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BESS Test Concussion Screening Predicted by Balance Test Sway Velocity

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Purpose: Determine whether there is a relationship between a gold standard BESS Test and a Balance Test performed on a force plate. **Methods:** Balance testing was performed using a Sparta Science system by 38 healthy varsity collegiate athletes. Testing procedure consisted of each subject performing a series of 4 single- leg balance trials (2 on each leg) and 4 double-leg balance trials with eyes closed for 20-second trials on a force plate. During single-leg balance trials, non-dominant legs were tested according to the BESS test procedures, with a proctor counting touches to the ground, as the force plate collected data. During double-leg balance trials, both legs were tested according to the BESS test procedures, with a proctor counting any stumbles or extra touches, as the force plate collected data. The balance tests variable of interest is resultant sway velocity. The BESS tests variable of interest is number of errors during a trial. Resultant sway velocity and number of BESS errors were matched by trial. Pearson correlations were used to determine the relationship between resultant sway velocity and number of BESS errors, independent of stance type and dependent of stance type. Linear regression was used to determine if resultant sway velocity could predict the number of BESS errors. **Results:** Resultant sway velocity and number of BESS errors, independent of stance type, was statistically significantly correlated ($r=0.62$, $p<0.001$). For single-leg stance, resultant sway velocity and number of BESS errors was statistically significantly correlated ($r=0.37$, $p<0.05$), as was double-leg stance ($r=0.5$, $p<0.01$). For single-leg stance, resultant sway velocity can statistically significantly predict number of BESS errors (F-statistic=5.63, df=1, $R2=0.1386$, $p<0.05$). For double-leg stance, resultant sway velocity can statistically significantly predict number of BESS errors (F-statistic=11.66, df=1, $R2=0.2499$, $p<0.01$). **Conclusion:** Resultant sway velocity from the force plate system can predict the number of BESS errors in both single-leg and double-leg stance tests. As the resultant sway velocity increases (worse neuromuscular control and feedback), the number of BESS errors increases (worse score). Therefore, the single-leg balance test on the force plate can be used as a correlate, quantitative measurement tool to the subjective, gold-standard BESS test.