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More Than One Personal Risk Factor is Associated with Worse Clinical Outcomes Among Adolescents Following Concussion

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PURPOSE: To examine the association between clinical outcomes following the incidence of a concussion and patient history containing both personal psychological risk factors (anxiety/depression) and headache risk factors (headache/migraine). **METHODS:** 399 (F: 208) participants aged 15.2 ± 2.1 years with a symptomatic, diagnosed concussion, completed the 1) Immediate Post-concussion Assessment and Cognitive Test (ImPACT), 2) Vestibular/Ocular-Motor Screening (VOMS), and 3) the Post-Concussion Symptom Scale (PCSS) within 10 days of injury. Anxiety, depression, and headache and migraine histories were obtained from electronic medical records, and individuals were categorized into four groups: 1) Personal Psychological History (PPH); 2) Headache/Migraine History (H/MH); 3) combined PPH and H/MH (BOTH); or 4) No PPH or H/MH (NONE). A series of univariate ANOVAs, and post-hoc Scheffe pairwise comparisons, were conducted to compare initial ImPACT composite scores (verbal and visual memory, motor processing speed, and reaction time), VOMS and PCSS symptoms, and length of clinical recovery between groups. **RESULTS:** Number of days between concussion and first clinical evaluation were similar between PPH ($M \pm SD 8.0 \pm 5.7$), H/MH (14.8 ± 43.3), BOTH (10.3 ± 5.4), and NONE (10.2 ± 24.4) groups. BOTH had worse verbal memory performance (66.24 ± 3.53) than H/MH (77.58 ± 1.54 , $p < 0.05$), PPH (78.76 ± 1.54 , $p < 0.05$), and NONE (77.92 ± 1.04 , $p < 0.01$) groups. The BOTH group reported greater total symptom severity (60.89 ± 4.86) than H/MH (31.74 ± 5.19 , $p < 0.01$), PPH (30.57 ± 6.97 , $p < 0.01$), and NONE (30.05 ± 4.98 , $p < 0.01$) groups. BOTH also reported greater symptoms during vestibular screening (87.68 ± 8.98) than H/MH (42.30 ± 3.80 , $p < 0.05$), PPH (39.64 ± 7.73 , $p < 0.05$), and NONE (45.74 ± 2.67 , $p < 0.05$) groups. Lastly, BOTH took more days (131.97 ± 29.10) until medical clearance than H/MH (83.46 ± 22.48 , $p < 0.05$), PPH (120.02 ± 28.11 , $p < 0.05$), and NONE (86.02 ± 21.75 , $p < 0.05$) groups. **CONCLUSION:** Adolescents reporting both psychological and migraine history exhibited worse symptoms, neurocognitive performance, and length of recovery than adolescents with only one of these histories or adolescents with neither history. Early identification for these risk factors should be considered as a part of the multidisciplinary management for concussion.