# Promoting Physical Activity for Elderly People: Towards a Hybrid Coaching?

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# Promoting Physical Activity for Elderly People: Towards a Hybrid Coaching?

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## Abstract

By using a qualitative method (focus group) with 42 seniors, this exploratory study is aiming to investigate attitudes and opinions of seniors about five types of trainers/coaches (self-training, human personal trainer, robot, virtual immersion, e-coach) to promote physical activity. Our results tend to confirm that a hybrid solution such as an E-coach (combining human appearance and digital dimensions) could be the most relevant and acceptable for elderly people to promote and maintain physical activity at home.

## Author Keywords

E-coach, Physical activity, Elderly people, Qualitative study, Attitudes.

## CSS Concepts

• **Human-centered computing~Human computer interaction (HCI)**; *Empirical studies in HCI; Interaction paradigms*:

## Introduction

By 2030, it is expected that the proportion of people aged 65 and over will raise from 17.4% to 25.6%. For some countries, this proportion will be more important: for instance, in Japan, by 2030, one in every three people will be 65 or older, and one in five people 75-plus years old; in France, by 2030, the share of the population aged 65 and older will increase steadily, to reach about 25% in 2030 and nearly 30% in 2050.

Whatever the country, population aging creates new challenges for the health care system, for both controlling costs and meeting new societal demands. Although it goes well beyond traditional health care reform, in France long-term care has emerged as one of the most crucial social policy issues. So, as people longer, maintaining cognitive and physical autonomy of older adults, and thus their independence, is a key challenge that all modern societies must face and succeed to ensure the economic and social wellbeing of the entire population. Although the positive effects of physical activity in health are well established, activity levels are decreasing with age. Elderly face cessation of physical activity as an inevitable consequence of aging [7].

In this context, both individual end-users (patients, elderly people, families) as well as the healthcare sector have become more and more interested to measure and promote health, wellness, and physical performance by using technologies such as robotics systems or Virtual Reality (VR). Indeed, the number of such technologies in the market has exploded, as their popularity and significance in both individual level and in healthcare has gradually risen.

One of the orientations concerns the use of E-coaching robotics systems because this kind of system combines human presence, a personalized companion and ease of use. According to Kari & Rinne [4], Muuraiskangas and his colleagues [5] and Kamali *et al.* [3], the main goals/advantages of an E-coach is to support behavior change and in doing so, it assumes different roles: (1) mentor, (2) friend, and (3) expert. These three complementary roles define the main characteristics that an e-coach should present: teaching the user new skills, providing a sense of companionship by establishing an effective relationship based on trust, and providing relevant and accurate information that the user asks for. Other fundamental characteristics for an e-coach are the ability to motivate the user to provide a personalized companion [2] [6].

Nevertheless, even if some recent states of the art of scientific literature are very interesting [3], it does not provide information about opinions and (positive and negative) attitudes of end-users. So our present exploratory study is aiming to investigate attitudes and opinions of seniors about five types of trainers/coaches (self-training, human personal trainer, robot, virtual immersion, e-coach) to promote physical activity.

## Method

For our study, we chose a qualitative approach based on focus groups conducted with 42 seniors to understand people, their sayings and behavior, as well as the cultural and social context they are living in, and is to find new knowledge and understand real life phenomena.

*Participants*

Forty-two French participants (21 women, 50%) enrolled in our study were volunteers to participate. Mean age is 72.5 years-old (range from 68 to 81 years-old). No participant has cognitive impairment and has no severe motor disabilities. Moreover, all participants live at home, and 81% (34/42) are married. All participants provided written informed consent at the beginning of the research.

*Procedure*

The procedure used in our qualitative study is based on focus group, with the same moderator. There are 7 groups (sessions), each session having 6 participants. Duration of each session is from 85 to 120 minutes. All sessions have been conducted in the same quiet room located in the campus of the university. A specific focus group guide has been composed (Table 1):
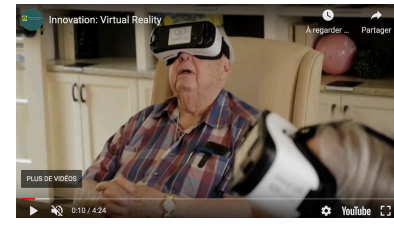
1. Introductory questions are addressed at the beginning of each session of focus group to collect general data about their attitudes and behaviors related to physical activity;
2. then, depth questions are addressed twice: (i) before to watch videos about different trainers/coaches (Figure 1); (ii) just after to watch these videos. Note that a Likert scale (from 1 to 7) is used inside the depth questions to assess the perceived *a priori* motivation to practice physical activity with each trainer/coach watched;
3. Closing questions are finally addressed.

*Videos used*

In each session of focus group, participants were asked to watch five videos, each video showing a specific type of coaching for physical. These videos, extracted from the Web, were counterbalanced for each focus group, were the following:

- Self-training: Video showing several examples of physical exercises performed by a single male https://www.virtual-personaltrainer.com/our-services/free-community-programs/elderly-program/; duration: 9'43 mn)
- Personal human coach: Video showing a group of elderly people with a human trainer/coach (retrieved from: https://www.youtube.com/watch?v=6DxbgvTSFr0; duration: 3'32 mn);
- Coach robot: Video showing a group of elderly people with a robotics system as trainer/coach (here, NAO©): https://www.notretemps.com/famille/dependance/nao-un-robot-de-compagnie-a-la-maison-de-retraite,i84474/; duration: 1'45 mn);
- VR coaching: https://healthtechmagazine.net/article/2020/12/how-launch-strong-vr-program-senior-care-perfcon; duration: 4'24 mn);
- E-coach: with this hybrid system (virtual coach and patient him/herself), the participants viewed the virtual coach through, and themselves in, a two-way mirror while the virtual coach led upper body exercises [1] (duration: 2'26 mn).

