

Does the Butterfly Test Aid in Predicting Self-Perceived Disability in Patients with Neck Pain?

Juan Gonzalez PT, DPT; Chelsea Miller PT, DPT; Claudia Hernandez; Gabriel Gonzalez PT, DPT; Cindy Bailon Perez, BA; Jessica Bolanos PT, DPT; Teresa Glynn PT, DPT; Marlon Wong PT, PhD

University of Miami, Miller School of Medicine, Department of Physical Therapy. Miami, FL, USA

BACKGROUND:

The cranio-cervical flexion (CCFT) and neck flexor muscle endurance tests are currently the only tests that are widely recommended for assessing movement coordination impairments in people with neck pain. These tests consist solely of uniplanar motions performed in the non-functional supine position, and performance on these tests are only weakly associated with disability. Thus, there is a need for more robust functional movement evaluation tools that can better define movement coordination impairment associated with pain and disability. **The aim of this study was to investigate the clinical utility of the Butterfly test (FLY)**, performed with the Neckcare™ system (Neckcare Inc., Iceland). The FLY is a tri-planar test that requires patients to manipulate a cursor on a screen using head and neck motions.

METHODS:

Twenty-four patients seeking physical therapy for neck pain at an outpatient clinic were consecutively recruited. The Neck Disability Index (NDI), Pain Catastrophizing Scale, numeric pain rating scale, CCFT, and FLY test were completed at the time of initial physical therapy examination. The CCFT was conducted using the Stabilizer Pressure Biofeedback (Chattanooga, TX). For the FLY, participants were fitted with the Neckcare headgear device and provided with warm up and practice trials prior to completion of 3 assessments at varying levels of difficulty: easy, medium, and difficult.

RESULTS:

The CCFT was not significantly correlated with performance on the FLY tests at any level of FLY difficulty (r values between -0.160 and 0.150, $p > .05$). **NDI scores were significantly ($p < 0.05$) and inversely correlated with FLY scores for easy ($r = -0.42$), medium ($r = -0.41$), and difficult ($r = -0.36$) levels (figures 1 – 3).** It is known that perceived neck disability is influenced by many factors, so linear regression analysis was performed to examine the utility of combining FLY test scores with current pain intensity, Pain Catastrophizing Scale score, and CCFT to predict baseline NDI scores. The model was significant with an R^2 value of 0.53, $p = 0.001$.

CONCLUSIONS:

The lack of correlation between the CCFT and FLY suggests that the FLY may add novel and complementary information to the CCFT. Interestingly, the FLY, but not the CCFT, was correlated with NDI scores suggesting that the FLY may be more useful than the CCFT for understanding underlying neck coordination impairments that are contributing to perceived disability. These findings may allow for better targeting of exercise interventions to improve neck pain and disability.

RELEVANCE FOR PATIENT CARE:

Since most people experience functional impairments associated with neck pain when in upright positions, **the FLY test may provide a valuable tool for assessing movement coordination impairments in salient postures.** The data provided by the FLY test may improve our understanding of neck pain with movement coordination impairments and help to develop more personalized treatment approaches.

Correlation Between Neck Disability Index (NDI) Total Impairment Scores and Butterfly (FLY) Percent Accuracy On Target (Easy)

