

Better Fitness is Related to Lower Injury Risk in Male and Female Marines during Integrated Training

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Background: The Secretary of Defense announced on 3 December 2015 his decision that all Combat arms be opened across all armed forces to females; however, it is unclear as to how the integration of females into ground combat occupational specialties may affect injury incurred during training. The Marine Corps assessed more than 35 studies on the potential impact of gender integration in the ground combat arms specialties and units that were previously restricted to female Marines. The purpose of this study was to determine if male and female Marines who met a male performance threshold on a comprehensive battery of physiological and musculoskeletal tests were less likely to sustain a musculoskeletal injury during the Marine Corps' Ground Combat Element Integrated Task Force.

Methods: A total of 302 Marines (age=22.49±2.67 yrs, height=173.34±8.61 cm, weight=76.14±12.19 kg) in the integrated force participated. Anthropometric data (height, weight, arm span, and leg length) along with the following were collected: body composition; aerobic capacity/lactate threshold during maximal treadmill testing; anaerobic power/capacity testing during a maximal 30-second cycle sprint; shoulder, trunk, knee, and ankle strength; balance testing; field-based power testing (medicine ball toss, standing broad jump, pro-agility); and select events from the Marine Corps Physical Fitness Test and Combat Fitness Test (crunches, maneuver under fire, movement to contact). The top 95% of male performance for each variable was identified as the performance threshold. The percent of variables that met or exceeded the male threshold was calculated, with the following categories created: threshold attained on ≥60%, ≥70%, ≥80% and ≥90% of all tests. Injury status (injury/no injury) was prospectively tracked throughout integrated training. Chi-square tests were performed to assess the relationship between the threshold categories and injury status (p<0.05).

Results: Significant relationships were found between injury status and Marines who met or exceeded the threshold on ≥60% [29.9% vs. 54.1% injured in met vs. no met; X^2 (1, N=302)=8.022, p=0.005], ≥70% [28.9% vs. 49.1%; X^2 (1, N=302)=7.500, p=0.006, ≥80% [28.6% vs. 46.3%; X^2 (1, N=302)=6.522, p=0.011, and ≥90% [26.6% vs. 46.3%; X^2 (1, N=302)=8.948, p=0.003] of the tests.

Conclusion: Better fitness was associated with reduced risk of injury during integrated training. Participants who attained threshold on ≥60%, ≥70%, ≥80%, or ≥90% of the laboratory/field variables were less likely to sustain an injury during integrated training than those who did not. Both male and female Marines should focus on training to maximize the modifiable muscular and physiological characteristics, such as muscular strength/power, body composition, and aerobic/anaerobic fitness, in order to reduce the risk of injury during integrated training.

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