT study (Nintendo Wii). The sampling was guided to reach variation regarding age, gender, severity of HF, educational level, marital status, and having grandchildren. Data on marital status, having grandchildren, and educational level were included since a previous pilot study showed that patients played longer than the median time if they were married, had a lower educational background, or had grandchildren.¹⁵ All 14 patients invited to the interview, agreed to participate.

Data collection

The study nurses at each site assisted in the sampling. Two research assistants conducted the interviews, one nurse who is experienced in care of the elderly and a medical student in her third year education. Both assistants received education in conducting interviews and were informed by the research staff in the HF-Wii study on the purpose of this study. The research assistants were not part of the HF-Wii study team, which we consider as a methodological strength.

The interviews were semi-structured and performed in the homes of the patients with HF or in a quiet room at the hospital, depending on the preference of the patient. With permission, the interviews were tape-recorded and transcribed verbatim for data analyses. Recording and transcribing interviews verbatim increase trustworthiness. Initially, an introduction question was asked: "Tell me about your experiences when using the game computer?" Subsequently, questions were asked about exergaming and various aspects of it, exploring preferences, attitudes, use, and abilities. Follow-up questions such as what do you mean by that, how did you feel about that, and could you give an example, were used in which the patients were asked to develop their descriptions. For the whole interview guide refer Table 1.

Data analysis

Qualitative content analysis based on an inductive approach was performed in several steps using the structure described by Elo and Kyngäs.²⁰ Subcategories and categories were identified inductively. Three authors were nurses and

TABLE 1. INTERVIEW GUIDE

“Tell me about your experiences when using the game computer?”

What do you mean by that, how did you feel about that, could you give an example

- Tell what you think of the different Wii sports games.
- How did you experience playing alone or with someone else?
- How did you experience the virtual environment in the game computer?
- Describe how you experienced success/improvement in the games.
- How did you master the game computer?
- What motivated you to play?
- Describe if you experience any problems in using the game computer.
- Describe if you have any bad experiences (like injuries) when playing on the game computer.
- Describe how you think playing on the computer influences your physical activity.
- How do you think that the game can be improved?
- Describe how you will use the game computer in the future.
- Do you have other thought or opinions you want to express?

experienced in qualitative analysis (A.S., J.M., and T.J.); and the first author has a master's degree in Health Sciences, Health Promotion, and Education (L.K.) and is a PhD student in the HF-Wii study.

Initially, three of the authors read four of the transcribed interviews separately and extracted meaningful units in the text that described experiences of exergaming and created the basis of a master codebook. Subsequently, the authors discussed their impressions of the text and the selection of meaningful units to establish a mutually agreed basis for the analysis. Two of the authors worked in parallel on the analysis of eight interviews (L.K. and A.S.), and the first author (L.K.) analyzed the remaining six interviews. The first author maintained the main codebook during all the analyses. In addition, a systematic approach to analysis was used to ensure reliability of the findings. This allowed investigators to share and explore charted data together.²⁰ Analysis triangulation was applied, with the researchers independently coding and categorizing data and having discussions to reach consensus on the final categories.

The interviews were read repeatedly to get an overall understanding of the whole, and there was also a constant comparison between the parts of the analysis and the text of the whole interviews.

To organize the qualitative data the first step was to carry out open coding, and the second step was to create subcategories from the codes. The structure of the subcategories was discussed among all authors. Finally, subcategories with similar content were grouped together into categories. In the last interviews the authors agreed that no new categories were identified, which support that the variation in the purposive sample was reached. Methodological rigor was aimed for by following guidelines outlined for qualitative research.²¹ Awareness of preconceptions was emphasized throughout the study. Presenting quotations offered insight into what was said and further elucidated the findings.

Results

The age of the patients ranged between 54 and 81 (mean age 70 years) and six women and eight men participated. Most patients were married or in a relationship (79%) and had grandchildren (79%). In this sample, three patients had finished primary school, seven had finished secondary school, and four had attained an education level higher than secondary school.

From the analysis of the 14 interviews, three categories describing patients' experience in exergaming were identified: (1) making exergaming work, (2) added value of exergaming, and (3) low appeal of exergaming (Fig. 1).

