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The physiological effects of a five-day specialist police tactical team selection course



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Background

Selection courses for entry into specialist police units are physiologically and psychologically demanding, designed to match the operational requirement of this job role [1]. Selection courses typically consist of extreme physical challenges under constant individual and team pressure, often with both sleep and nutritional deprivation [2]. In order to maximize candidate preparation, reduce the number of failures and better design selection courses, it is important to understand not only the physical requirements of these courses but also the physical effects of participation on these courses. Greater insight into the effects of a course can enable agencies to better plan courses, provide information to potential candidates and ensure injury risk is minimized. The aim of this investigation was to examine the physiological effects of a one-week specialist tactical police selection course on candidates attempting selection.

	Completed (n=11)	Not Completed (n=7)
Age (yrs)	30.64 ± 4.97	34.43 ± 4.51
Height (cm)	182.82 ± 4.85	185.14 ± 7.20
Body Mass (kg)	87.52 ± 7.15*	98.10 ± 7.95
Grip Strength Right (kg)	63.96 ± 7.46	59.12 ± 6.20
Grip Strength Left (kg)	62.62 ± 5.53	58.96 ± 6.71
Sit and Reach (cm)	18.05 ± 4.47	19.07 ± 5.48
Vertical Jump Height (cm)	26.36 ± 10.22	28.57 ± 7.28
Vertical Jump Power (W)	5532.94 ± 1117.35	5553.16 ± 760.05
Vertical Jump Velocity (m/s)	3.18 ± 0.30	3.02 ± 0.14
Bench Throw Power (W)	1003.20 ± 215.34	999.45 ± 162.92
Bench Throw Velocity (m/s)	1.58 ± 0.29	1.56 ± 0.24
Bench Pull Power (W)	994.55 ± 286.76	1087.54 ± 345.44
Bench Pull Velocity (m/s)	1.35 ± 0.23	1.41 ± 0.26



Over the course of the week there were significant ($p=0.006$) decreases in body weight of 2.05kg [95% CI=3.65-0.45], (Figure 1) significant ($p<0.001$) decreases in grip strength of 14.48kg [95% CI=21.32-7.64] on the right and 14.27kg [95% CI=21.89-6.66] on the left (Figure 2) and a significant ($p<0.001$) decrease of sit and reach flexibility of 6.64cm [95%CI=9.94-3.33](Figure 3). Non-significant decreases in power output and peak jump velocity of 669.77W [95%CI= 1942.92 to 603.39] and 0.28m/s [95%CI=0.69-0.14], (Figure 4) were also found with an overall increase in vertical jump height 6.09cm [95%CI = -6.08 to 18.79] (Figure 5). There was a 216.72W [95% CI =471.06-37.61] decline in bench throw power and velocity of 0.12m/s [95% CI = 0.47-0.22], however these differences were not significant ($F(4,40)=7.041$, $p=0.122$, partial $\eta^2=.41$ & $F(1.86, 18.595)=1.235$, $p=1.000$, partial $\eta^2=.11$ respectively). Power output on the bench pull decreased by 148.43W [95% CI = 357.34-60.49] and velocity decreased by 0.12m/s [95% CI = 0.29-0.06], both not significant changes ($F(2.159, 21.595)=3.333$, $p=0.291$, partial $\eta^2=.25$; $F(4,40)=3.448$, $p=0.377$, partial $\eta^2=.26$ respectively).

