improvements relative to stage 4. Additionally, percent change in pain scores for clients with stage 1 Eaton OA were significantly larger than in those with stages 2, 3, and 4.

**Conclusion:**

- This study builds on early research on the same dataset. Data became available for analysis of predictive factors, including CMC OA staging.
- Findings suggest that clients may need to be referred early in the arthritic process. Those who have pain syndromes, metabolic conditions, involvement of their dominant hand, and bilateral involvement might not respond as favorably.
- Results suggest that orthosis type, treatment frequency, and concurrent cortisone injections did not appear to influence these outcomes however the small sample size warrants that these findings be handled with caution.
- Low level of evidence (Level IV) to support the effectiveness of this intervention approach.

**Limitations:**

- QuickDASH may not be sensitive to changes in disability in persons with CMC arthritis.
- Small sample size and retrospective design.
- Missing OA staging data.

**Future Research:**

- Investigate how this intervention approach can be standardized, for prospective studies.
- Fine tune guidance for clinical decision making in this approach, since it must be individualized.
- Other tools might better detect change in this population/ approach (e.g., TDX, MHQ, PRWHE, AUSCAN).



Figure 1a: Dynamic Stability Phase 1

Figure 1b: Dynamic Stability Phase 2

Figure 1c: Dynamic Stability Phase 3

Predictors of QuickDash Scores

Predictors of Percent Change in Pain NRS

Figure 1d: Standardized Regression Coeffecients for Predictors of Responseness to Dynamic Stability Approach: QuickDASH

Figure 1e: Standardized Regression Coeffecients for Predictors of Responseness to Dynamic Stability Approach: Pain NRS Percent Change

**4**

**Patient and Student Outcomes of a Student Experiential Learning Clinic for Hand Therapy**

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**Purpose:** Student pro bono clinics (SPBC) provide access for thousands of individuals who are uninsured or underinsured. SPBC demonstrate positive outcomes for patients and students. The Student Experiential Learning Clinic for Hand Therapy (SELC-HT) is a newly formed SPBC that provides Occupational Therapy (OT) to patients with hand and upper extremity conditions who receive free medical care at a major urban medical center. This study presents how participation in the SELC-HT positively influences patients' ability to live their daily lives and students' preparation for clinical practice.

**Methods:** Students elect to participate in the SELC-HT over the course of several semesters and receive advanced training in hand therapy (HT) before treating patients. Student clinicians deliver HT services to patients under supervision of licensed clinicians and through peer mentorship from third year students who have completed a HT level II fieldwork. To demonstrate improvements in patients' daily life we routinely administer standardized measures to assess disability, ability to work, global health, and pain at baseline and discharge. Disability was rated on the Disability of the Arm, Shoulder, and Hand (DASH) and work disability on the Work-DASH. The Patient-Reported Outcome Measurement Information System (PROMIS) Global Health measured self-rated health status using a 10-item survey, with physical (PH) and mental (MH) subscales. Current ability to work was rated by the 0-10 Work Ability Score.

Current, best, and worst pain over last week was rated on 0-10 scale.

The Hand Therapy Certification Commission's Self-Assessment Tool (HTCC SAT) measured students' hand therapy knowledge on a 4-point scale (1=limited knowledge 2=basic knowledge, 3=advanced knowledge, and 4=expert knowledge) in the 4 HT content areas of anatomy, diagnoses/ conditions, interventions, and knowledge areas. Scores were obtained prior to advanced instruction, before treating patients, after one semester of treating patients, after a Level II HT fieldwork, and after one semester as peer mentor. Supervising licensed clinicians used AOTA's Fieldwork Performance Evaluation (FWPE) to assess student clinical performance after one and two semesters of delivering patient care. FWPE passing scores are 90 at midterm and 120 at final.

**Results:** Twenty-six patients and 10 OT graduate students, in 2 cohorts, participated in this research. Most patients underwent surgery (69%) and the most common diagnoses were fracture (42%), soft tissue/tendonitis (19%), or nerve injury (19%). Forty-two percent were unemployed and 38% had injury related to violence, each higher than the metropolitan area averages. Mean improvements in disability, work disability, current and best pain were statistically significant and above the threshold for clinically meaningful differences for these measures. Work ability demonstrated statistically significant improvements in both unemployed and employed patients. Global health status remained relatively stable from baseline to discharge, with MH remaining within population norms throughout and PH one standard deviation below at discharge (Table 1).