Making exergaming work

This category includes how the patients with HF experienced that the introduction sessions were helpful in getting started. The feeling of obligation to the research team kept some of the patients exergaming for the first 12 weeks (intervention period). Also, setting goals, such as trying to gain a higher score every time they played, helped the patients to keep exergaming. They also described how they found their routines to include exergaming in daily life.

“Sometimes I thought it was good to do it (exergaming) right away in the morning. Later it went well any other time of the day ... it was to put it (exergaming) in my daily routine somewhere. It was important to determine a time.” (Male, 70 years old)

Most patients aimed to exergame for half an hour, 5 days a week (as advised by the study coordinators). They said that there was a difference in the intensity between the five different games that were available in Wii Sports, namely baseball, bowling, tennis, boxing, and golf. The patients said that bowling was the least physically intensive game in the exergame platform, whereas tennis and boxing were experienced as physically intensive.

“Bowling was not particularly difficult when you started. Golf on the other hand could be a little troublesome. It was more difficult. In boxing you try to not get hit... You had to move your arms very much. So it was pretty tough actually.” (Male, 71 years old)

Exergaming needed a mental and/or physical effort to be successful and therefore tested their abilities in many different ways. Furthermore, knowing the sports in the game in real life helped patients to select a specific game to play. Sometimes they fantasized that they were playing the sport in the game for real outdoors.

“I fantasized I was out on the tennis track. When I lived in Spain for a while... I lived near a tennis court. And I heard people playing tennis ... So I went there in my thoughts (during exergaming).” (Male, 70 years old)

Patients also described the virtual reality environment (e.g., the bowling alley or the tennis court) in the exergame platform as realistic. Many felt that the movements they made in playing the games were the same as those the avatar on the screen made.

Added value of exergaming

Patients with HF in the study said that exergaming was an activity that added value in terms of improvement of their

