



Evaluating the Effects of Grasp Patterns and Grip Strength on Handwriting Skills

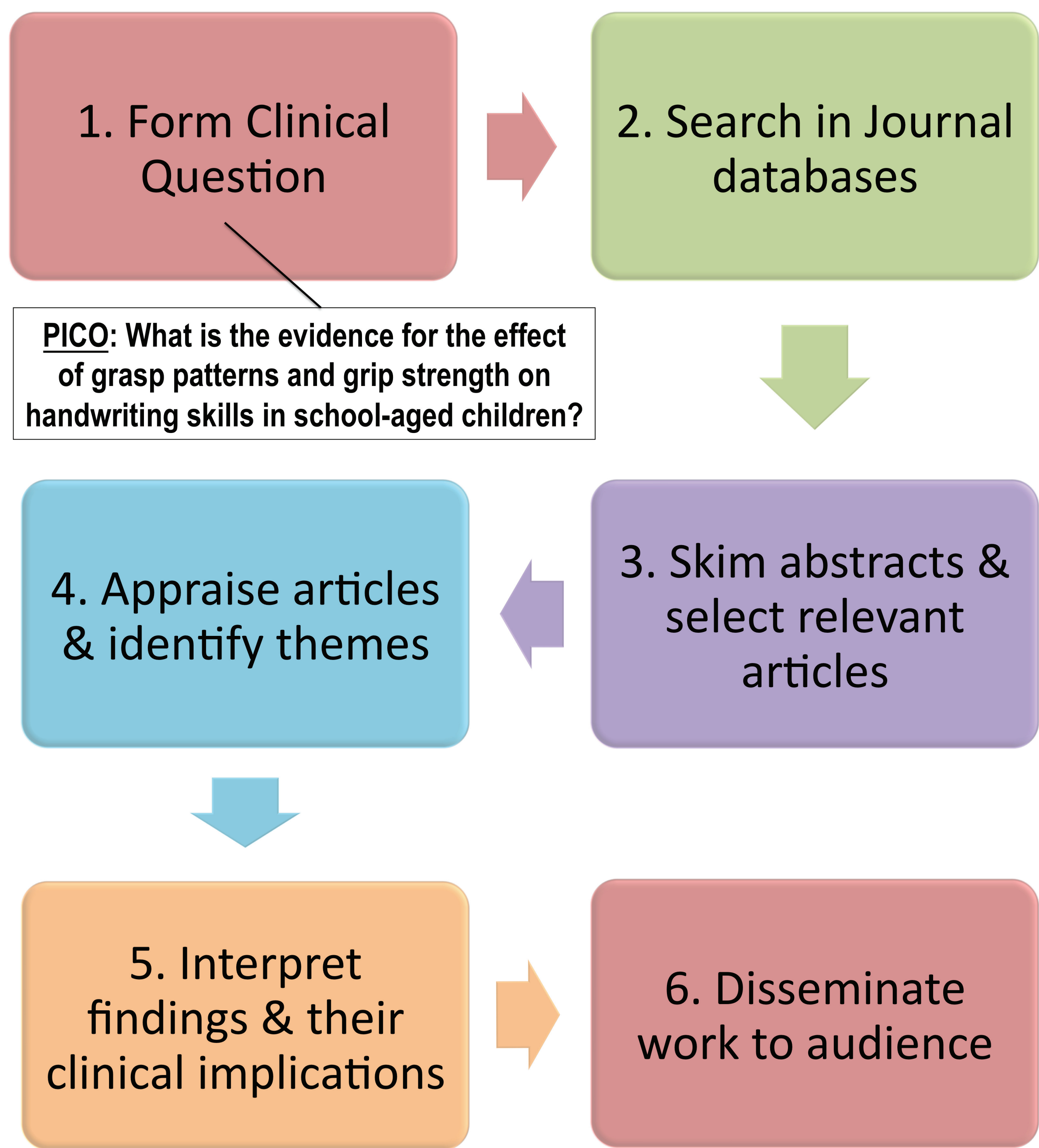
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BACKGROUND INFORMATION

- Handwriting is a critical and complex skill that school aged children acquire over time.
- When a child demonstrates handwriting difficulties, he or she may have challenges with:
 - Completing written school assignments in a timely fashion,
 - Taking notes,
 - Finishing homework,
 - Completing exams, especially short answer.
- 80% to 85% of occupational therapy referrals in schools are due to atypical grasp pattern, fine motor and handwriting concerns that affect a child’s educational performance.

