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POSTER

Designing a Conversational Exercise Coach for Aging Adults: Engagement, Motivation, and Interaction

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Designing a Conversational Exercise Coach for Aging Adults: Engagement, Motivation, and Interaction

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Abstract

Exercise supports healthy aging, but motivation often declines with age, increasing demand on therapists and coaches. We present a conversational robotic exercise coach that promotes engagement and assesses motivation through dialogue. In a WoZ study with ten adults aged 59 and above, participants showed varied interaction styles; even those with low motivation rated sessions positively, suggesting such agents can enhance exercise enjoyment. We identify three design needs for autonomous coaches: rephrasing for clarity, conversation beyond exercise, and adaptable speech delivery.

CCS Concepts

• **Human-centered computing → User studies**.

Keywords

Older adults, Exercise, Motivation, Wizard of Oz, Social Robots

1 Introduction

Exercise promotes wellness and reduces risks such as falls for older adults [2, 10], but motivation declines with age [16]. Active older adults often prefer group activity, while less active individuals value personalized coaching [6, 19].

Growing aging populations and a shortage of physical therapists [5] highlight the need for robotic exercise coaches to provide consistent, personalized support aligned with older adults' goals of maintaining mobility and quality of life. We present a conversational robotic coach designed to engage older adults during physical activity[1]. We opted for a robot because embodiment increases engagement compared to virtual agents [1, 22]. Using a Wizard-of-Oz (WoZ) study, we explored how older adults interact with such a system, focusing on motivation, engagement, and design needs for autonomous agents. **Our contributions include evaluating engagement and acceptance of a robotic exercise coach, demonstrating how conversational interactions can serve as a measure of exercise motivation, and outlining design considerations for future systems tailored to older adults.**

2 Related Works

2.1 Robotic Systems for Exercise Support

Socially Assistive Robots (SARs) support users through social interaction in healthcare and aging care [8]. Embodiment is key: physical robots elicit more empathy and engagement than virtual agents [17, 21], and older adults prefer embodied coaches [7].

Robot coaches can improve performance through multimodal feedback [15]. Personalization further sustains motivation [11]. Studies with therapists stress that systems must adapt feedback to patient personality and lifestyle [23].

2.2 Robotic Systems for Aging Adults

Similarly, conversational robots in eldercare improved emotional wellbeing and encouraged personal interactions [14]. Exercise-focused systems such as NAO kept older adults engaged [9], and overall participants preferred embodied platforms [7, 13].

3 Method

We studied how older adults engage with a conversational robotic exercise coach using a WoZ system integrated with an existing robotic coach. Our focus was on conversational engagement.

3.1 Exercise Coach Design

We used the Quori robot [18] with an Orbbec Astra Mini and Mediapipe for real-time pose estimation. The Quori robot was developed and distributed by another research team [18], and it has been used

in prior work for similar purposes [12]. The robot tracked seated bicep curls and lateral raises and provided verbal and nonverbal feedback in either a *firm* or *encouraging* style.

3.2 Conversation System

Researchers triggered scripted or typed phrases, vocalized via Google TTS. Before the exercise session, the robot introduced itself, asked three motivation questions adapted from an existing scale (LCES [20]), and prompted participants to select a feedback style.

3.3 Procedure

We recruited $n = 10$ adults aged 59–94 (7F/3M), eight from a local assisted living facility and two from a university pool; most had no prior robot experience. Sessions were IRB-approved, and participants received $10.

Each participant completed two rounds of exercises, alternating between preferred and non-preferred styles. Pain ratings used the Wong-Baker scale [24], and perceptions were measured with RoSAS [4] and Godspeed items [3].

4 Results

We analyzed transcripts and surveys to assess participants' engagement and motivation. One participant was excluded because of communication difficulties.

4.1 Engagement

Three engagement types emerged: *answer* (direct responses), *confusion* (requests for clarification), and *social* (thanks, jokes, personal remarks). Most participants gave short replies such as "good" or "fine." On average, they answered 19 of 23 robot questions, though some responded nonverbally (e.g., nodding to indicate pain levels).

Confusion-related engagement was less frequent but common among those with hearing difficulties, leading to phrases like "What?" or "I can't understand" and occasional requests to repeat instructions. Assisted living participants tended to direct confusion toward researchers, while university participants spoke more to the robot.

Social engagement was rare but often began early and persisted, including thanks ("Okay," "Thank you") and playful remarks ("Pretty good for 94," "If I get too fast, I fly"). Some also shared personal stories. Social engagement varied widely—one participant joked 12 times, while others gave only short answers. Coaching style preference did not appear to influence these patterns.

4.2 Exercise Motivation

LCES scores varied widely. Several participants verbally claimed they exercised by choice, but their survey scores suggested they felt obligated. Despite this discrepancy, even participants with lower motivation scores rated the robot positively and often engaged socially, suggesting embodied coaches can enhance enjoyment regardless of baseline motivation.

4.3 Themes

Two themes emerged: (1) **Low motivation, high ratings**: participants with low LCES scores still rated the robot highly and engaged socially. (2) **Initial confusion, later enjoyment**: participants who struggled early often reported satisfaction later.

5 Discussion

Our analysis revealed three engagement types: most responses were short answers to robot prompts, confusion often arose due to hearing or speech clarity, and some participants engaged socially by thanking the robot or making jokes. Social engagement was rare but tended to emerge early in the session and continue throughout. Notably, engagement did not differ across feedback style conditions.

We also found discrepancies between verbal motivation and LCES scores: some participants stated they exercised by choice but scored low on self-reported motivation. Importantly, even participants with low motivation rated the robot positively and engaged socially, suggesting that robotic coaches can enhance the exercise experience regardless of baseline motivation. Others who initially expressed confusion later reported enjoyment, highlighting the potential for positive outcomes despite early difficulties.

5.1 Design Considerations

From these findings, we identify three design needs for autonomous exercise coaches tailored to older adults. First, systems should include a **rephrasing ability** that allows dialogue to be simplified or reworded when participants express confusion. Second, coaches should support **conversation beyond exercise**, responding to jokes or personal remarks to foster rapport and sustained engagement. Finally, they must offer **speech adaptability**, with adjustable speed, pauses, volume, and clarity, and ideally multimodal support such as captions for accessibility.

These considerations emphasize the importance of adaptable, accessible, and socially responsive design in robotic exercise coaches for aging populations.

6 Conclusion

We presented a conversational robotic exercise coach designed to support older adults' motivation and engagement during physical activity. In a user study with ten participants, we observed diverse interaction styles: some responded minimally, while others engaged socially or shared personal stories. Notably, participants with low baseline motivation still rated the robot positively and reported enjoying the sessions, suggesting that embodied conversational agents can enhance exercise experiences for aging adults.

Our findings highlight three design needs for autonomous exercise coaches: the ability to rephrase for clarity, support for conversation beyond exercise, and adaptable speech delivery. Addressing these factors can help ensure more natural, accessible, and engaging interactions. Future work will focus on moving from WoZ to autonomous systems and examining the impact of long-term exposure to better understand sustained engagement.

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