CONCLUSIONS: Overall, this sample was relatively lean, though M met the "Good-Excellent" category while F met the "Fair" category according to ACSM standards. Both measures of RT were consistent across M and F, though M had higher CMJ. VO2max was also higher in M, but both teams were considered "Excellent." Correlational findings suggest increased BF% may negatively impact both anaerobic and aerobic performance, as athletes with higher BF% had lower CMJ heights and cardiovascular fitness. Future research should assess how these measures, particularly reaction time metrics, relate to on-court tennis performance.

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Effects Of Specific Exercise Training During 120 Days Isolation On Physiological Kinetics And Inhibitory Control

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PURPOSE: Long-term isolation is known for the detrimental effects of inactivity and decreased external stimuli on physical and cognitive systems, which is relevant for space travel in microgravity but also for pandemic-related isolation periods. Exercise countermeasures are investigated in terrestrial analog settings concerning feasibility, time efficiency, and overall beneficial effects on cardiorespiratory and cognitive fitness (i.e., positive exercise-cognition interaction). In terrestrial settings, interval (INT) and continuous (CON) treadmill exercise showed positive effects on heart rate (HR) and oxygen uptake ($\dot{V}O_2$) capacities and kinetics, but research for space application is still pending. We expected (I) negative effects of isolation on cognitive performance and (II) physical fitness improvements, especially from INT.
METHODS: Six participants (34±6 years, 3 females) spent 120 days in isolation on a simulated journey to the moon (SIRIUS-19). 8 weeks of CON, followed by 8 weeks of INT aerobic exercise on a treadmill were conducted in a crossover design. Cardiorespiratory capacities, kinetics (HR, $\dot{V}O_2$), and cognitive performance (Flanker task measuring inhibitory control) were assessed with an exercise protocol, including pseudo-random binary sequences (PRBS), constant work-rate *phases* (Rest, 3, 6, 9 km h^{-1}, recovery), and incremental exercise for Pre, Post, and five *times* during isolation (ANOVA: *time* x *phase*).
RESULTS: Peak values for HR (P=0.025), $\dot{V}O_2$ (P=0.012), and respiratory exchange ratio (P=0.001) had significant *time* effects with lower values during isolation. Kinetics of HR and $\dot{V}O_2$ improved during the mission with slightly better effects for INT (both p<0.05). Inhibitory control was not altered by 120 days of isolation.
CONCLUSIONS: This study proved the successful implementation of cognitive testing within our endurance exercise test. Positive effects for INT and CON aerobic exercise were confirmed for HR, but not for $\dot{V}O_2$ kinetics during isolation periods. We assume the lack of general physical activity is merely compensated for by the applied exercise countermeasure, at least in 1G contexts. Currently, additional exercise modalities (i.e., strength training, passive treadmill exercise) are investigated during a consecutive 240-day mission (SIRIUS-21).

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A Minimalistic Exercise Program Without Equipment Improves Global Strength, Endurance And Flexibility In Untrained Persons

