

Impact of physical therapy on reducing mobility issues and pain in long-term care patients: findings from the ICARE4OLD project

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Introduction and Aim

Physical therapy (PT) plays a crucial role in improving the general well-being of older adults residing in nursing homes (NHs) by enhancing their functional abilities and overall quality of life. Through targeted exercise and therapeutic interventions, PT helps residents maintain and improve their strength, balance, and mobility, which are essential for performing daily activities independently. By addressing physical limitations, PT not only reduces the risk of falls but also helps to control symptoms of some chronic conditions.

The aim of this work is to assess the impact of physical therapy on reducing mobility issues and pain in long-term care patients, with a focus on difficulty turning around and presence of pain.

Methods

Data were collected using version 9.0 of the interRAI assessment tools as part of routine evaluations in nursing homes (NHs). These tools include 200 to 400 standardized variables covering clinical, functional, medical, and psychosocial domains. The measured **outcomes** included the presence of **difficulty turning and pain within the past three days** (coded as 0 if absent and 1 if present). The **treatment group** comprised patients who received PT at two time points between the 80th and 200th day, with a minimum of 45 minutes of therapy during the week preceding the baseline assessment. The **control group** included individuals who did not receive therapy either at baseline or during the follow-up period.

Models were developed using data from the Netherlands (n = 41,610) and Belgium (n = 34,832) collected between 2005 and 2023. **Logistic regression analyses** were conducted separately for the treatment and control groups to evaluate the effect of physical therapy (PT). Subsequently, the **Average Treatment Effect (ATE)** was calculated by comparing outcomes between the treatment and control groups. ATE values **below 0 indicate a positive effect of PT** in reducing mobility problems and pain, while values above 0 suggest a negative effect. Model performance was assessed using the receiver operating characteristic (ROC) curve and accuracy (ACC). **Propensity score matching** was employed to pair each patient in the treatment group with a counterpart from the control group based on outcomes. The study sample was divided into a **training set (70%)** and a **testing set (30%)**.

Results

We assessed the impact of PT using the Average Treatment Effect (ATE), which measures the difference in outcome changes between treatment and control groups from baseline to follow-up.

For both difficulty turning around and the presence of pain, we found a **positive effect of therapy** (in both cases, the ATE was below 0). Although the baseline prevalence of these problems was similar in both groups, their frequency decreased in the treatment group at follow-up—by 15% for difficulty turning around and by 17% for pain.

The goodness of fit of the models was acceptable for difficulty turning around and lower for pain, as the ROC and ACC values were below 0.7 (Table 2 and Figures 1 and 2).

Table 2. The effect of physical therapy on the occurrence of problems with turning around and pain, training data set (n=221)

| Outcome | Time of observation (a) and intensity of PT (b) | n | ATE (95%CI) | ROC | ACC |
|------------------------------------------|-------------------------------------------------|-----|---------------------------|------------|------------|
| Difficulty turning around in last 3 days | (a) 80-200 days | 441 | -0.15 [-0.21 to -0.09] | Control: | Control: |
| | (b) 45 minutes of PT in last week | | | 0.75 | 0.77 |
| Present of pain in last 3 days | (a) 80-200 days | 441 | -0.17 [-0.24 to -0.09] | Control: | Control: |
| | (b) 45 minutes of PT in last week | | | 0.60 | 0.70 |
| | | | | Treatment: | Treatment: |
| | | | | 0.71 | 0.72 |
| | | | | 0.62 | 0.66 |

Table 1. Basic characteristics of the training data set used in the analysis of difficulty turning around, after propensity score matching

| Characteristic | Treatment group (n=221) | Control group (n=221) |
|--------------------------|-------------------------|-----------------------|
| Difficulty turning, yes | 110 (50%) | 110 (50%) |
| Gender, female | 154 (71%) | 175 (79%) |
| Age | | |
| 60-79 | 48 (22%) | 37 (17%) |
| 80-89 | 112 (51%) | 108 (49%) |
| 90 and more | 61 (28%) | 76 (34%) |
| Unsteady gait, yes | 106 (48%) | 109 (49%) |
| Dizziness, yes | 42 (19%) | 64 (29%) |
| ADL dependency | | |
| no (0-1) | 28 (13%) | 88 (40%) |
| moderate (2-3) | 117 (53%) | 99 (45%) |
| severe (4-6) | 76 (34%) | 34 (15%) |
| Hemiplegia, yes | 31 (14%) | 6 (3%) |
| Parkinson's disease, yes | 23 (10%) | 4 (2%) |