Two cohorts of students were analyzed for the HTCC SAT. Statistically significant increases were noted in cohort 1 (n=3) and cohort 2 (n=7) after advanced training, and in cohort 1 after one semester as a peer mentor. Notably, both cohorts demonstrated slight decrease in scores following 1 semester of treating patients. Despite completion of a Level II HT fieldwork, pre and post HTCC SAT scores did not demonstrate statistically significant changes in Cohort 1 (Table 2).

Cohort 2 Mean FWPE improved from 84.86 (sd=9.44) after semester 1 to 109.25 (sd=21.53) after semester 2.

**Conclusion:** The SELC-HT produces positive changes in patients' ability to live their lives and students' ability to deliver HT. Patients demonstrate statistically significant and clinically meaningful changes in disability and pain and statistically significant improvements in work disability and work ability, Work ability ratings improved in both employed and unemployed patients, which is noteworthy as the unemployment rate in our sample
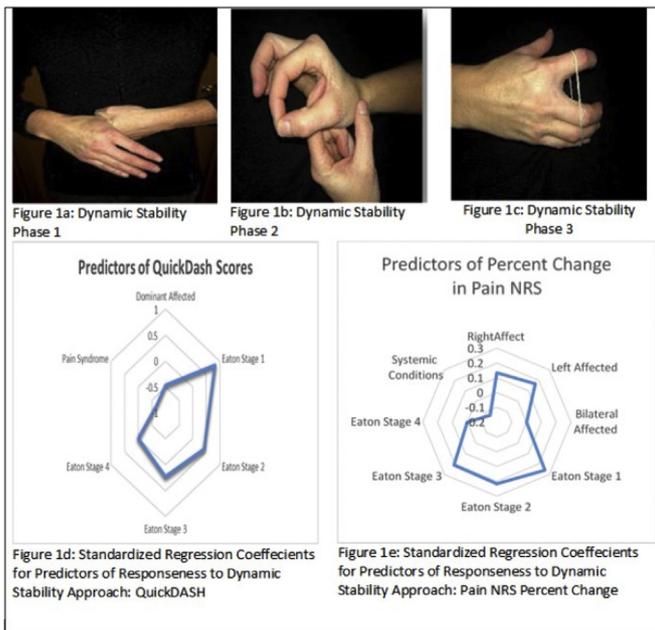
was greater than our metropolitan area. It is also important to note that despite the prevalence of violence-related injuries, MH ratings were in the normal ranges for our sample. Students demonstrated growth in HT knowledge, and licensed clinician's ratings of student's patient care competencies were near AOTA midterm and final rating thresholds suggesting that the SELC-HT is positively impacting students' development into future OTs. The data from this study stuggest that with advanced training, students can successfully evaluate and treat in a specialty SPBC, produce meaningful changes in participating patients, and demonstrate positive changes in their own clinical skills and HT knowledge, impacting their future practice. Additional research will continue to measure these outcomes.

**Table 1**
Patient Baseline and Discharge Score Comparisons

| Construct | n | Baseline | Discharge | Change | p value |
|---|---|---|---|---|---|
| Disability | 14 | 52.12 | 37.32 | 14.82 | .023* |
| Work Disability | 12 | 79.16 | 55.2 | 23.96 | .008* |
| Physical Health | 14 | 40.46 | 38.79 | 1.67 | .367 |
| Mental Health | 14 | 43.47 | 41.75 | 1.72 | .444 |
| Current Pain | 14 | 5.43 | 3.71 | 1.72 | .044* |
| Best Pain | 13 | 4 | 1.85 | 2.15 | .036* |
| Worst Pain | 13 | 7.92 | 6.38 | 1.54 | .192 |
| Work Ability | 11 | 3.09 | 6 | 2.91 | .007* |