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INTRODUCTION: Physical fitness is a major requirement for soldiers to conduct demanding training programs but also to perform tasks on the battlefield. As soldiers for the German Army are recruited from a population which may have developed physical deficits already in school age, there is a high probability that a yet undefined range of soldiers is not in an adequate physical condition at the time of deployment. The time between application and deployment offers therefore a possibility to develop strength, endurance and flexibility via a defined training program.
PURPOSE: To validate the effectiveness of a standardized 4-week training program designed to improve general strength, endurance and flexibility capacities in untrained and sedentary active persons.
METHODS: The exercise plan was designed for a time time frame of 4 weeks and 4 training sessions per week with volume and intensity progression. Each session lasted 45 min containing a variable mixture of extensive running and bodyweight exercises without any equipment. These consisted basic flexibility routines for warmup, static and dynamic bodyweight strength exercises include abdominal exercises, pushups, planks, lunges and unilateral variations of these exercises. 9 sedentary active persons (8 females, 1 male) (Age: 34±15, Bodyheight: 171±7 cm, Bodyweight: 69±7 kg) were recruited to participate in the training intervention. Basic strength, endurance and flexibility diagnostics were conducted PRE and POST the study. Statistic evaluation was carried out using two-sided, dependent T-Tests with an alpha level of p<=0.05.
RESULTS: Subjects performed in mean 74% of all exercises. 1RM significantly increased in benchpress (p<0.01) from 32,2 +- 7,5 kg to 36 +- 9,5 kg. Time to exhaustion increased (p=0.021) from in mean 14,7 to 16,0 min. Peak power output on the ergometer tendencially increased (p=0.051) from 155+-33 to 166+-30 Watts. Knee to-wall tests indicated increased flexibility (p<0.05) development in both knees from 11,8 +- 3,6 cm to 13,4 +- 2,9cm (left knee) and from 11,7 +- 3,3 to 13,7 +- 2,9 cm (right knee).
CONCLUSION: The developed training procedure is sufficient to induce significant improvements of physical performance in untrained persons even with moderate reductions in training time and without equipment.

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Efficacy Of Proteus Motion Training To Increase Fastball Velocity In Collegiate Pitchers

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Proteus (Proteus Motion, USA) is a novel testing and training instrument that produces isotonic resistance through three-dimensional space. It is increasingly employed as a component of baseball conditioning regimens to improve pitching performance, but its efficacy has not been confirmed.
PURPOSE: To evaluate the effect of a Proteus-focused training program on changes in fastball velocity.
METHODS: 14 collegiate baseball pitchers, ages 18-22, underwent 6 weeks of structured exercise using the Proteus device; 13 subjects completed baseline and follow-up testing and were considered the study sample. At both testing sessions, fastball velocity was measured using Rapsodo (Rapsodo, USA), and each subject completed a battery of 11 exercise tests (5 bilateral, 6 unilateral) on Proteus. We exported the Proteus Performance Score (PPS) as well as composite calculations of power, acceleration, explosiveness, and velocity across all exercises. Paired-samples t-tests evaluated performance changes from baseline to follow-up. Linear regressions tested the relationships between Proteus metrics and fastball velocity at baseline and follow-up.
RESULTS: Fastball velocity was 83.5 ± 1.2 mph at baseline and 87.1 ± 3.2 mph at follow-up ($p < 0.001$). Similarly, PPS increased from 1.3 ± 0.2 to 1.5 ± 0.1 ($p = 0.002$) over the 6-week intervention, and it predicted fastball velocity at both baseline ($p = 0.027$) and follow-up ($p < 0.001$). Mean Proteus power improved from 213.2 ± 48.7 w to 258.3 ± 58.2 w ($p < 0.001$) and predicted fastball velocity at follow-up ($\beta = 0.012$; $p = 0.001$) but not baseline ($p = 0.177$). Mean Proteus acceleration improved from 15.7 ± 13.0 m/s^2 to 18.4 ± 8.4 m/s^2 ($p < 0.001$) and predicted fastball velocity at baseline ($\beta = 0.048$; $p = 0.033$) and follow-up ($\beta = 0.100$; $p < 0.001$). Mean Proteus explosiveness improved from 830.9 ± 696.5 w/s to 984.0 ± 446.5 w/s ($p < 0.001$) and predicted fastball velocity at baseline ($\beta = 0.001$; $p = 0.033$) and follow-up ($\beta = 0.002$; $p < 0.001$). Mean Proteus velocity improved from 17.8 ± 4.1 m/s^2 to 21.5 ± 4.9 m/s^2 ($p<0.001$) and predicted fastball velocity at follow-up ($\beta = 0.145$; $p=0.001$) but not baseline ($p=0.177$).
CONCLUSIONS: A 6-week, Proteus-focused exercise intervention elicited significant improvement in pitch velocity and Proteus performance metrics among collegiate pitchers.