

Gross Motor Development in Children with Lower Limb Differences (LLDs)

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Introduction

- Limited research exists that establishes normative data for gross motor development in kids with lower limb differences (LLD).
- 25,000 of the 1.6M people in the US with limb loss in 2005, were children (Ziegler-Graham et al., 2008).
- Limb loss significantly affects balance and ambulation (van Schaik et al., 2019).
- Children with lower limb differences play regularly but may have difficulty keeping up with peers in active play (Kerfeld et al., 2018).

Objectives

- To determine if LLDs experience a delay in the child's gross motor development compared to unaffected peers.
- To determine if the level of LLD affects the delay in gross motor development.
- To determine if the age at which the LLD was acquired affects the delay in gross motor development.
- This study intends to compare ages children with LLDs stand, walk, run, and bike to normative data from unaffected children.

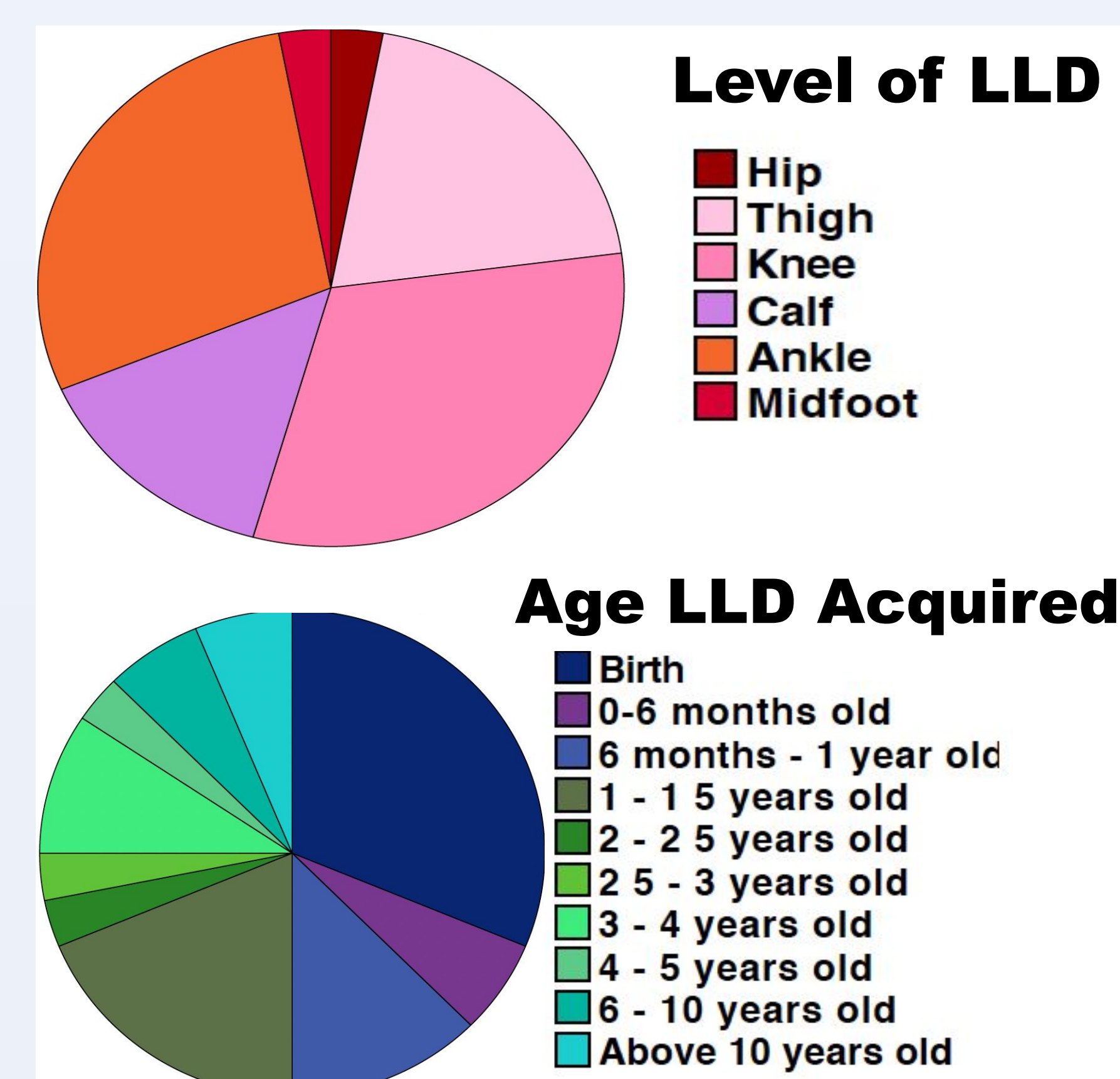
Methodology

- Anonymous parental survey regarding participants' children's ages, and the ages at which they learned to stand, walk, run, and ride a bike with and without training wheels.
- Data collected was compared to normative data of unaffected children from Zubler et al. (2022) using one-sample t-tests and one-way ANOVA tests.

Results

Descriptive Statistics:

- 38 parents or guardians of children with various LLDs participated in the survey. 37 children referenced in the responses had amputations (congenital and acquired) ranging from midfoot amputation to hip disarticulation. 1 child had an LLD that was not an amputation.