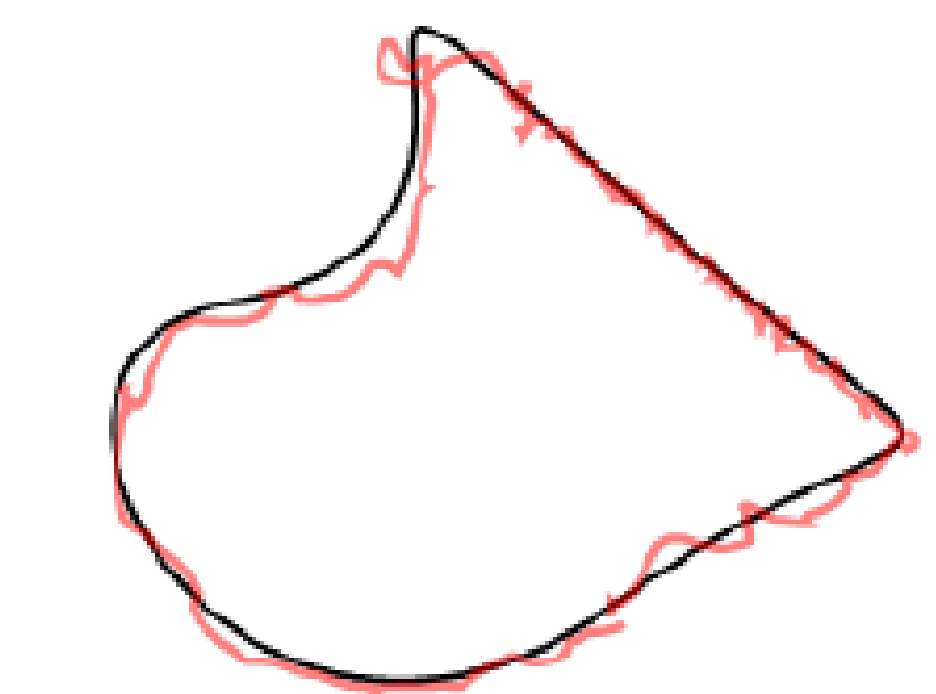
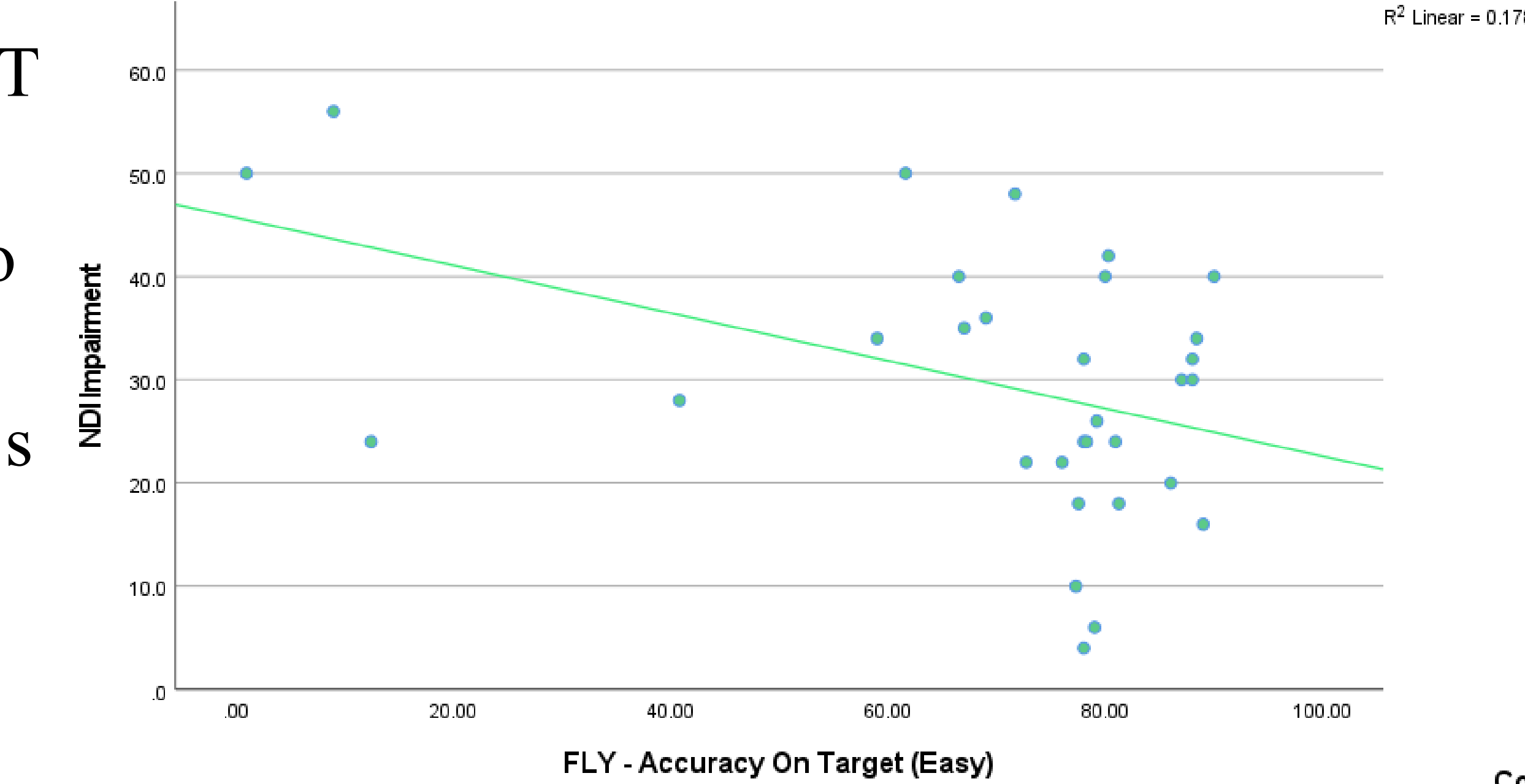


