HANDFULS: Hand Accumulation and Dexterity Functional Limits – Shriners Normal Hand Function Study

Ana G. Starcevich M.S.[1]; Ingrid Parry, D.P.T. Michelle A. James, M.D.[2]
University of California Davis School of Medicine, Sacramento, CA[1] ; Shriners Children's– Northern California, Sacramento, CA[2]

INTRODUCTION

- Clinicians routinely measure hand function in patients following hand injury or surgery.
- Hand function is assessed through patient-reported outcome measures (PROMs) or clinical tests and measurements of grip strength, dexterity, and range of motion.[1,2]
- Several available tests measure these components of hand function; however, few tests comprehensively measure in-hand collection and manipulation and hand volume.[3]
- For this reason, we developed a novel test to assess hand volume and in-hand collection and manipulation using marbles

OBJECTIVES

1. Collect normative values for a novel hand function test
2. Identify factors correlated to test outcomes
3. Disseminate the test to medical community for clinical use

METHODS

- 170 children aged 48 months to 20 years were recruited from Shriners Children's Northern California waiting areas, cafeteria, and clinics; the community of Ukiah, CA; two pre-schools in Sacramento County
- Participants performed the HANDFULS tests with each hand and hand measurements were taken
- Descriptive statistics were used to evaluate population characteristics, grip and pinch strength, and hand anthropometrics.
- Normative scores were established using means and standard deviations stratified by age group. Values were developed separately for dominant and non-dominant hands.
- ANOVA was used to compare HANDFULS scores among age groups

RESULTS

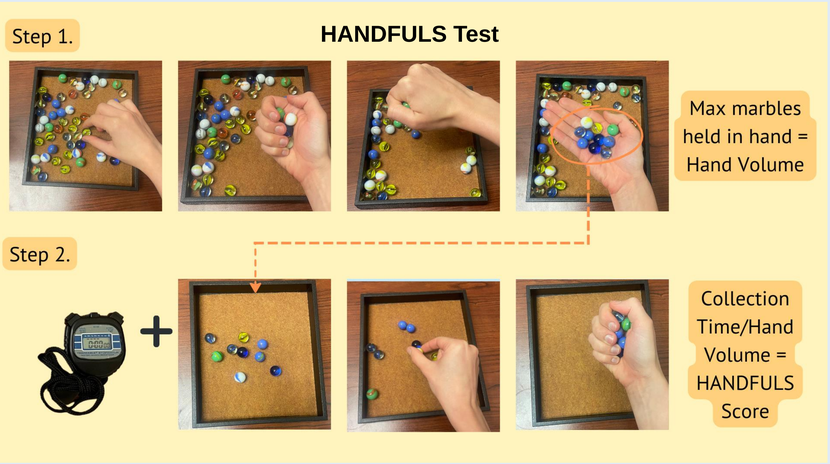
HANDFULS scores were significantly different between age groups when the test was done with the dominant hand ($p=0.01$).

Differences with the non-dominant hand were not significant ($p=0.20$)

	Age Group					
	48-59 mo.	5-6 years	7-9 years	10-12 years	13-15 years	16-20 years
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Max. number of marbles	4.54 (0.72)	5.78 (1.53)	8.35 (2.21)	11.13 (2.2)	11.94 (3.03)	12.93 (3.55)
Marble collection time (s)						
Dominant hand	7.34 (3.73)	7.82 (3.57)	14.87 (12.75)	13.95 (4.63)	22.18 (4.43)	15.29 (6.61)
Non-dom. hand	6.81 (3.50)	8.87 (5.20)	12.23 (4.58)	15.41 (5.44)	14.78 (6.08)	16.97 (8.86)
HANDFULS score						
Dominant hand	1.45 (0.61)	1.28 (0.39)	1.44 (0.41)	1.21 (0.27)	1.15 (0.33)	1.14 (0.37)
Non-dom. hand	1.53 (0.65)	1.44 (0.54)	1.48 (0.39)	1.37 (0.32)	1.25 (0.3)	1.3 (0.47)

Benefits of HANDFULS:

- Does not require specialized equipment
- Can be used in low-resource settings
- Captures in hand collection *and* manipulation



DISCUSSION

- The HANDFULS test is feasible to administer to children aged 4 to 20.
- Like prior research,[4,5] we found measures of hand dexterity to be significantly different between age groups.

Limitations:

- The inter-rater reliability of this test has yet to be established for this novel test.
- We were not able to recruit the desired number of participants in the 48-59 months age group.
- Although we collected data on subject hand anthropometrics, gender, and body size, we did not perform the analysis examining those relationships within our study population. The next steps for this study will be to perform more in-depth statistical analysis evaluating the relationship between HANDFULS scores and subject characteristics.

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