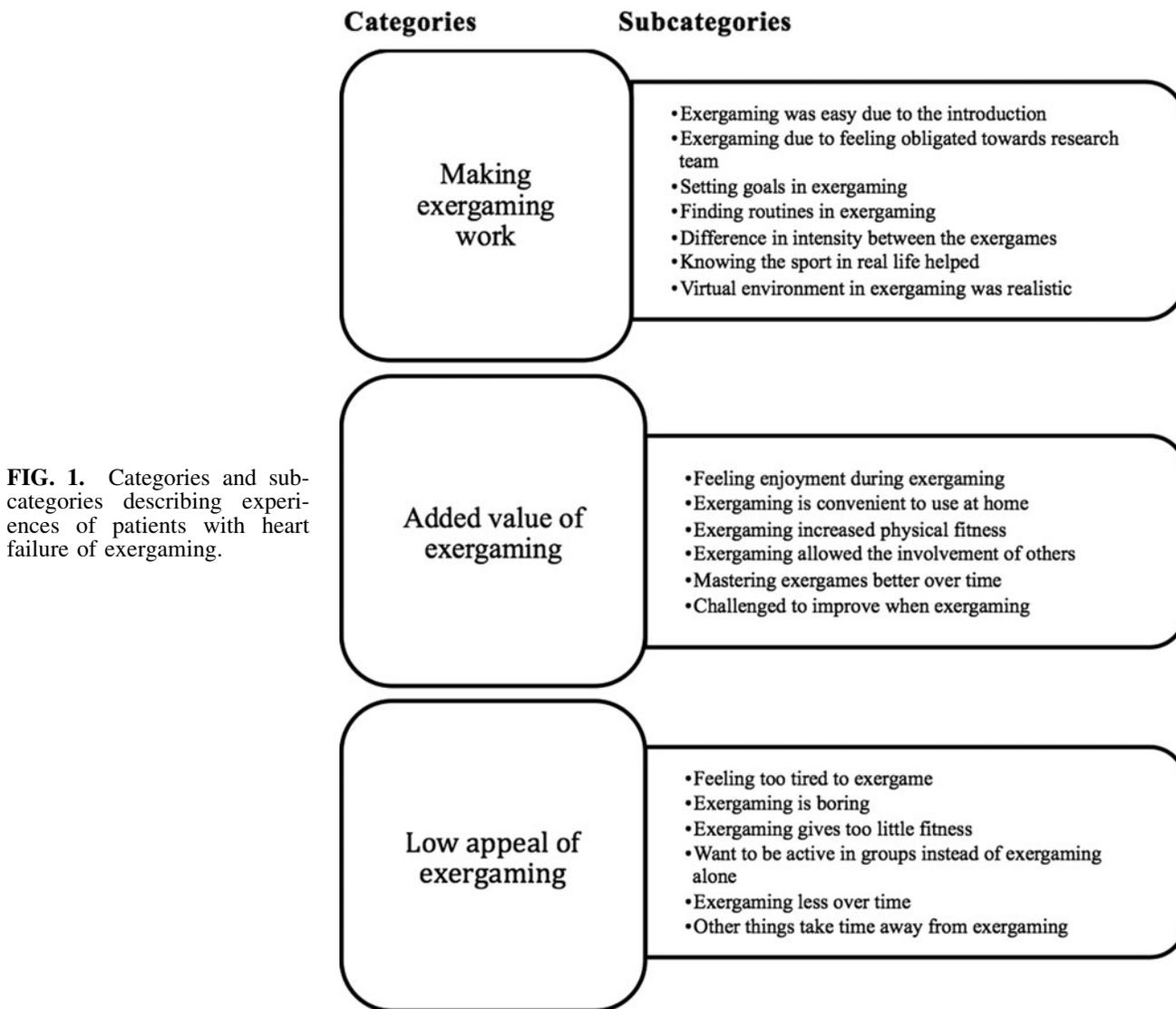


FIG. 1. Categories and subcategories describing experiences of patients with heart failure of exergaming.

physical and/or mental state. They enjoyed the exergaming, especially when they were diagnosed with or recovering from deterioration.

“It was probably useful at the beginning when I was at home using the game instead of going out for a walk alone. Because then I was a bit worried to go out and walk alone ... with my heart in the beginning. But I have come to realize that it is not dangerous. Gaming is now a great addition to some other activities.” (Male, 71 years)

Patients thought it was cool to do exergaming and experienced it convenient to be able to use this exercise mode in their home. The Mii (free-form digital avatar) was seen as a fun addition to the exergame platform. In times of bad weather, exergaming was a found to offer a possibility to be more active inside. Exergaming also increased physical fitness, and helped them to stay healthy.

Being able to exergame together was also seen as added value of exergaming. The patients exergamed together with their spouses, neighbors, friends, children, and grandchildren.

“They thought (the grandchildren) it was fun to beat the grandmother of course... I have always liked to play different

stuff. We have always been a family that liked to play games. Of course it’s fun, better than to play alone.” (Female, 81 years old)

This category also describes how the patients with HF became more skilled and experienced in exergaming over time. The patients gave reasons for why they were interested in playing specific games offered by the platform and how they chose the games that suited them best. The patients found that exergaming was exciting to learn and was competitive. Patients challenged themselves and constantly wanted to improve their skills.

“It was tennis I preferred. I have got a little competitive spirit too, and try to win as much as possible. It was also a challenge all the time... In terms of winning every day... Playing games and setting a new record every time. It was a challenge to constantly improve yourself, to get better and gain better results.” (Female, 65 years old)

Low appeal of exergaming

This category refers to the reasons why some patients with HF did not connect with the exergame platform and

considers why they did not feel that exergaming was suited to them. Some described feeling too tired as a reason for not wanting to exergame. The category also includes that some patients experienced exergaming as boring and they could not stand doing it daily.

“Boring! To stand and play like this in front of a computer... I think it is useless, therefore, even if you try to perform and do things better than last time, it is very boring.” (Female, 81 years old)

Some patients also experienced that exergaming gave too little fitness and did not give enough physical movement to add to health. Exergaming did not appeal to those who wanted to be active in groups instead of exergaming alone.