LITERATURE REVIEW PROCESS



DATABASE SEARCH TERMS AND STUDY INCLUSION

- Search Terms**
 - Handwriting
 - Occupational therapy
 - School-aged
 - Children
 - Grasp
 - Grip
 - Strength
 - Kinematics
 - Fine motor
- Inclusion criteria**
 - Published after 1995
 - Peer-reviewed
 - School aged children between 1st and 5th grade
 - Interventions addressing improvement of fine motor skills
 - Handwriting factors:
 - grip strength
 - grasp pattern
- Exclusion criteria**
 - Articles addressing sensory or visual/motor components of handwriting
 - Study participants with developmental or physical disabilities

STUDY EVALUATION AND ANALYSIS

Article	Level of Evidence	Grasp Patterns	Grip Strength	Length of Task	Other Factors	Legibility	Speed	Handwriting Performance
Ratzon, et al (2007)	1				Hand-eye coordination, FM skills			As measured by BOT, DTVP-2
Cornhill, et al (1996)	2				In-hand manipulation			MHT score
Dennis, et al (2001)	2	x				x		
Koziatek, et al (2003)	3	x				x	x	
Kushki, et al (2011)	3		x	x				
Rosenblum, at al (2006)	2	x						HHE score
Schwellnus, et al (2012)	3	x				x	x	
Schwellnus, et al (2012)	3	x		x		x	x	
Schwellnus, et al (2012)	3	x	x			x	x	

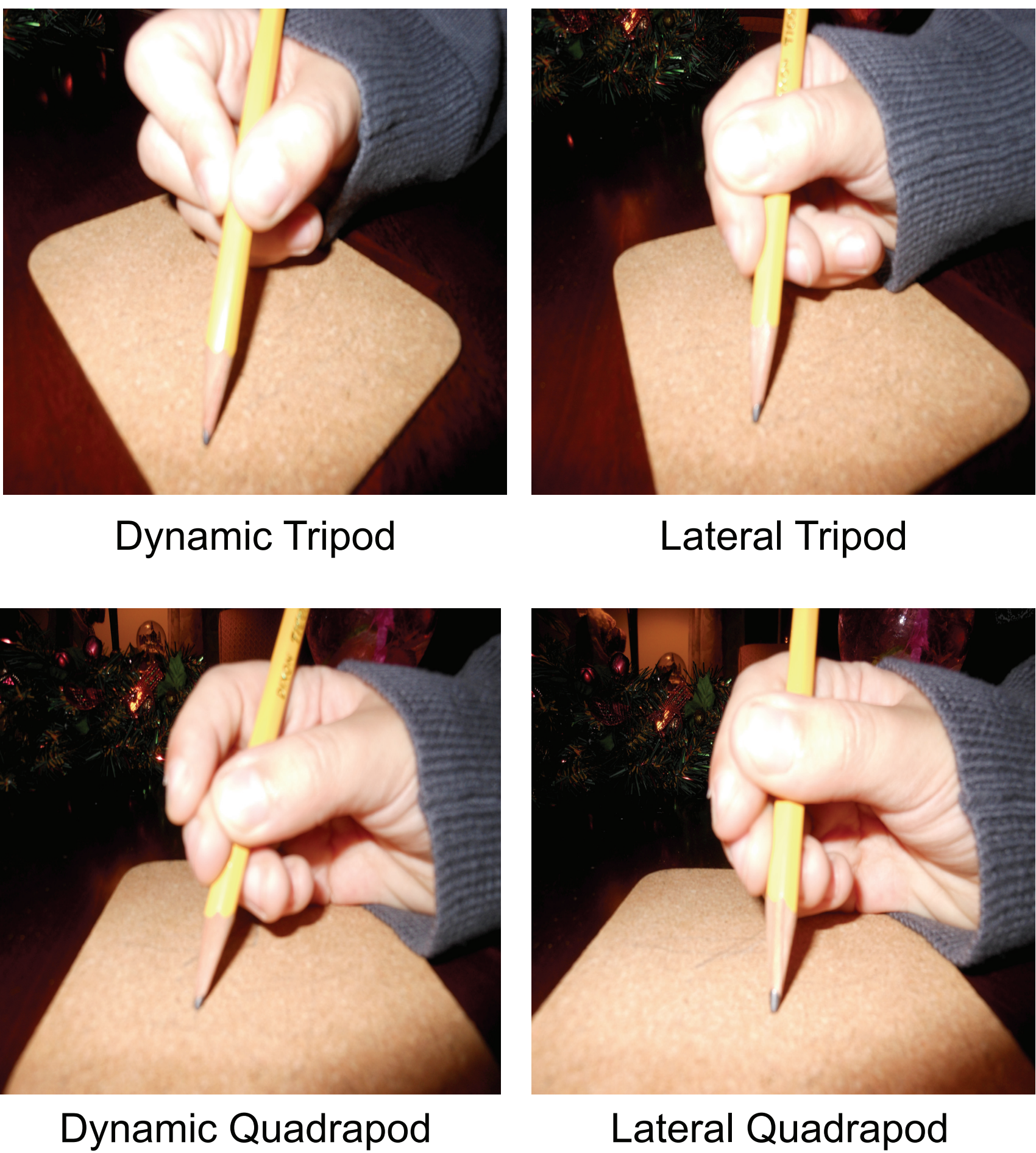
Level 1 Evidence: Randomized Control Trial