Results Continued

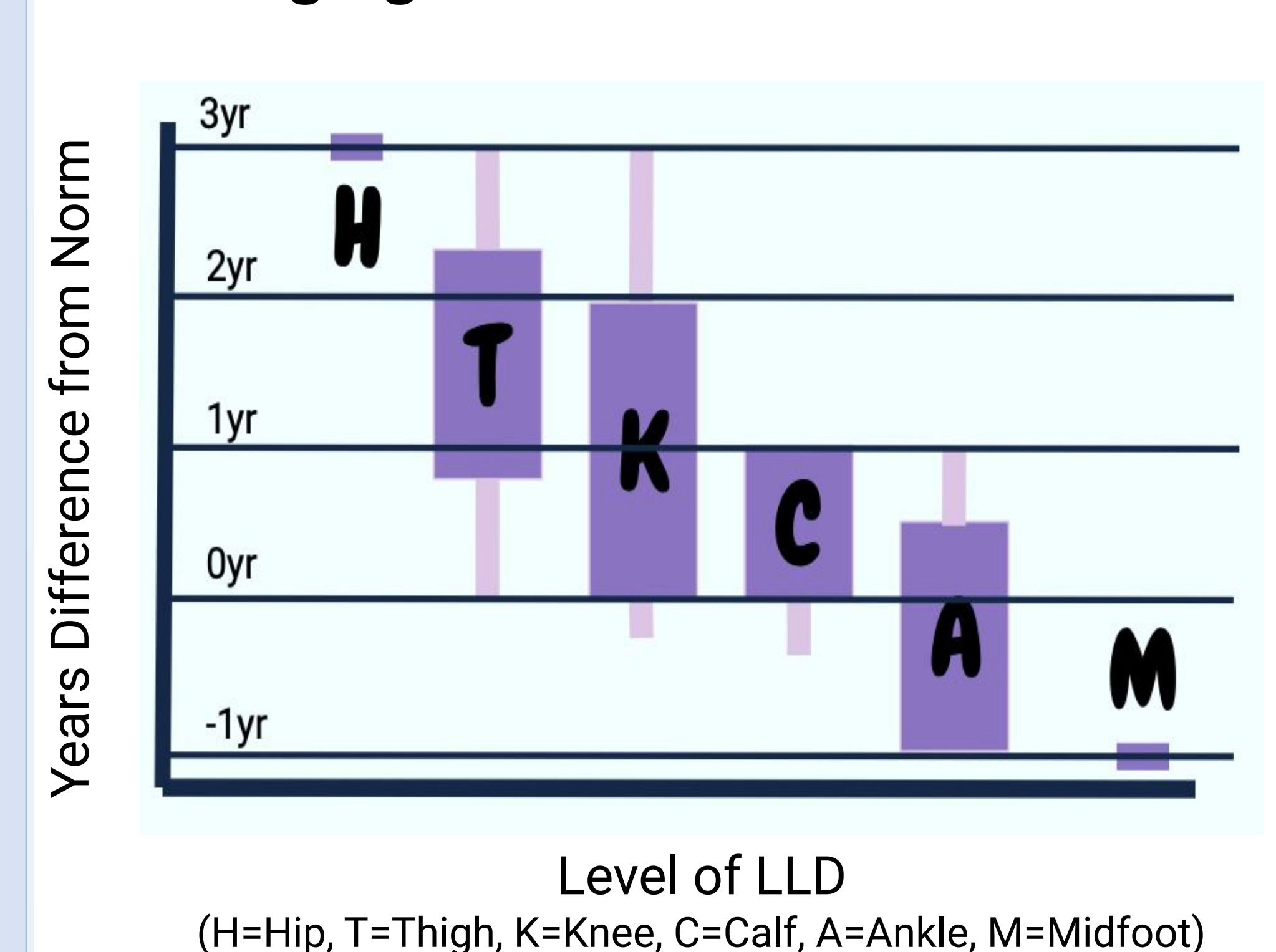
Statistical Significances:

- Running and biking with and without training wheels show statistical significance in the delay from the normative age obtained from the Zubler et al data.
- Running age difference correlates to the level of LLD.
- Age that the LLD is acquired relates to delay in standing and walking.

Age of Achievement Compared to Norm.

Milestone	Norm. Data Average Age	Survey Data Average Age	Average Diff. From Norm.	One-Timed p-Value
Stand	12mo*	15.23mo	3.23mo	0.052
Walk	18mo*	18.31mo	0.31mo	0.432
Run	2yr*	2.53yr	0.53yr	0.016
Bike	5yr	6.75yr	1.75yr	0.015
Bike w/o TW	5yr	6.71yr	1.46yr	0.012

Running Age Diff. from Normative Values



Conclusions

- Level of amputation has a direct correlation to the amount of age delay at which a child with a lower limb difference can run.
- The age at which an LLD is acquired relates to a delay in standing and walking.
- The main limitation is the fact that the survey is not a standardized outcome measure, and clearer wording in the survey questions would lead to more compelling results.
- Supporting standardized outcome measures accompanying these results could present compelling cases for proof of medical necessity for more advanced/active componentry for pediatrics.
- A similar study could be done for evaluating upper limb differences (ULDs) by using milestones related to upper extremity gross motor function.

References

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