“I’m probably more a group person than I am an ‘alone’ person. I do not like it that much to be alone. I’m alone almost all the time and physical things are more fun to do with someone. It is much more fun if you have someone to talk to” (Male, 72 years old)

The patients were especially adherent to the exercise routine in the beginning of the study, but exergamed less over time. Some patients played more sporadically, and some even stopped exergaming. Other things that took time away from exergaming (e.g., family obligations and holidays) was the most common explanation for why patients did not exergame.

Discussion

Although previously shown that exergaming has the potential to increase exercise capacity and physical activity,^{11,15} this is the first study to explore the experiences of patients with HF of using an exergame platform at home. The results provide insight into what makes exergaming work and into the added value of exergaming. It also provides important information on what aspects to discuss when initiating and supporting long-term maintenance for patients who may want to use an exergame at home to increase their exercise capacity and daily physical activity.

The experiences of exergaming can be summarized in three categories: (1) making exergaming work, (2) added value of exergaming, and (3) low appeal of exergaming.

Making routines to increase adherence is important for increasing the time being physically active with exergaming and for adopting exergaming in daily life. From studies in rehabilitation it is known that it can be helpful to use goal setting, graphic feedback, problem-solving support, peer teaching, skills mastery, reinterpretation of symptoms, social persuasion, and motivational interviewing to help patients to stay active.^{22–27} Goal setting and getting feedback were specifically mentioned in our study.

As previously described in a pilot study with exergaming in patients with HF¹⁵ and in other studies including interventions to increase physical activity in patients with HF,^{1,2} adherence often decreases over time. The current qualitative data describe that the adherence in the HF-Wii study was high since the patients in the study felt obligated to the research team.

Our study also revealed that although exergaming was experienced as fun and as having added value, still other activities, for example work and family obligations, were prioritized and took time away from exergaming. These

competing activities were also described in previous studies and they included being tired from work, exercise, and other activities each.^{3,8} It is important to realize that patients with HF have a lot more to do in their life than being physically active, and the things that take time away from being physically active should be discussed before rehabilitation. In research including exergaming in older adults, it was found that good familiarization with an exergame platform is important,^{18,28,29} which is also supported by our findings. The introduction and installation session were experienced as helpful to get started in exergaming.

The results show that the choice of exergame depended partly on the popularity of these specific sports in the country where the research took place. In our case, baseball is not a national sport in Sweden and therefore many of the study patients did not know the rules of this sport and therefore did not prefer to play baseball. To increase the suitability and attractions of exergaming, the sports in exergaming should be adapted to the specific country where the intervention takes place, or patients should be given additional education about the sports that are not popular or well known in that country.

Our results also show that experiencing added value of exergaming is important to consider. The patient with HF in our study experienced enjoyment during exergaming and thought the virtual environment was realistic. The enjoyment during exergaming was also found in a former review including exergaming in older adults.¹¹

An interesting reflection can be made on the influence of weather in relation to physical activity. In general, bad weather is described as being a barrier to physical activity, since too much rain, strong wind, snow, or hot temperatures make it difficult and even dangerous to exercise outdoors.³ However, we found that as regards the specific activity in our study (exergaming), bad weather was experienced as a motivator, and therefore exergaming could be a great asset to patients with HF who are not active due to bad weather. Increasing physical fitness is important in patients with HF and most of the patients in this study experienced an increase of physical fitness.

Our patients also described that the possibility to exergame with others added enjoyment to the activity. In this study, we did not specifically instruct patient to play with others, but they were allowed to do so. From former research it is known that that elderly who exergame with family felt more connected with their family members, especially their grandchildren.^{18,28} Future research is needed to study the possibilities to include significant others from the beginning of an intervention with exergaming to increase enjoyment and adherence for the patients who want to play with others. For patients who want to be physically active in groups, possibilities should be explored to do exergaming in a group, for example a Wii bowling competition, or other rehabilitation possibilities to be physically active in groups should be offered.

