

# The Child Focused Injury Risk Screening Tool (ChildFIRST): Normative Values, Correlations, and Sex Differences for a group of Children aged 8-12

## INTRODUCTION

Physical literacy (PL) concepts promote physical activity (PA). When children increase PA participation their injury risk also increases, but PL does not address injury prevention. The Child Focused Injury Risk Screening Tool (ChildFIRST) is designed to evaluate movement competence and injury risk in 8-12-year-old children. The ChildFIRST has 10 movements: walking lunge (LUNGE), bodyweight squat (BWS), single-leg sideways hop and hold (SLSHH), two-to-one foot hop and hold (TOFHH), 90-degree hop and hold (NINETY), single-leg hop (SLH), leaping (LEAP), running (RUN), vertical jump (VERT), and horizontal jump (HORI). Each movement has four evaluation criteria.

## PURPOSE

The ChildFIRST has validity and reliability evidence but no normative data. The purpose of this study is to establish normative data and evaluate trends using the ChildFIRST in the 8-12 age group.

## METHODS

Cross-sectional design was used to evaluate 146 children using 3 participation methods: in-person, live video, or video upload. Participants viewed a demonstration of one movement then performed the movement, this continued until the child completed all movements. In-person data was collected from local YMCAs, a soccer facility, and a volleyball Club. Video upload data was collected using the Champions for Life website ([www.championsforlife.ca](http://www.championsforlife.ca)). Live video data was collected using Zoom video conferencing.

## IMPORTANCE

- Movement competence is linked to better overall health outcomes, so it should be evaluated early in a child's development.
- Evaluating movement competence will help guide curriculum and interventions to improve movement skill, promote physical activity participation, and identify children at risk of musculoskeletal injury
- This study is the first to provide reference data and normative using the ChildFIRST. This data can act as reference standards for the 8-12-year-old group and help inform physical education teachers, clinicians, and other stakeholders about general movement competence and injury risk.

## NORMATIVE DATA

	Age 8		Age 9		Age 10		Age 11		Age 12	
	F	M	F	M	F	M	F	M	F	M
BWS	2.90	2.69	2.31	2.48	2.68	2.65	2.84	2.38	4.00	2.67
SLH	2.70	2.46	2.69	2.96	2.95	2.71	2.60	2.50	3.20	3.33
LUNGE	2.00	1.77	2.54	2.70	2.89	2.65	3.16	3.25	3.20	3.33
NINETY	1.80	2.23	2.38	2.04	2.16	1.94	2.36	2.50	2.60	2.00
VERT	2.40	2.08	2.31	2.22	2.37	2.47	2.40	2.38	3.20	3.00
HORI	2.50	2.62	2.69	2.83	2.95	2.82	3.00	3.13	3.20	3.33
RUN	3.20	3.46	3.15	3.74	3.37	3.47	3.48	3.38	4.00	3.00
SLSHH	2.20	2.23	2.54	2.26	2.95	2.29	2.96	2.75	2.80	3.67
TOFHH	1.90	2.38	2.08	2.61	2.68	1.88	2.28	2.25	2.60	2.33
LEAP	2.30	1.92	1.92	2.30	2.21	2.41	2.36	2.25	1.80	2.33
Total	23.90	23.85	24.38	26.13	27.21	25.29	27.44	26.75	30.60	29.00

## CORRELATIONS

	Age	Height	Weight	BMI	PA Habits
BWS	0.10	0.01	-0.16	-0.19*	0.07
SLH	0.05	-0.10	-0.14	-0.95	0.27*
LUNGE	0.46*	0.30*	0.20*	0.29	0.11
NINETY	0.15	0.14	0.19*	0.08	-0.15
VERT	0.20*	0.05	-0.09	-0.21*	-0.08
HORI	0.21*	-0.08	-0.11	-0.03	0.24*
RUN	0.04	0.13	0.10	-0.01	0.10
SLSHH	0.30*	0.24*	0.24*	0.04	-0.02
TOFHH	0.03	0.24*	0.17	-0.06	0.07
LEAP	0.06	-0.04	-0.02	-0.15	-0.13
Total	0.35*	0.25*	0.12	-0.12	0.10

## SEX DIFFERENCES

	Males (N = 70)		Females (N = 74)		F value
	Mean ± SD	95% CI	Mean ± SD	95% CI	
BWS	2.52 ± 1.08	(2.26 - 2.78)	2.78 ± 1.21	(2.50 - 3.06)	1.86
SLH	2.78 ± 0.98	(2.55 - 3.02)	2.74 ± 1.09	(2.49 - 2.99)	0.07
LUNGE	2.61 ± 0.91	(2.39 - 2.83)	2.79 ± 0.91	(2.58 - 3.01)	1.47
NINETY	2.08 ± 0.85	(1.88 - 2.29)	2.21 ± 0.91	(2.01 - 2.43)	0.79
VERT	2.30 ± 0.81	(2.11 - 2.50)	2.42 ± 0.82	(2.23 - 2.61)	0.78
HORI	2.87 ± 0.93	(2.67 - 3.07)	2.84 ± 0.93	(2.62 - 3.05)	0.06
RUN	3.42 ± 0.98	(3.19 - 3.66)	3.38 ± 0.83	(3.19 - 3.58)	a
SLSHH	2.41 ± 0.99	(2.18 - 2.65)	2.76 ± 0.86	(2.56 - 2.96)	4.22*
TOFHH	2.28 ± 1.14	(2.00 - 2.55)	2.31 ± 0.78	(2.13 - 2.50)	0.60
LEAP	2.20 ± 1.03	(1.96 - 2.46)	2.19 ± 0.84	(1.99 - 2.39)	0.00
Total	25.21 ± 4.61	(24.11 - 26.31)	26.14 ± 4.90	(25.01 - 27.28)	1.40

1. Rao DP, Kropac E, Do MT, Roberts KC, Jayaraman GC. Childhood overweight and obesity trends in Canada. *Health Promot Chronic Dis Prev Can.* 2016;36(9):194-198.  
 2. Government of Canada SC. Overweight and obese adults, 2018. Published June 25, 2019. Accessed January 4, 2021. <https://www150.statcan.gc.ca/n1/pub/82-625-x/2019001/article/00005-eng.htm#n1>  
 3. Rey-López JP, Vicente-Rodríguez G, Biosca M, Moreno LA. Sedentary behaviour and obesity development in children and adolescents. *Nutrition, Metabolism and Cardiovascular Diseases.* 2008;18(3):242-251. doi:10.1016/j.numecd.2007.07.008  
 4. Nauta J, Martin-Diener E, Martin BW, van Mechelen W, Verhagen E. Injury Risk During Different Physical Activity Behaviours in Children: A Systematic Review with Bias Assessment. *Sports Med.* 2015;45(3):327-336. doi:10.1007/s40279-014-0289-0  
 5. Hootman JM, Macera CA, Ainsworth BE, Martin M, Addy CL, Blair SN. Association among Physical Activity Level, Cardiorespiratory Fitness, and Risk of Musculoskeletal Injury. *American Journal of Epidemiology.* 2001;154(3):251-258. doi:10.1093/aje/k154.3.251



### BODYWEIGHT SQUAT



### SINGLE LEG SIDEWAYS HOP AND HOLD



### WALKING LUNGE

