

# Using socially assistive robots for monitoring and preventing physical frailty among older adults: A study on usability and user experience.

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## Backgrounds.

Physical Frailty&Sarcopenia, PF&S, (Del Signore, Roubenoff, 2017) represents an underestimated health risk among older adults leading to increased morbidity (including falls/injurious falls) and mobility disability. Socially assistive robots have the potential to play a meaningful role in assessing and monitoring over time the grade of physical frailty of older adults. As a preliminary step, proper usability and a positive user experience need to be ensured.

## Objectives

In this study, we tested the usability and user experience toward a socially assistive robot (the NAO humanoid robot) as an innovative method 1) to administer questionnaires to frail older adults and 2) to engage them in repeating a sequence of standardised physical exercises.

## Methods.

Participants after giving their informed consent were asked to complete the SARC-F questionnaire and subsequently to execute physical training tasks, first administered by the NAO robot, and a second time provided by a Tablet PC application (as a reference technology). After using each technology, they completed the System Usability Scale for usability, and a set of rating scales for perceived usefulness, enjoyment, and control. Finally, we questioned the participants' preference for one of the technologies. All interactions were recorded on video and scrutinized for usability issues.

## Results.

Twenty non-disabled, non-demented older adults (age≥70 years) accepted to participate. They awarded to both technologies 'average' usability scores. Perceived usefulness and enjoyment were rated as very positive for both modalities; control was also scored positively. Main usability issues for the robot tasks were related to speech interaction (e.g., NAO's limited speech library, NAO's difficulty to cope with some Dutch dialects) and more in general, with older adults' difficulties with taking their proper role in a human-robot interaction. Only seven participants preferred NAO: it was easier to use and more personal.

## Conclusion.

Social robots have the potential to monitor and train frail older adults in adapted programs. However some key usability challenges need to be addressed, some only requiring a technical adaptation, other concerning the human expectation vis a vis of a robot, none appears critical. As a next step, longitudinal studies in homogenous populations suffering from Physical Frailty&Sarcopenia should determine if Patient Reported Outcomes administered and recorded via a social robot can be considered a suitable endpoint for clinical trials.