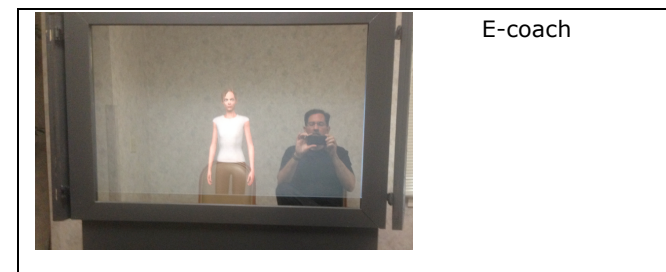| | |
|---|---|
|  | Self-training |
|  | Personal human trainer/coach |
|  | Robot as trainer/coach (here, NAO©) |
|  | VR system |



**Figure 1**: Screenshots of video used to conduct the focus groups.

*Focus group guide*

Because developing a focus group guide is essential to hone in on the research objectives, we created a specific guide to conduct our focus groups, as a general question-by-question outline used by a moderator (always the same moderator) who is thoroughly informed about the project. The moderator flexibly asks the questions while considering the dynamics of the group. Table 1 provides the focus group guide used in our study to assess the acceptability of various trainers/coaches to promote physical activity

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INTRODUCTORY QUESTIONS

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1. Let's start with a fun activity. I am going to ask each of you to fill in the two following sentences orally:
    a. When I want to practice physical activity, I …
    b. Three words to describe the person or the system who has helped me to practice physical activity are …
    c. How can we help you make changes in your physical activity?

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DEPTH QUESTIONS (BEFORE VIDEO VIEWING)

2. Thinking about your own physical activity, if we assigned someone to work with you - like a coach or a trainer - describe what type of person or system would be most helpful?
- PROBE: What specific things could s/he do that would be most helpful?
- PROBE: Do you know some digital tools for physical activity??
- PROBE: Should the trainer/coach be human or digital?
- What types of incentives would motivate people to GET involved in the program?
- Now, we will watch five videos about different systems of coaching. Please, watch them carefully.

DEPTH QUESTIONS (AFTER VIDEO VIEWING)

- PROBE: You watched different trainers and systems, human and robotics. What kind of system (human, robot) do you prefer for you?
- PROBE: What are the main advantages for each of these trainers/coaches?
- PROBE: What are the main limits for each of these trainers/coaches.
- PROBE: for each trainer/coach you watched, indicate if it could be motivating for you, from 1 ""strongly disagree"

to 7 "strongly agree".

CLOSING QUESTIONS

3. We have asked a lot of question of you. Now we want to turn the tables a bit. What questions do you have of us that are related to this program? Thank you to everyone who made an effort to be here today. With your comments we will be better able to design a coach/trainer that is relevant to you.

**Table 1**: Focus group guide.

## Main results

As Table 2 shows, E-coach is considered as the most motivating system, all the differences being significant with other trainers/coaches (ANOVA; $p<.001$). Moreover, self-exercise training is the less motivating solution according to our participants. The three other systems (VR, Personal coach, Robot) are assessed as equally motivating.

Analyses of verbalizations confirm that E-coach is the preferred system, evaluated as "funny", "the most personalized", "the most attractive", "original", "easy to use", "vey-well integrated in my home", "pleasant", "combining human and technology", and "convivial". Other trainers/coaches received more negative comments such as "[robot, personal coach, VR] is too complex", "not motivating", "strange", "no adapted to me", "[robot, VR] is funny but just for the first time", "I

would feel uneasy with [robot, personal coach]", "I would feel nervous in front of [robot, personal coach]", "I would like uncomfortable being with [robot]", and "[robot, personal coach, VR] is too restrictive".

Finally, data revealed that attitudes on the one hand, between VR and robot and on the other hand, between VR and personal coach are significantly and positively correlated. Future research is needed to investigate these relationships.

In other words, even if future investigations are needed, our exploratory study tends to confirm that a hybrid solution such as an E-coach (combining human appearance and digital dimensions) could be the most relevant and acceptable for elderly people to promote and maintain physical activity at home [7].

|  | Personal_coach | Self-Exercice | Robot | VR | E-Coach |
|---|---|---|---|---|---|
| N | 42 | 42 | 42 | 42 | 42 |
| Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | 3.14 | 1.57 | 3.83 | 3.48 | 6.00 |
| Median | 3.00 | 1.00 | 3.50 | 3.00 | 6.00 |
| Mode | 3.00 | 1.00 | 3.00 | 3.00 | 6.00 |
| Standard deviation | 0.872 | 0.703 | 1.23 | 1.11 | 0.988 |
| Minimum | 2 | 1 | 2 | 2 | 3 |
| Maximum | 5 | 3 | 6 | 6 | 7 |

**Table 2**: "how much each system motivates you to perform a physical exercise", from 1 ("strongly disagree") to 7 ("strongly agree").

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