



iCAHE JC Critical Appraisal Summary

Journal Club Details

Date of submission	2013
Journal Club location	CHSA
JC Facilitator	Heather Bean
JC Discipline	Physiotherapy

Review Question/PICO/PACO

- P** infants (when intervention) but children up to school age for follow up.
- I** physiotherapy, early intervention with focus on motor skills
- C** no intervention or other types of early intervention
- O** cognitive development, language development, spatial development (as well as motor but more interested in other areas)

Article/Paper

Schwarzer, G, Freitag, C, Buckel, R & Lofruth A 2013, 'Crawling is Associated with Mental Rotation Ability by 9-Month-Old Infants', *Infancy*, Vol. 18; No. 3: pp. 432–441.

Please note: due to copyright regulations CAHE is unable to supply a copy of the critically appraised paper/article. If you are an employee of the South Australian government you can obtain a copy of articles from the [DOHSA librarian](#).

Article Methodology: Experimental Study

Returned JC on: 2013

CONTACTS

www.unisa.edu.au/cahe
 iCAHE@unisa.edu.au
 Telephone: +61 8 830 22099
 Fax: +61 8 830 22853

University of South Australia
 GPO Box 2471
 Adelaide SA 5001
 Australia

CRICOS Provider Number
 00121B



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Ques No.	Yes	Can't Tell	No	Comments
1	✓			<p>Was the purpose stated clearly?</p> <p>The current study aimed to investigate if infants' mental rotation ability was related to their crawling ability.</p> <p>Population: Healthy male and female full-term infants (mean age: 9 months, 3 days).</p>
2	✓			<p>Was relevant background literature reviewed?</p> <p>Relevant background literature has been reviewed and presented to justify this study.</p>
3	✓			<p>Describe the study design. Was the design appropriate for the study question?</p> <p>An experimental study design was used to address the study aims. Although there was no intervention, study variables were manipulated between groups (L- or R-object video).</p>
4	✓		✓	<p>Was the sample described in detail?</p> <p>The sample was described with detail provided for relevant characteristics such as age, crawling status and socio-economic status (reporting that all infants were from middle-class families). However, there were no details given on the characteristics of infants who were in each of the groups.</p> <p><i>Answer provided by journal cub</i></p> <p>The sample was very tightly controlled for age and crawling vs non-crawling (how generalizable). The group questioned the crawling definition (on hands and knees) as it excluded commando crawling and bottom hitching which also allow babies to explore their world and interact with objects, the premise important to the theory. They excluded the babies who had crawled for 7-8 days (and possibly less than 2 weeks), supposedly to mean crawling meant they had experience but slightly strange exclusion criteria.</p> <p>Describe ethics procedures. Was informed consent obtained?</p> <p>This was not reported.</p>
5				<p>Were the outcome measures reliable? Were the outcome measures valid?</p> <p>The inter-observer reliability of the experimenter and the off-line observers were reported to exceed 0.9. The observers were naïve to the hypotheses under investigation and recorded times related to the stimuli from the videotapes of the sessions.</p>

			<p>Crawling journals kept by parents were noted to provide reliable reports of their infants' attainment of motor milestones, including crawling, according to a study (Bodnarchuk & Eaton 2004).</p> <p><i>Answer provided by journal club</i></p> <p>A simple infant behaviour- time looking- was then interpreted in terms of cognitive ability. The group felt this was only one possible interpretation. We were interested in this example of research into infant cognition, but feel there was a large jump to the conclusions- Hence was it valid as a measure of mental rotation ability, as really it was a measure of the babies' interest. It was also interesting that they interpreted the fact that the crawling babies spent more time looking at the novel one, meant that they recognised the one they had already seen from a different angle. Several group members would have interpreted it differently so we felt this was a sig jump that may not be correct.</p>
6			<p>Results were reported in terms of statistical significance?</p> <p>The results were reported using means, standard deviation and p-values to show statistical significance.</p> <p><i>Bottom line result:</i> As reported in the results, 9-month-old infants who were able to crawl were more successful in performing the mental rotation task than non-crawling infants of the same age. In contrast, non-crawling infants did not distinguish between the familiar object in a novel orientation and the mirror image of the object.</p> <p>What was the clinical importance of the results? Were differences between groups clinically meaningful?</p> <p><i>Answer provided by journal club</i></p> <p>If the interpretation of the results is correct (we were not sure as above) then it is significant that crawling increases infant's spatial understanding of objects. Children who are delayed in moving, may be disadvantaged in learning about objects, spatial relations etc.</p> <p>We thought that as the babies were all the same age, this might also be explained by a parallel maturation rather than a cause and effect relationship. Ie babies who are crawling are more developmentally advanced and might also be expected to be on other developmental aspects. The authors did consider this but could not dismiss it despite the fact that it may mean their interpretation did not hold.</p> <p>The authors did not mention gender as a factor in their results, despite discussing literature suggesting this has previously been shown to be significant. We assumed this was because the results were not significant as it seemed to</p>

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				<p>imply they did look for this effect. This could have been explained better and discussed.</p> <p>They commented that it was surprising that non-crawlers could not mentally rotate objects as a previous study had shown boys could at 3-5 months (presumably when not crawling!). They tried to explain this with subtle variations of design, but did not seem to consider that it could be the validity of the interpretation of the looking time.</p>
7				<p>Did any participants drop out from the study?</p> <p>There were no drop-outs reported, however, two infants were excluded from the study because they were able to crawl for only 7 and 8 days at commencement of the laboratory testing.</p>
8				<p>What did the study conclude? Conclusions were appropriate given study methods and results?</p> <p><i>Answer provided by journal club</i></p> <p>We were not convinced that their conclusions were justified. Overall it was interesting how infant cognition is studied and the conclusions reached. Generally the broader body of evidence does seem to suggest that movement experience does assist infants' cognitive development. This intuitively makes sense, but reading this article demonstrated some of the difficulties in researching infant cognitive skills and the interpretation of behaviours in pre-verbal children. Hence a healthy scepticism about the conclusions of this style of research seems warranted. It was interesting to read one primary source after our last journal club that explored an opinion article that drew on this style of evidence. Clinically we feel that the message of motor development being an essential skill to enable exploration and learning holds and is useful to discuss with families. We are not sure that this article was methodologically strong enough to further this case!</p> <p>Other clinical discussion points:</p> <ul style="list-style-type: none"> • Importance of finding ways for children to be mobile, electric wheelchairs, children with restriction to movement from causes that are not developmental (eg. child in hip spica for late diagnosed DDH) • Can we move children in other ways around the environment, including increasing awareness of movement, up and down in relation to gravity, - eg. hydro, on gym ball, • Experience of movement important, otherwise can become cautious, find vestibular and movement stimuli overwhelming and retreat to familiar • Impact of being at eye level on communication eg. case of child in classroom in a standing frame rather than

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				WC or floor, better able to communicate with peers
				<ul style="list-style-type: none">• Use of movement experiences as a platform for concept development for children who are a bit older but find classroom style learning hard- discussed “literacy in motion”

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