Identifying Motivational Factors in Robot-Based Assist-As-Needed Rehabilitation

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INTRODUCTION: Globally, 2.41 billion people can benefit from rehabilitation due to various injuries or diseases (WHO, 2019). Traditional rehabilitation relies on techniques that are physiological in nature (e.g., assisted stretching, tasks of everyday living; Langhorne, 2011). These exercises target physical needs but don't always mentally engage or motivate the patient fully in their rehabilitation.

PURPOSE: It is important to understand the relationship between physical and mental factors as they relate to robot-based, assist-as-needed rehabilitation. This study was designed to determine how person based and task-based characteristics affected participants' performance or their judgements of difficulty (JODs) about the exercises.

METHODS: Ten participants completed a 55-minute experiment in which they performed three tasks of daily living. The participants completed 8 sets of 5 repetitions of each task in a random order. After each of the 5 reps, the difficulty of the task was manipulated. Each level of difficulty was completed twice for each task.

RESULTS: The results of the study indicated that participants' JODs did not affect their effort allocation decisions in relation to task engagement. On a metacognitive level, participants' JODs were most affected by the task's difficulty. To a lesser extent, JODs were also informed by performance-based feedback, which included task accuracy and physical effort.

CONCLUSION: This pilot data indicates that JODs and task engagement decisions are distinct, but related constructs that are present during rehabilitation. Furthermore, the results present an introductory framework for understanding human engagement with assist-as-needed devices, particularly in the development of assist-as-needed exoskeletons.