Figure 1. FLY (Easy)

Correlation Between Neck Disability Index (NDI) Total Impairment Scores and Butterfly (FLY) Percent Accuracy On Target (Medium)

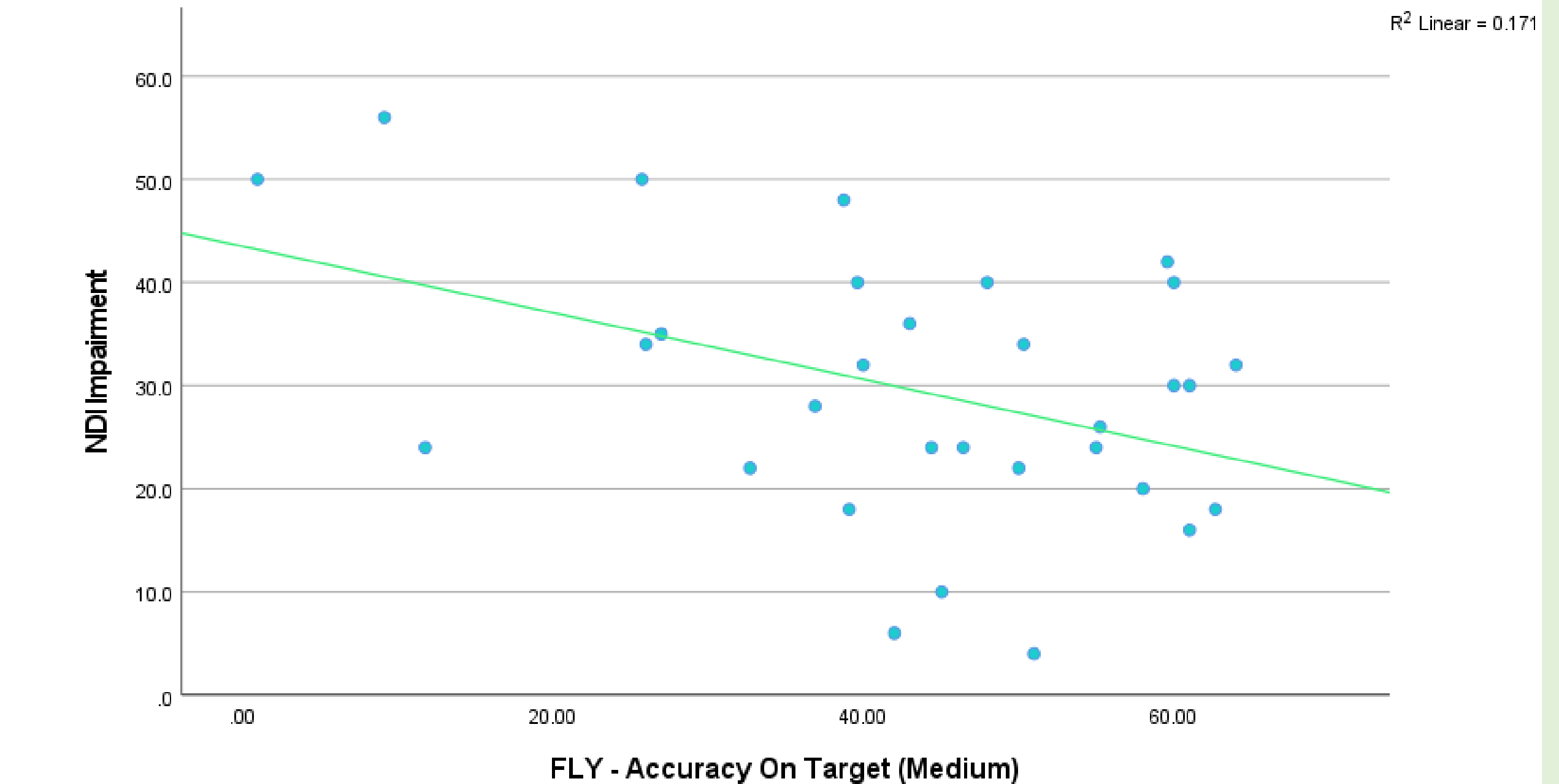


Figure 2. FLY (Medium)