From this study, we once again were reminded that for exergaming the “one size fits all” approach does not work. In the category “low appeal of exergaming” some patients said that exergaming was not a good option for them, suggesting that rehabilitation for patients with HF should be tailored to individual preferences and capabilities. It would be good to screen patients on the possibilities of adapting exergaming in daily life. With regard to tailoring an activity

to specific capacities, the different sports patients could choose in exergaming showed to be able to do this to some extent. Some patients felt that exergaming challenged them to perform on a sufficient level, while others found that exergaming did not give them enough fitness. As seen in research on multiple sclerosis and exergaming,¹⁶ the exergame platform used in this study was limited in its customizability to accommodate various fitness and functional levels. To further improve options for tailoring, future exergames should include a wider range of different fitness and functional levels.

Limitations

This is a multicenter study in Sweden, which implies that the experiences of patients with HF in other countries may be different due to differences in, for example, healthcare system and culture. Although, the confirmability of the study was strengthened by the fact that some of our findings were confirmed by previous studies on experiences in physical activity,^{3,8} further work is being planned by the authors to also collect data on the experiences of exergaming in international sites included in the HF-Wii study.¹⁹

Efforts were made to ensure variation in the patients with HF in terms of age, gender, and NYHA classification. Although such efforts were made to ensure variation, there were no patients included in the study with NYHA I and VI were missing. An explanation is that this study reported on patients with HF living at home who were able to exergame. Therefore, these results may neither transfer to those patients with a decreased left ventricular function, but no symptoms of HF, nor to the more vulnerable and severely ill patients. Also, the mean age of patients was 70. It is possible, that perceptions of younger or oldest old patients with HF on exergaming are somewhat different.

Conclusion

This is the first study that explores how stable patients with mild to moderate HF experienced using an exergame platform at home. The patients described the challenges in making exergaming work, including how they got started, the competing attention from other activities, factors influencing adherence to the exercise recommendation, and goal setting. When they became more skilled in exergaming, they also experienced development in terms of how they selected the games, the challenges and competition, and selecting different levels of intensity and complexity in the games. The results also revealed that this technology might be suitable for some patients while others prefer other kinds of physical activity.

Acknowledgments

This work is supported through the Swedish National Science Council (Grant No. K2013-69X-22302-01-3), Swedish Heart and Lung Association (Grant No. E085/12), Swedish Heart-Lung Foundation (Grant No. 20130340), Vårdal Foundation (Grant No. 2014-0018), FORSS (Grant No. 474681), and Swedish National Science Council/Swedish research council for health, working life, and welfare (VR-FORTE) (Grant No. 2014-4100).

Author Disclosure Statement

No disclosure.

References

1. Piepoli MF, Davos C, Francis DP, et al. Exercise training meta-analysis of trials in patients with chronic heart failure (ExTraMATCH). *BMJ* 2004; 328:189.
2. Flynn KE, Piña IL, Whellan DJ, et al. Effects of exercise training on health status in patients with chronic heart failure: HF-ACTION randomized controlled trial. *JAMA* 2009; 301:1451–1459.
3. Tierney S, Mamas M, Skelton D, et al. What can we learn from patients with heart failure about exercise adherence? A systematic review of qualitative papers. *Health Psychol* 2011; 30:401.
4. Conraads VM, Deaton C, Piotrowicz E, et al. Adherence of heart failure patients to exercise: Barriers and possible solutions: A position statement of the Study Group on Exercise Training in Heart Failure of the Heart Failure Association of the European Society of Cardiology. *Eur J Heart Fail* 2012; 14:451–458.
5. Leventhal MJ, Riegel B, Carlson B, De Geest S. Negotiating compliance in heart failure: Remaining issues and questions. *Eur J Cardiovasc Nurs* 2005; 4:298–307.
6. Alharbi M, Gallagher R, Neubeck L, et al. Exercise barriers and the relationship to self-efficacy for exercise over 12 months of a lifestyle-change program for people with heart disease and/or diabetes. *Eur J Cardiovasc Nurs* 2017; 16:309–317.
7. Piotrowicz E, Stepnowska M, Leszczyńska-Iwanicka K, et al. Quality of life in heart failure patients undergoing home-based telerehabilitation versus outpatient rehabilitation—A randomized controlled study. *Eur J Cardiovasc Nurs* 2015; 14:256–263.
8. Santaularia N, Jaarsma T. Motivational factors for exercise in cardiac patients? A literature review. *Eur J Prev Med* 2013; 1:1–19.
9. Kharrazi H, Shirong A, Gharghabi F, Coleman W. A scoping review of health game research: Past, present, and future. *Games Health J* 2012; 1:153–164.
10. Chao Y-Y, Scherer YK, Montgomery CA. Effects of using Nintendo Wii™ exergames in older adults: A review of the literature. *J Aging Health* 2014; 25:379–402.
11. Klompstra L, Jaarsma T, Strömberg A. Exergaming in older adults: A scoping review and implementation potential for patients with heart failure. *Eur J Cardiovasc Nurs* 2013; 13:388–398.
12. Peng W, Lin JH, Crouse J. Is playing exergames really exercising? A meta-analysis of energy expenditure in active video games. *Cyberpsychol Behav Soc Netw* 2011; 14: 681–688.
13. Plow M, McDaniel C, Linder S, Alberts J. A scoping review of exergaming for adults with systemic disabling conditions. *J Bioeng Biomed Sci* 2011; S1:1–11.
14. Kramer A, Dettmers C, Gruber M. Exergaming with additional postural demands improves balance and gait in patients with multiple sclerosis as much as conventional balance training and leadsto high adherence to home-based balance training. *Arch Phys Med Rehabil* 2014; 95:1803–1809.
15. Klompstra L, Jaarsma T, Stromberg A. Exergaming to increase the exercise capacity and daily physical activity in heart failure patients: A pilot study. *BMC Geriatr* 2014; 14: 119.

