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IS THERE A CORRELATION BETWEEN RESCUER CHARACTERISTICS, CPR QUALITY AND
PERFORMANCE IN MARTIAN HYPOGRAVITY SIMULATION?**Abstract**

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INTRODUCTION: Little remains known whether current CPR quality in Martian hypogravity differs due to rescuer characteristics. The purpose of this investigation was to evaluate the correlation between rescuer height and weight, the performance of external chest compressions (ECCs) on a CPR mannequin and oxygen consumption during simulated 0.38Gz. **METHODS:** 30 healthy male volunteers (17-30years) performed 4 cycles of 30 ECCs, with 6s intervals between sets to allow for ventilation, on a CPR mannequin (Resusci Anne Skill Reporter, Laerdal Medical Ltd). Protocol was performed at +1Gz and in simulated 0.38Gz—achieved using a body suspension device. ECC depth, rate and rescuer oxygen consumption (VO₂) were measured during CPR administration. **RESULTS:** All volunteers completed the study. ECC depth and rate were sufficient during both +1Gz and simulated 0.38Gz; no difference was noted between the two gravitational conditions for these variables. Depth of inadequate chest recoil (DIRcoil) was less during 0.38Gz (1.6–1.8 mm) when compared to +1Gz (4.6–3.5 mm) ($p < 0.0001$). Throughout the last 30 s of ECCs, mean VO₂ increased from 3.2–1.1 ml·kg⁻¹·min⁻¹ at rest to greater levels during simulated 0.38Gz (17.9–4.5 ml·kg⁻¹·min⁻¹) compared to +1Gz (13.7–3.1 ml·kg⁻¹·min⁻¹). Multivariate regression analysis was performed to determine the predictors of depth, DIRcoil, ECC rate and VO₂ at +1Gz and during simulated 0.38Gz. The regression model variables included height and weight. Weight was a strong predictor of depth during simulated 0.38Gz ($r = 0.41$, $p = 0.02$), but not at +1Gz ($r = 0.12$). No variable was a significant predictor of DIRcoil or ECC rate. Weight was a significant predictor of VO₂ during simulated 0.38Gz and +1Gz ($r = -0.42$, $p = 0.02$ for both). **DISCUSSION:** Weight was the only predictor of ECC depth and VO₂ during simulated 0.38Gz. The positive correlation between ECC depth and weight emphasizes the importance that lightweight rescuers may require strength training and alteration of CPR technique to conduct effective CPR in simulated 0.38Gz. The negative correlation seen between VO₂ and weight highlight an increased effort, especially for lightweight males, to conduct adequate CPR in simulated 0.38Gz.