Correlation Between Neck Disability Index (NDI) Total Impairment Score and Butterfly (FLY) Percent Accuracy On Target (Difficult)

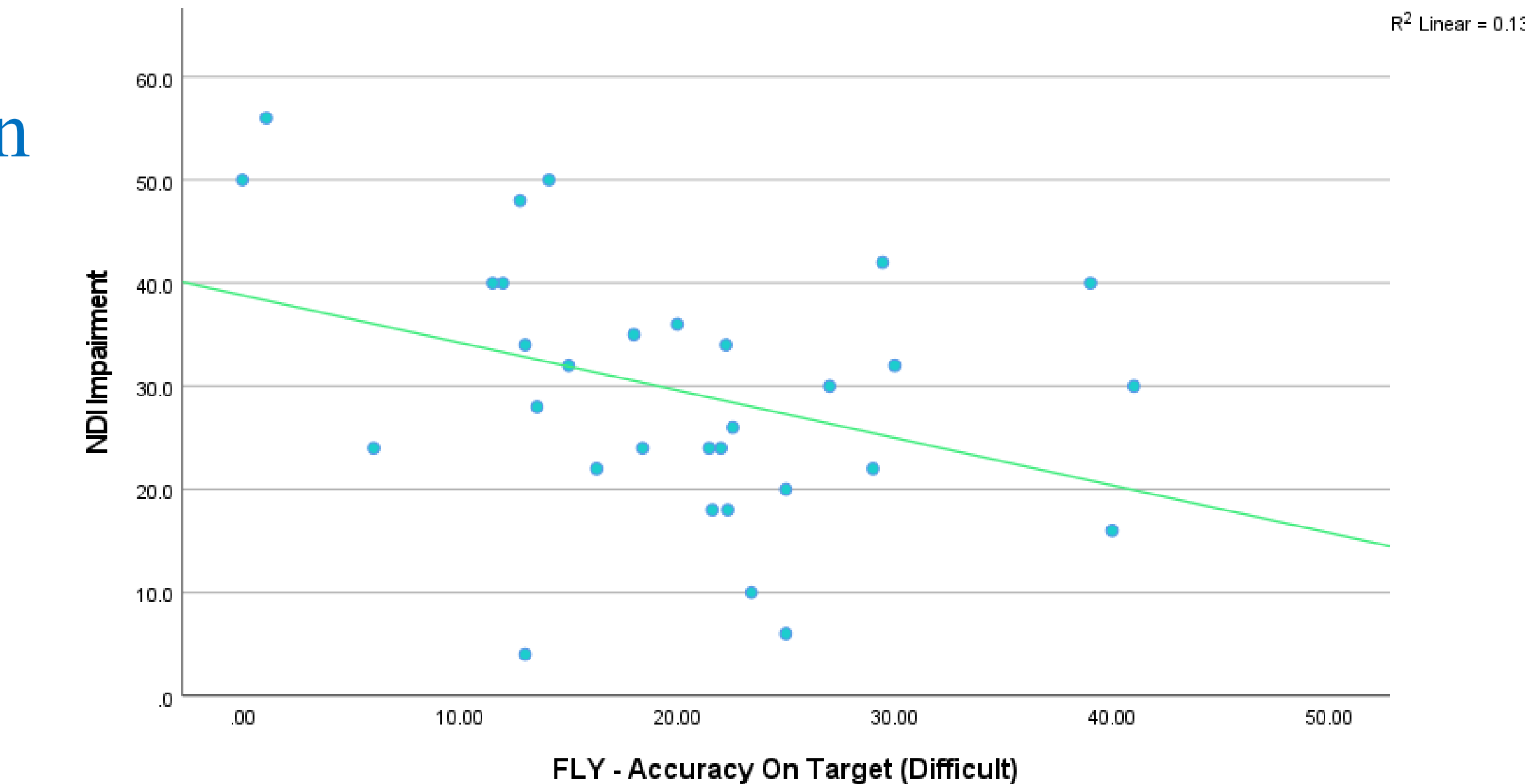


Figure 3. FLY (Hard)