16. Plow M, Finlayson M. A qualitative study exploring the usability of Nintendo Wii Fit among persons with multiple sclerosis. *Occup Ther Int* 2014; 21:21–32.
17. Rosenberg D, Depp CA, Vahia IV, et al. Exergames for subsyndromal depression in older adults: A pilot study of a novel intervention. *Am J Geriatr Psych* 2010; 18:221–226.
18. Agmon M, Perry CK, Phelan E, et al. A pilot study of Wii Fit exergames to improve balance in older adults. *J Geriatr Phys Ther* 2011; 34:161–167.
19. Jaarsma T, Klompstra L, Ben Gal T, et al. Increasing exercise capacity and quality of life of patients with heart failure through Wii gaming: The rationale, design and methodology of the HF-Wii study; a multicentre randomized controlled trial. *Eur J Heart Fail* 2015; 17:743–748.
20. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs* 2008; 62:107–115.
21. Elliott R, Fischer CT, Rennie DL. Evolving guidelines for publication of qualitative research studies in psychology and related fields. *Br J Clin Psychol* 1999; 38:215–229.
22. Barbour KA, Miller NH. Adherence to exercise training in heart failure: A review. *Heart Fail Rev* 2008; 13:81–89.
23. Duncan K, Pozehl B. Effects of an exercise adherence intervention on outcomes in patients with heart failure. *Rehabil Nurs* 2003; 28:117–122.
24. Smeulders ES, van Haastregt JC, Ambergen T, et al. The impact of a self-management group programme on health behaviour and healthcare utilization among congestive heart failure patients. *Eur J Heart Fail* 2009; 11:609–616.
25. Brodie DA, Inoue A, Shaw DG. Motivational interviewing to change quality of life for people with chronic heart failure: A randomised controlled trial. *Int J Nurs Stud* 2008; 45:489–500.
26. Brodie DA, Inoue A. Motivational interviewing to promote physical activity for people with chronic heart failure. *J Adv Nurs* 2005; 50:518–527.
27. Du HY, Newton PJ, Zecchin R, et al. An intervention to promote physical activity and self-management in people with stable chronic heart failure The Home-Heart-Walk study: Study protocol for a randomized controlled trial. *Trials* 2011; 12:63.
28. Wollersheim D, Merkes M, Shields N, et al. Physical and psychosocial effects of Wii video game use among older women. *Int J Emerg Technol Soc* 2010; 8:85–98.
29. Saposnik G, Teasell R, Mamdani M, et al. Effectiveness of virtual reality using Wii gaming technology in stroke rehabilitation: A pilot randomized clinical trial and proof of principle. *Stroke* 2010; 41:1477–1484.

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