Wilcoxon Signed Rank Test; *p<.05

**Table 2**
Student Hand Therapy Knowledge Time Point Comparisons

| Time point comparison | N | Time Point 1 Mean (Standard Deviation) | Time Point 2 Mean (Standard Deviation) | Change | p value |
|---|---|---|---|---|---|
| Pre advanced training– | | 1.47 (.175) | 2.364 (.09) | .894 | *.005 |
| Post advanced training | 3 | 1.075 (.265) | 1.952 (.363) | .877 | *.000 |
| Cohort 1 | 7 | | | | |
| Cohort 2 | | | | | |
| Post-advanced training– | | 2.364 (.09) | 2.299 (.317) | -.064 | .750 |
| Post 1 semester | 3 | 1.952 (.363) | 1.791 (.295) | -.161 | .142 |
| treating patients | 7 | | | | |
| Cohort 1 | | | | | |
| Cohort 2 | | | | | |
| Post 1 semester treating– | | 2.299 (.317) | 2.452 (.08) | .153 | .510 |
| Post Level II HT | 3 | | | | |
| Fieldwork Cohort 1 | | | | | |
| Post Level II Hand Therapy | | 2.452 (.08) | 2.602 (.088) | .15 | *.004 |
| Fieldwork–Post 1 | 3 | | | | |
| semester as Peer | | | | | |
| Mentor Cohort 1 | | | | | |

Paired samples t-test; *p<.05

## 12

## Mobile Tech Posture and the Upper Extremity: Prevalence and Biomechanics

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**Purpose:** Mobile technologies have transformed communication, education, and the workplace, simplifying daily tasks and increasing efficiency of communication. However, these undeniable benefits may have significant impact to posture and use of the upper extremity. The term tech posture, or "tech neck", is often used in articles related to ergonomics or workstation design to describe general postural compromise. The term is used to describe posture when interfacing with any type of technology, though posture at a workstation varies widely from posture when using mobile technology.

*Mobile tech posture* indicates the position a person assumes to interface with a mobile device (i.e. smartphone or tablet) in a seated or standing position.

The primary objectives of this study are to 1) provide a formal goniometric description of mobile tech posture, and 2) examine the prevalence of this sub-optimal posture among a group of graduate students.

**Methods:** Study Design

A descriptive analysis was used to gain insight into the biomechanics of mobile tech posture and prevalence of time spent using mobile technology among a healthy sample ($N = 46$) of graduate students. The study consisted of self-report of mobile device usage using Screen Time app data and comprehensive goniometric measurements of the neck and upper extremity while using a mobile device. Upon IRB approval, participants followed standardized instructions to self-report Screen Time data as well as estimated time spent using laptop technology. Comprehensive goniometric measurements were taken of the neck and upper extremity with each participant seated while using a mobile device (tech posture).

Aggregate data were analyzed to identify mean time spent using mobile technology as well as mean joint angles.

**Results:** The sample ($N = 46$) was largely female (96%), between the ages of 22 and 25 (87%), white (87%), and predominantly right-handed (91%).

The mean time spent in mobile tech posture, according to Screen Time data, was 2 hours and 23 minutes per day (SD = 70.4). Additionally, participants estimated the time spent using laptop technology with the majority of the sample reporting 1-10 hours per day of laptop use. (comprehensive results will be presented in table format). Several mean joint angles raise musculoskeletal concerns including cervical spine flexion (19 deg), scapular protraction (R 41 deg; L 43 deg), shoulder internal rotation (R 34 deg; L 33 deg), elbow flexion (90 deg), as well as wrist ulnar deviation (R 16 deg; L 13 deg) coupled with thumb palmar abduction (R 36 deg; L 35 deg) and flexion at the MCP (R 27 deg; L 30 deg) and IP joint ((R 30 deg; L 33 deg). (comprehensive results to be presented in table format). Specific anatomical concerns related to identified angles include neck flexor/extensor muscle imbalance, ulnar neuropathy at the cubital tunnel, as well as De Quervain's tenosynovitis with repetive exting with the APL/EBP tendons under positional stress.

**Conclusion:** The results of this study align with prior research findings regarding the prevalence of mobile technology use among a group of graduate students. Additionally, specific goniometric measurements describe joint angles, identifying potential musculoskeletal risks and providing an operational biomechanical description for further analysis. Further research is recommended to confirm angular joint position with mobile device use, examine specific related symptomologies, as well as more definitive musculoskeletal examination potentially with imaging.