DEVELOPING BIOMECHANICAL INTERVENTIONS FOR MAJOR DEPRESSION: THE RELATIONSHIP BETWEEN DEPRESSION, ANXIETY, MOOD AND STATIC BALANCE

Tom. Outram[1], Paul. Briley[2], Callum. Osler[1], Sean. Lowten-Smith[1], Simon. Briley[1]
[1]School of Sport and Exercise Science, University of Derby, Derby, UK
[2]Faculty of Medicine and Health Sciences, University of Nottingham, Nottingham, UK
Email: t.outram@derby.ac.uk

Summary

The aim of this study was to examine the relationship between depression, anxiety, mood and static balance in a group of healthy volunteers. Nineteen participants provided self-reported measures of depressive symptoms (PHQ-8) and anxiety (GAD-7) and completed a happy-sad emotional bias task (CANTAB) before completing a 60 s single leg static balance task. Although no correlations were identified between depressive symptoms, anxiety and static balance, the results indicated that static balance was improved by a happy mood.

Introduction

Depression is a widespread mental health condition affecting millions globally, posing a significant public health challenge. Research has suggested potential links between biomechanical factors, such as gait and posture, and mental health conditions like depression and anxiety [1,2]. However, it has not been determined whether subtle changes in mood can influence these results. The aim of this study was to examine the relationship between depressive symptoms, anxiety, mood and static balance in healthy volunteers.

Methods

Nineteen participants, 16 male and 3 female (age 19.7 ± 0.8 years, height 1.78 ± 0.08 m, mass 77.5 ± 13.5 kg) volunteered to take part in this study. Data collection was part of a broader study seeking to develop a biomechanical intervention for major depression. For this study, participants provided self-reported measures of depressive symptoms (PHQ-8) and anxiety (GAD-7), completed a happy-sad emotional bias task (CANTB, Cambridge Cognition) and a static balance task. Measures of reaction time (mean and standard deviation) for happy and sad faces were collected. Static balance was assessed with participants standing on their dominant leg for 60 s on a force plate (Kistler, Winterhur, Switzerland) sampling at 1000 Hz. They were instructed to keep hands on hips and look straight ahead at an eye level target 1.2 m away Measures of center of pressure (COP) range (Ax and Ay) and average COP velocity were calculated. The Pearson correlation coefficient was used to assess the relationship between depressive symptoms, anxiety, mood and balance.

Results and Discussion

In the nineteen participants for whom baseline analyses are complete, mean PHQ-8 (self-reported depressive symptoms) ranged from 0 to 11 (none to low-moderate), and mean GAD-7 (self-reported anxiety) ranged from 0 to 25 (none to severe). There were no significant relationships between PHQ-8 total score, GAD-7 score and measures of static balance. However, there was a large positive correlation between the mean reaction time to happy faces and range in Ax ($r = 0.519$, $p = 0.023$). Large positive correlations were also identified for the relationship between standard deviation of the reaction time to happy faces and the range in Ay ($r = 0.658$, $p = 0.002$), mean Ax velocity ($r = 0.758$, $p < 0.001$) and mean resultant velocity ($r = 0.612$, $p = 0.002$) (Figure1). No correlations were identified for reaction times to sad faces and static balance.

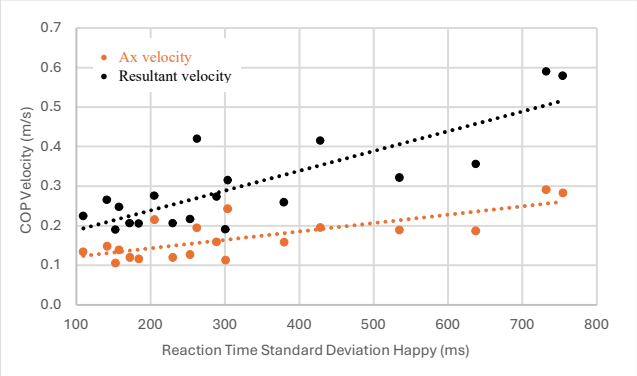

Figure 1: The relationship between standard deviation of the reaction time for happy faces and COP velocity.

The results provide evidence that, for healthy participants, a happy mood is related to improved balance. It is possible that positive mood improves attentional focus and can have a positive impact on the visual system [3], a factor responsible for balance attenuation via the integrated sensory feedback system. Further research is required to establish whether this relationship is enhanced over a broader spectrum of mood.

Conclusions

There is a strong indication that improved balance was associated with sensitive mood markers (reaction times to happy faces) in this non-patient sample with low levels of self-reported depression and anxiety. Ongoing work is examining changes in metrics following physiotherapist-directed interventions and preparing the approach for clinical studies.

Acknowledgments

Funding for the research was provided by the University of Derby's Vice-Chancellor Partnership Award.

References

[1] Murri M et al. (2020). *Psychiatry Res.* **284**, 112687.
[2] Radovanović S et al. (2014). *Psychiatry Res,* **217:** 39-46.
[3] Vanlessen, N (2016). *Neurosci. Biobehav. Rev*, **68:** *816.*