Reliability of the Wii Balance Board in kayak

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Summary

Background: **the seat of the kayaker represent the principal contact point to express mechanical Energy.**
Methods: **therefore we investigated the reliability of the Wii Balance Board measures in the kayak *vs*. on the ground.**
Results: **Bland-Altman test showed a low systematic bias on the ground (2.85%) and in kayak (-2.13%) respectively; while 0.996 for Intra-class correlation coefficient.**
Conclusion: **the Wii Balance Board is useful to assess postural sway in kayak.**

The Wii Balance Board (WBB) showed itself as good device to assess postural sway[1,2]. In additional there aren't ecological field studies[3] that assessed postural sway in kayaker[4]. Besides, the power developed by the kayak padding is shifted to the kayak through applications against a seat[5]. Considering the extensive of this device in sport[6,7] we believe that WBB can be used also in kayak. For this aim we compare the reliability of the measures of WBB on ground, on WBBm modified as the seat of the kayak on ground and WBBm on kayak in water.

Eight international male kayakers (age 24.5±2.8 years, body height 1.81±0.1 m, body mass 78±3.6 kg, BMI: 24±0.2 kg·m^{-2}) performed on WBB (Fig. 1) in randomized order in seated position (to emulate kayak place on ground) and in water for to assess postural sway accordingly to MLTJ guideline[8]. The trials (WBB-WBBm-WBBm on kayak) with Wii balance board was selected for each athlete (Latin square design[9]) for two sets (test- retest) on WBB on ground (Fig. 1A) and on WBBm (modified as the seat of the kayak on ground "Seat Sensor"). While other two (test- retest) sessions was performed with a WBBm on kayak (Nelo™ 12 kg) in water (Fig. 1B). The duration time for each session was 25'' with 2 min between sets[10]. Spss 19 was used for the reliability[11] of the measures with Intra-class Correlation Coefficient (ICC) and Bland – Altman tests of the centre of pressure (COP) velocity (mm·s^{-1}). While the three different conditions (WBB-WBBm-WBBm on kayak) was analyzed with an Univariate ANOVA and "Bonferroni" *post-hoc* analysis. The significant effect was fixed at $p < 0.05$.

ANOVA showed significant effect on the three conditions F=9.121 with p<0.001. The path was 19.01±1.35 and 16.64±1.41 mm·s^{-1} in WBB and WBBm respectively (p>0.05), differently in kayak where there is less stability the path velocity was more higher (33.81±14.96 mm·s^{-1}) with p=0.008 *vs*. WBB (78%), and p=0.002 *vs*. WBBm (103%). While the ICC was 0.932 – 0.902 – 0.996 with <3% between repeated measures in WBB – WBBm and WBBm in kayak respectively. Bland-Altman shows good agreement (WBB) with a low systematic

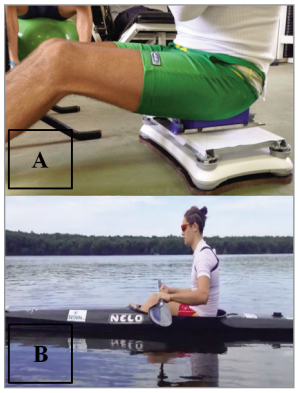

Figure 1 A, B. Wii Balance Board on the ground and in kayak.

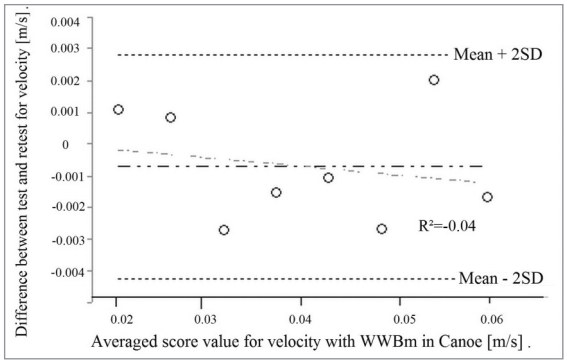

Figure 2. Bland-Altman plotting with limits of agreement between velocity of Centre of pressure between test and retest.

bias (-0.29 mm·s^{-1} or -1.49%) and low confidence interval (-1.69 < 95% CI < 1.11) and the variable is homoscedastic (r=0.02). For WWBm, the Bland-Altman (Fig. 2) shows good agreement with a low systematic bias (0.46 mm·s^{-1} or 2.85% for WWBm and -0.72 mm·s^{-1} or -2.13% for WWBm in kayak respectively) and moderate confidence interval (-1.05 < 95% CI < 1.97 for WWBm and -4.24 < 95% CI < 2.80 for WWBm in kayak respectively) and the variables are homoscedastic (r<0.1). Though the path velocity showed in this new experimental approaches in kayak was very high moreover the reliability was very strong 0.996. Moreover, this is the first study assessing postural sway reliability in kayak by a new tool low cost "Wii Balance Board".

Considering the accurate methodological approach and the good reliability of the measures, this article can be encourage the young scientific researcher to assess postural sway during the kayak race to improve the balance and force during paddle strokes's phases[12].

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