Figure 1. The effect of physical therapy on the occurrence of problems with turning around, training data set (n=442)

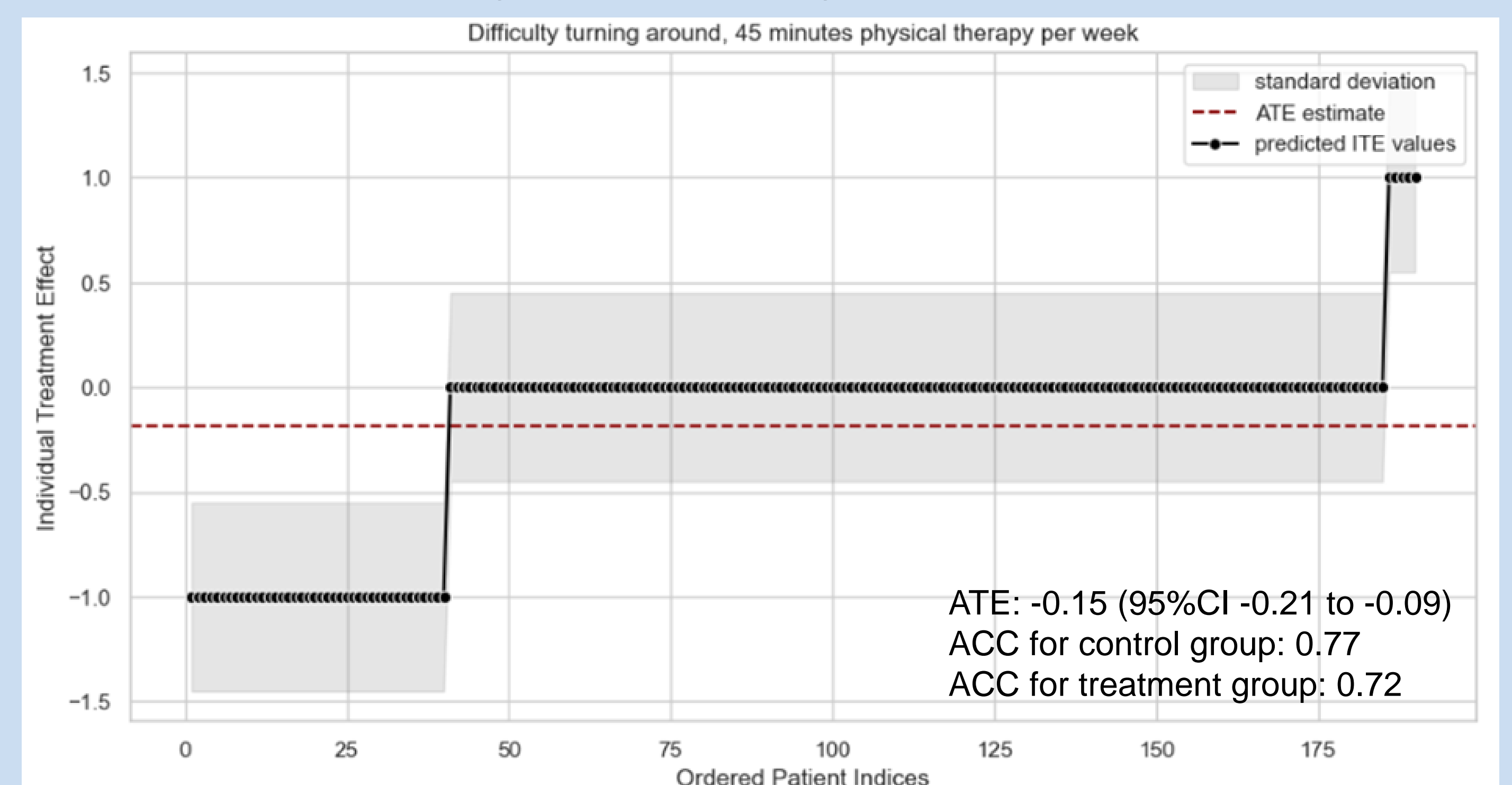
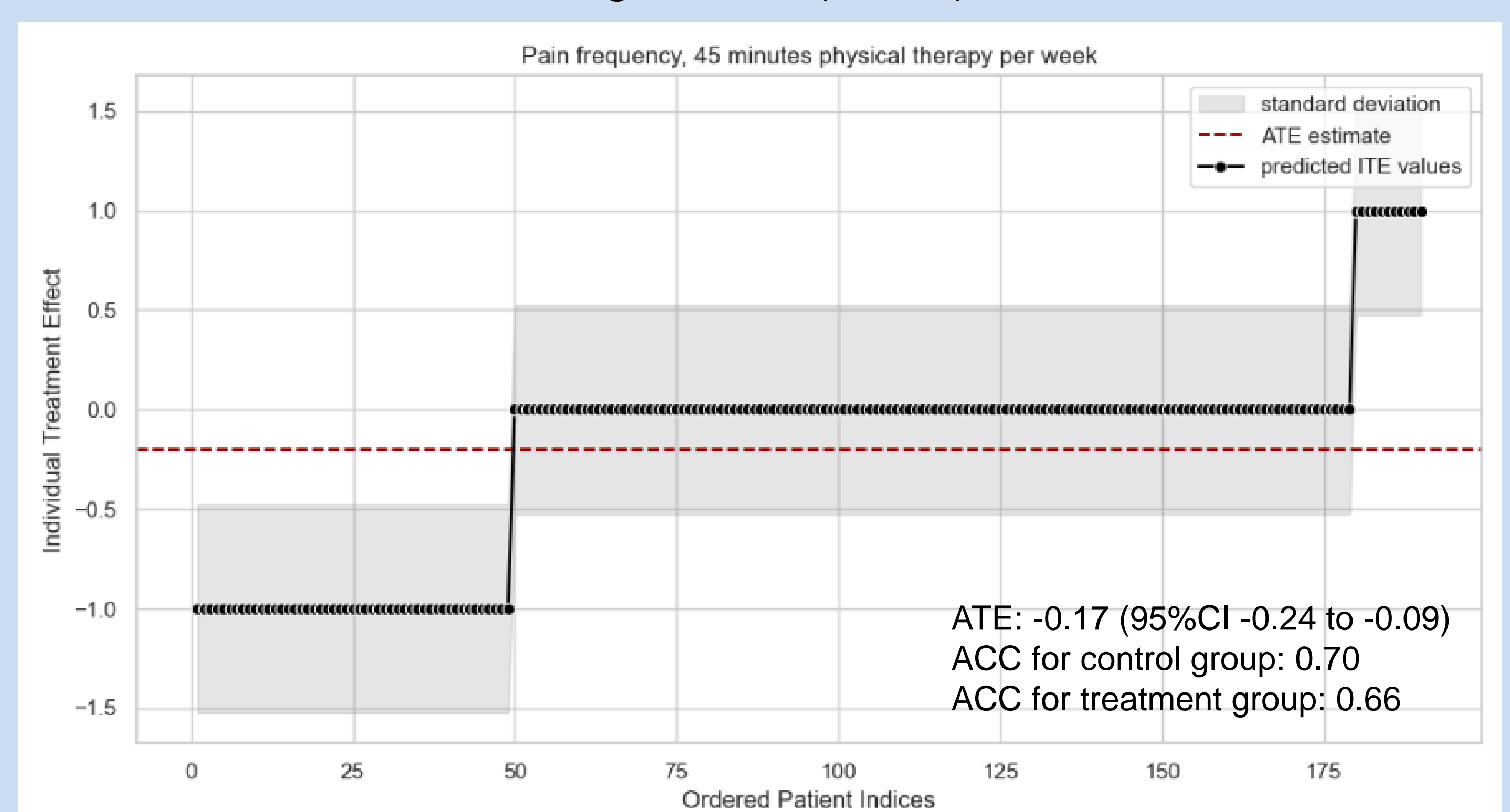


Figure 2. The effect of physical therapy on the occurrence of pain, training data set (n=442)



Conclusion

Preliminary results suggest that physical therapy may positively impact the reduction of mobility issues and pain in long-term care patients, specifically addressing difficulty turning around, difficulty standing, locomotion, and pain. These are the first analyses of real-world data (RWD) of this type, which need to be confirmed in other databases to ensure consistency across different populations, settings, and countries.