Level 2 Evidence: Cohort Trials (non-randomized) with two comparison groups

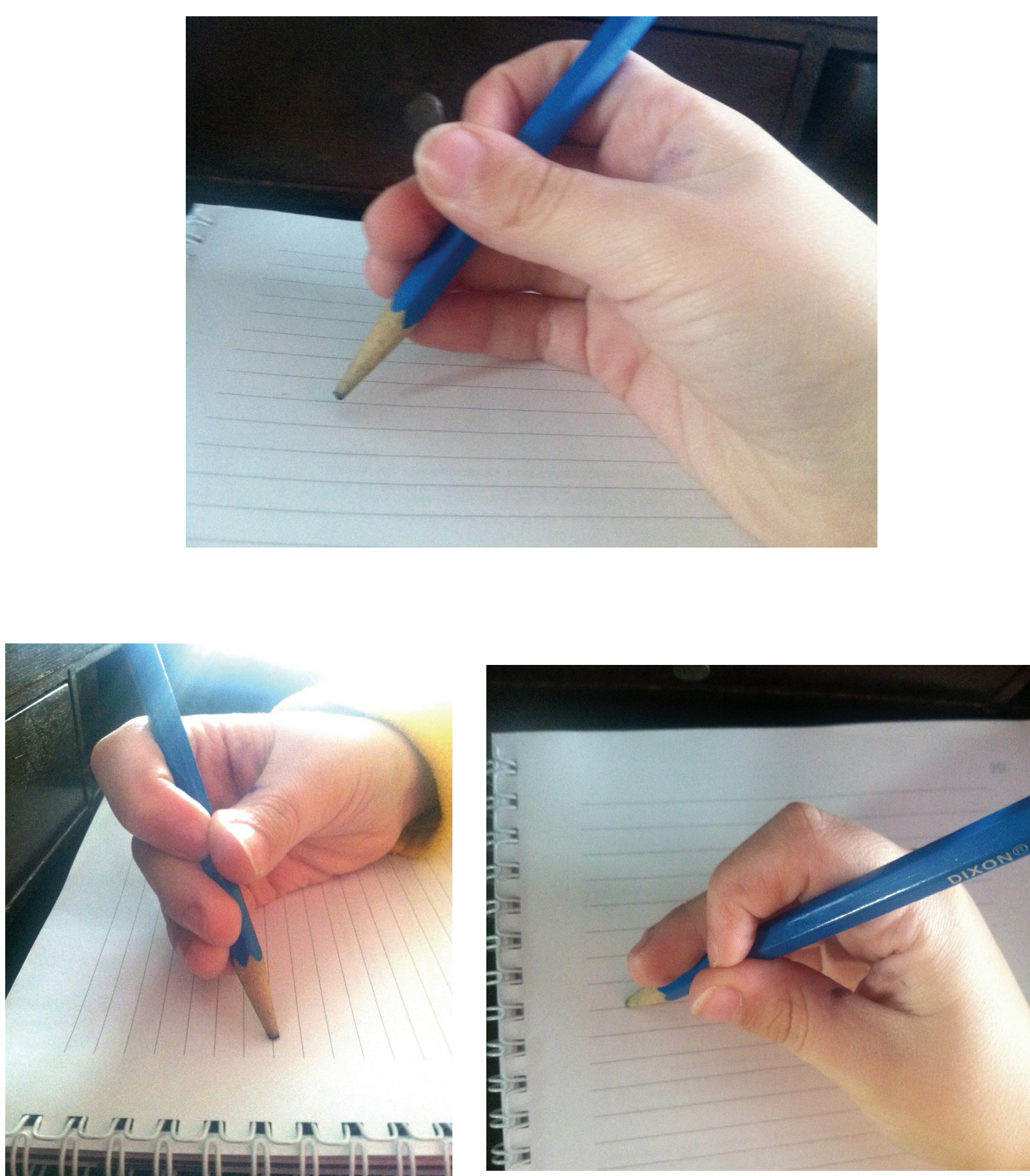
Level 3 Evidence: Nonrandomized pre-test/post-test with one group

CAP Worksheet adapted from: Critical Review Form – Quantitative Studies ©Law, M., Stewart, D., Pollack, N., Letts, L., Bosch, J., & Westmorland, M., 1998, McMaster University.

MATURE GRASP PATTERNS



ATYPICAL GRASP PATTERN



THEMES DERIVED FROM EVIDENCE

- As long as a child has adopted a mature grasp pattern, speed and legibility are not compromised. 4/9 articles
- Pencil grasp does not impact handwriting alone; therapists and teachers should focus on client factors and performance skills. 6/9 articles
- Length of written task and muscle endurance can affect speed and legibility in students with typical or atypical grasps. 3/9 articles
- Atypical grasp patterns are not the only reason for an OT referral, as long as they are functioning in other performance areas (i.e. dressing, feeding, etc.). 3/9 articles

FUTURE RESEARCH & IMPLICATIONS FOR PRACTICE

- Occupational therapists can play a key role in teacher consultation on handwriting instruction and intervention. OTs provide strategies and recommendations to assist students in reaching their full educational potential.
- It is crucial for occupational therapists to identify underlying factors and contributing performance components to a student’s poor handwriting performance, not solely grasp pattern.
- More rigorous research, including randomized control trials, are needed on the relationship between pencil grasps on handwriting speed and legibility.