

Gender differences in Functional Movement Screen and Y-Balance Test scores in middle school aged children

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Abstract

Poor static and dynamic postures have been related to musculoskeletal injury. These postures can cause poor arthrokinematics, which in time may lead to pain and disability. Recent research has suggested that better functional movement and dynamic balance are associated with reduced injury rates. However, there are no published reports in this area on middle school aged children and whether gender differences exist in this age group. **PURPOSE:** To examine gender differences in functional movement quality and dynamic balance, as measured by the Y-Balance testing protocol, in middle school aged children. **METHODS:** Two physical education classes of middle school aged students (13 boys and 19 girls) were recruited for the study. Informed consent was obtained from the students and the students' parents. All students participated in dynamic balance testing using the anterior, posteromedial, and posterolateral reach directions of the Star Excursion Balance Test as measured by the Y-Balance testing device. Video instruction was given to all students followed by practice trials to reduce learning effects. Scores on anterior, posteromedial, posterolateral, and composite reach distances were normalized to leg length. In addition to Y-Balance testing, all students participated in the Functional Movement Screen. The Functional Movement Screen consisted of 7 tests: squat, lunge, hurdle step, push up, shoulder mobility, active straight leg raise, and rotary stability test. Independent samples t-tests were used to examine differences between boys and girls for the Y-Balance Test scores while Mann-Whitney U tests were used to examine differences in the functional movement tests due to the rank-order nature of the data. **RESULTS:** Girls performed better on the squat, lunge, straight leg raise, and shoulder mobility compared to boys ($p < 0.05$). There were no statistically significant differences between girls and boys for the hurdle step, push up, rotary stability or any of the Y-Balance Test reach scores ($p > 0.05$). **CONCLUSION:** Girls and boys of middle school age may exhibit different qualities of functional movements. Studies focused on improving functional movements in middle school aged children should consider these findings when developing interventions aimed at improving functional movements.

Background

- Musculoskeletal pain common in adolescent population
 - Related to obesity (cite)
 - Related to poor movement ?
- Little research on movement patterns in adolescents
 - Injury prediction tools
 - Functional Movement (cite)
 - Dynamic Balance (cite)
- Need baseline data on differences in movement characteristics between adolescent boys and girls.

Purpose and Hypotheses

- PURPOSE:** To examine differences in functional movement patterns and dynamic balance between middle school aged boys and girls.
- Hypotheses:**
 - 1°: There will be no difference in Functional Movement Screen® (FMS) scores between ♂ and ♀ on the individual test scores or the composite score.
 - 2°: There will be no difference in Y Balance Test scores between middle school aged ♂ and ♀ for any of the reach directions or the composite reach score.

Methods

- Subjects**
 - 39 middle school students
 - 23 girls and 16 boys
 - Two Eighth grade classes
- Inclusion Criteria**
 - No current injury
 - Parental consent received
- Functional Movement Screen (FMS)**
 - Test kinematics during functional activities
 - Seven different tests (score out of 100)
 - Deep Squat (Figure 1)
 - Hurdle Step (Figure 2)
 - In Line lunge
 - Active Straight Leg Raise (Figure 3)
 - Push Up
 - Rotary Stability
 - Shoulder Mobility
 - Composite score
- Y Balance test (YBT)**
 - Evaluates dynamic balance in unilateral stance
 - Examined in three different reach directions
 - Anterior
 - Posteriomedial
 - Posteriolateral
 - Composite
- Data Analysis**
 - FMS
 - Scored by blinded raters
 - Examined video of performance
 - Y Balance
 - Scored on site
 - All values normalized to limb length
- Statistical Analysis**
 - Mann Whitney U for FMS (rank order)
 - Independent t-tests for Y Balance (continuous)
 - All significant differences identified at $p < 0.05$

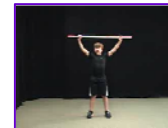


Figure 1. Starting position for Squat test



Figure 2. Starting position for Hurdle Step



Figure 3. Starting position for Active SLR

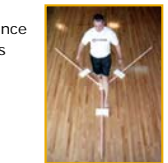


Figure 4. Anterior reach direction



Figure 5. Posterior Medial reach direction

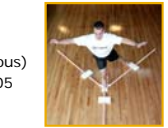


Figure 6. Posterior Lateral reach direction

Results

- Girls performed better on the FMS than boys ($p < 0.05$)
 - Deep Squat
 - In Line Lunge
 - Active SLR
 - Shoulder Mobility
 - Composite Score
 - ♂ = 40.9 / 100
 - ♀ = 64.9 / 100

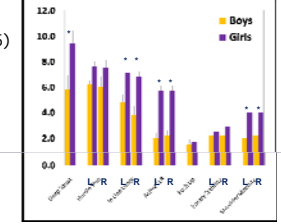


Figure 7. Mean values (+ SEM) for the individual components of the FMS for the Boys and Girls

- No difference on YBT for any of the reach directions.

Table 1. Data on Y-Balance Reach Distances for the Boys and Girls in the study. All values are normalized to limb length (% LL).

Variable	Boys Mean (SEM)	Girls Mean (SEM)	p-value
Anterior Left (% LL)	0.79 (0.03)	0.77 (0.02)	0.58
Anterior Right (% LL)	0.76 (0.02)	0.78 (0.02)	0.50
Posteromedial Left (% LL)	1.11 (0.03)	1.08 (0.02)	0.39
Posteromedial Right (% LL)	1.09 (0.03)	1.09 (0.02)	0.90
Posterolateral Left (% LL)	1.07 (0.02)	1.07 (0.04)	0.48
Posterolateral Right (% LL)	1.07 (0.04)	1.02 (0.03)	0.38
Composite Right (% LL*100)	99.23 (2.24)	96.68 (1.92)	0.41
Composite Left (% LL*100)	97.20 (2.69)	96.26 (2.05)	0.79

Discussion

- Middle school aged girls move differently than boys however exhibit no differences in dynamic balance
- Important to consider in developing musculoskeletal interventions for adolescents

References

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