2023

A cross-sectional cohort of the healthy older adult population's ability with left right judgment task

Cody Jay Davis SPT
University of South Dakota, Cody.J.Davis@coyotes.usd.edu

Aleesha Kristine Kreutzfeldt SPT
University of South Dakota, Aleesha.alverson@coyotes.usd.edu

Ali A. Kuca SPT
University of South Dakota, Ali.kuca@coyotes.usd.edu

Whitney Anne Smith SPT
University of South Dakota, Whitney.smith@coyotes.usd.edu

Bailey Marie Volmer SPT
University of South Dakota, Bailey.volmer@coyotes.usd.edu

A cross-sectional cohort of the healthy older adult population's ability with left right judgement task

Cody Davis, SPT; Aleesha Kreutzfeldt, SPT; Ali Kuca, SPT; Whitney Smith, SPT; Bailey Volmer, SPT
Faculty Research Advisor: Dr. Kory Zimney, PT, DPT, Ph.D.

Study Design

Cross-sectional cohort study

Purpose

The purpose of the study was to determine left/right judgement task (LRJT) norms for healthy older adults. Secondary analysis looked at differences between age groups to see if there was a difference with aging. Lastly, fitness, grip strength, and hand dominance were explored as potential covariates to outcomes in LRJT.

Background

- Chronic pain is associated with alterations in an individual's body schema, affecting one's ability to perform motor imagery.
- The LRJT is the most common measure of motor imagery.
- Previous research suggests that individuals with chronic pain have decreased accuracy and increased reaction time on the LRJT.
- Norms need to be established for specific age groups.

Inclusion and Exclusion Criteria

- Inclusion
  - Adults > 50 years old
- Exclusion
  - History of mental illness
  - Left Right Judgement confusion
  - Dyslexia
  - Stroke
  - Significant pain complaints for which they were receiving medical care
  - Visual impairment that impairs reading or seeing objects that's not corrected

Subject Recruitment

Older adults from a senior community center in Vermillion, SD. There were 24 participants aged 55-92 years old.

Characteristics	Participants (n=24)
Age, mean, (years)	80.2 ± 8.9
Gender, n (%)	
Female	17 (70.8)
Male	7 (29.2)

Methods

Each participant completed the following:

- Informed consent
- Demographic information
  - Age, gender, race
- Fitness history questions
  - Number of days participating in purposeful exercise
  - Cardiovascular and strength training exercise minutes
- Hand dominance
  - Edinburgh Handedness Inventory
- Grip strength (kg)
  - Hand-held dynamometer
  - 3 trials x each hand
  - Arm at side, elbow 90 degrees of flexion
- LRJT
  - Recognise™ app for hands
  - 40 image practice session
  - Minimum of 2 additional sessions consisting of 40 images each

Data Analysis

IBM SPSS Statistics for Windows, version 24.0

- Alpha .05
- Descriptive statistics
- Pearson correlation
- One-way ANOVA
- Levene's test for homogeneity of variance and Bonferroni post hoc correlation

Results

Left Right Judgment Task Performance for Participants

	All participants (n = 24)	50-59 age group (n = 1)	60-69 age group (n = 2)	70-79 age group (n = 7)	80+ age group (n = 14)
Accuracy L, mean, (%)	66.46±15.41	70.00±0.00	82.50±0.00	64.64±14.46	64.82±16.68
Accuracy R, mean, (%)	67.40±14.79	50.00±0.00	77.50±3.55	68.93±16.57	66.43±14.77
RT L, mean, (sec)	2.33±0.52	3.15±0.00	2.70±0.64	2.21±0.45	2.28±0.51
RT R, mean, (sec)	2.24±0.48	2.30±0.00	2.13±0.46	2.38±0.31	2.19±0.58

- Speed/accuracy trade-off was found (r = -.483, p = .017). When participants were faster, they were less accurate
- No correlations were found between amount of exercise, handedness, and grip strength with accuracy and reaction time.
- No significant difference between age groups for reaction time and accuracy.

Limitations

- Small sample size with each age group not represented equally.
- Participants used different methods to complete the LRJT.
- Exercise performed each week was self reported which could result in errors in recall which limits the ability to know how much exercise impacted the LRJT.

Discussion

- Slightly slower reaction times were found but did not reach significant levels.
- There was clinically meaningful differences with lower accuracy scores when compared to previous norms.
- Comparisons of results of this study to previous research looking into LRJT of Senior Athletes demonstrates that these community dwelling older adults performed slower and with less accuracy. These results may suggest that exercise has an influence on LRJT.

Clinical Relevance

- The study showed that elderly individuals may present with delay in LRJT of hands, which has not been previously measured.
- Concerns with speed and accuracy trade-off with this population may be a problem during clinical use that has not been found with other age groups.

References

1. Zelaya CE, Dahlhamer JM, Lucas JW, Connor EM. Chronic pain and high-impact chronic pain among U.S. adults, 2019. Centers for Disease Control and Prevention. https://www.cdc.gov/nchs/products/databriefs/db390.htm. Published November 4, 2020. Accessed July 22, 2021.
2. Cleveland Clinic. Acute pain vs. chronic pain. Cleveland Clinic. https://my.clevelandclinic.org/health/articles/12051-acute-vs-chronic-pain. Published December 8, 2020. Accessed July 22, 2021.
3. Schwoebel J, Friedman R, Duda N, Coslett HB. Pain and the body schema: Evidence for peripheral effects on mental representations of movement. *Brain*. 2001;124:2098-2104.
4. Pelletier R, Bourbonnais D, Higgins J, Mireault M, Danino MA, Harris PG. Left Right Judgement Task and Sensory, Motor, and Cognitive Assessment in Participants with Wrist/Hand Pain. *Rehabilitation research and practice*. 2018 Aug;2018:1-13.
5. Saimpont A, Pozzo T, Papaxanthis C. Aging affects the mental rotation of left and right hands. *PLoS One*. 2009;4(8):e6714. doi:10.1371/journal.pone.0006714
6. Wallwork S, Butler D, Fulton I, Stewart H, Darmawan I, Moseley G. Left/right neck rotation judgments are affected by age, gender, handedness and image rotation. *Man Ther*. 2013 Jun;18(3):225-30. doi: 10.1016/j.math.2012.10.006
7. Breckenridge JD, Ginn KA, Wallwork SB, McAuley JH. Do People With Chronic Musculoskeletal Pain Have Impaired Motor Imagery? A Meta-analytical Systematic Review of the Left/Right Judgment Task. *The Journal of Pain*. 2019;20(2):119-132.
8. McMeekan ER, Lishman WA. Retest reliabilities and interrelationship of the Annett hand preference questionnaire and the Edinburgh handedness inventory. *British Journal of Psychology*. 1975;66(1): 53-59.
9. Zimney KJ, Wassinger CA, Goranson J, Kingsbury T, Kuhn T, Morgan S. The reliability of card-based and tablet-based left/right judgment measurements. *Musculoskeletal science & practice*. 2018;33:105-109.
10. Moseley GL, Butler DS, Beames TB, Giles TJ. *The graded motor imagery handbook*. Noigroup publications; 2012
11. Site designed and developed by bka interactive ltd A. Recognise hand app review: Health navigator NZ. Health Navigator New Zealand. https://www.healthnavigator.org.nz/apps/r/recognise-hand-app/. Accessed June 30, 2022.

UNIVERSITY OF SOUTH DAKOTA