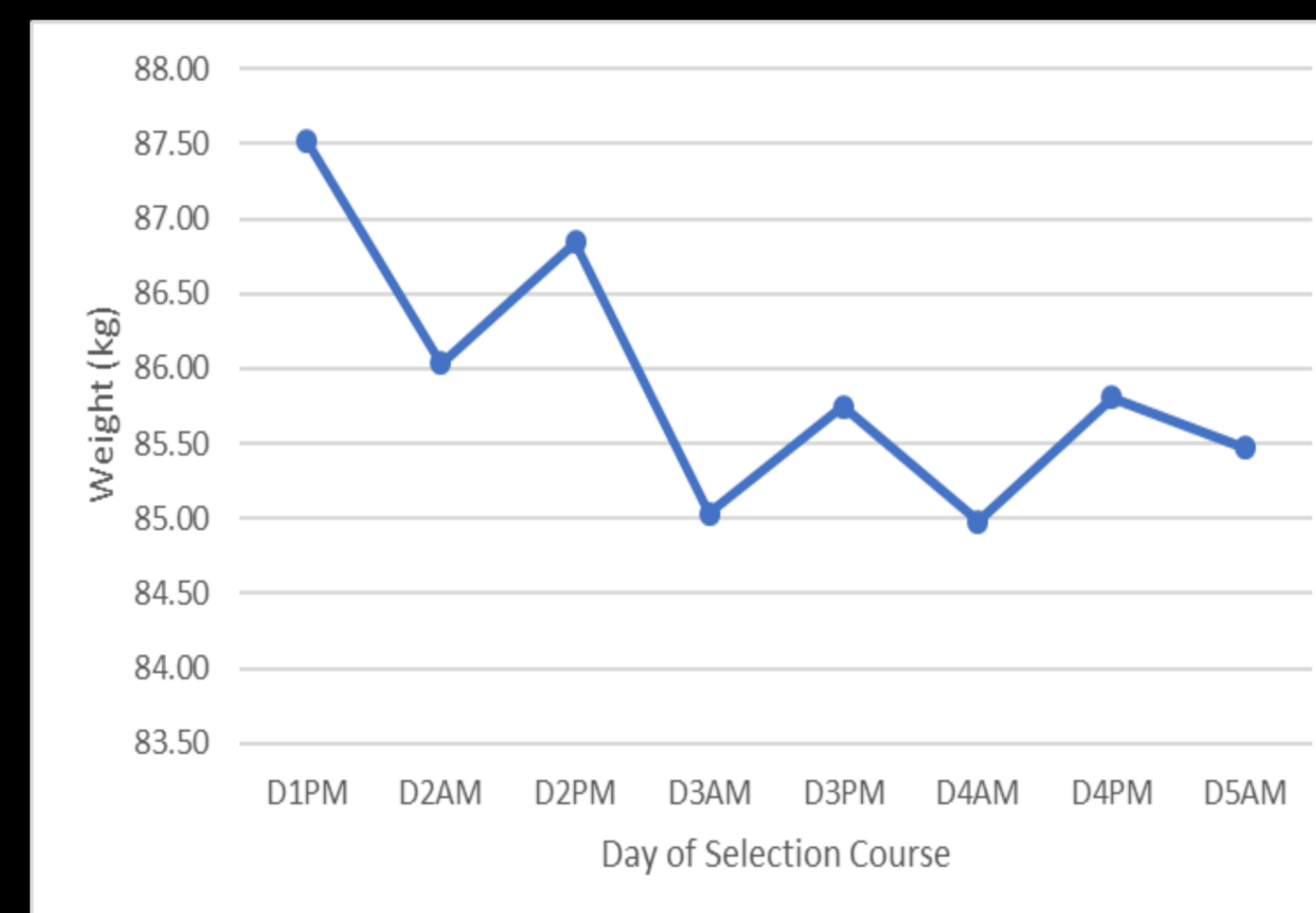


Figure 1: Changes in body mass



Figure 2: Changes in grip strength

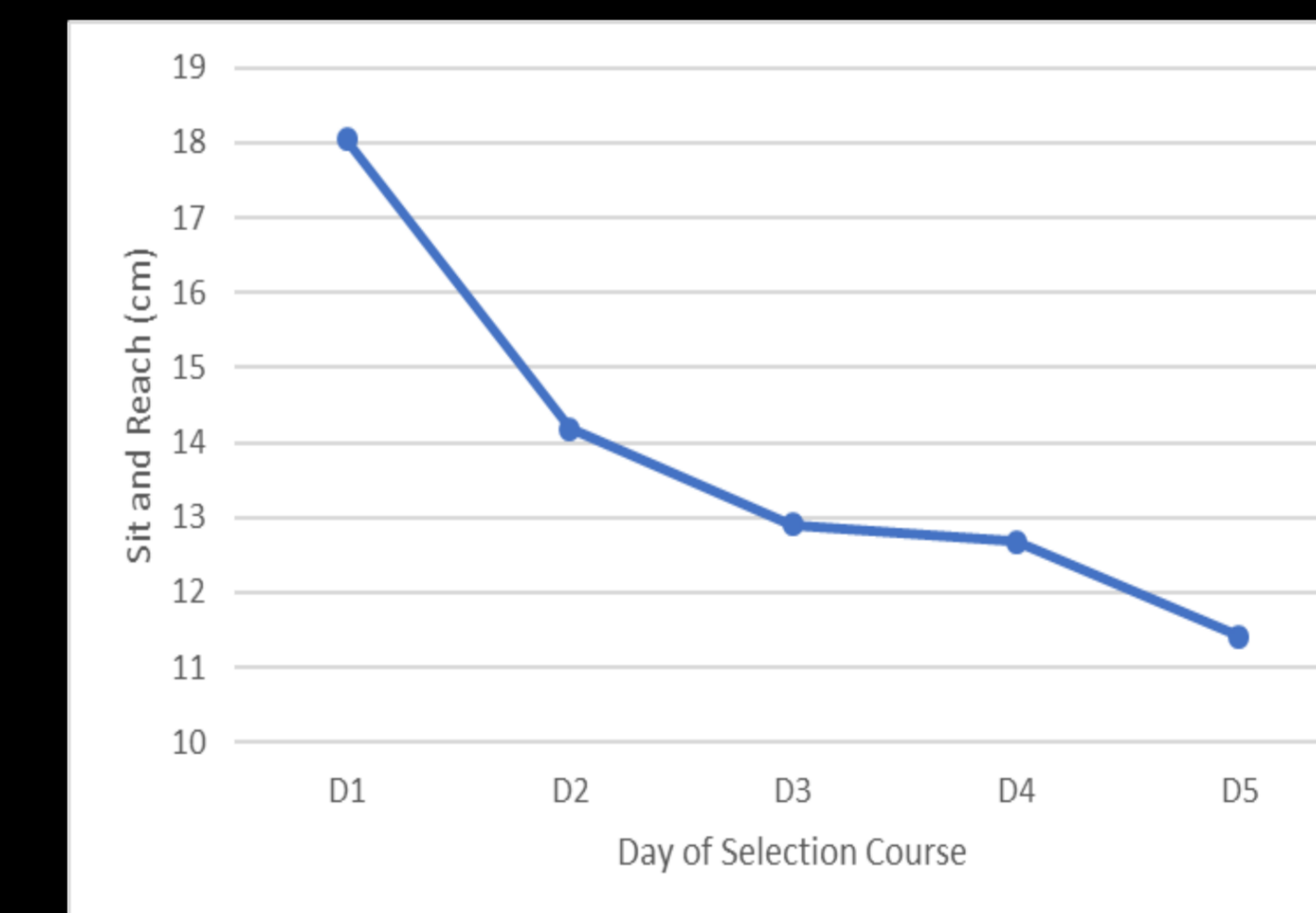


Figure 3: Changes in flexibility

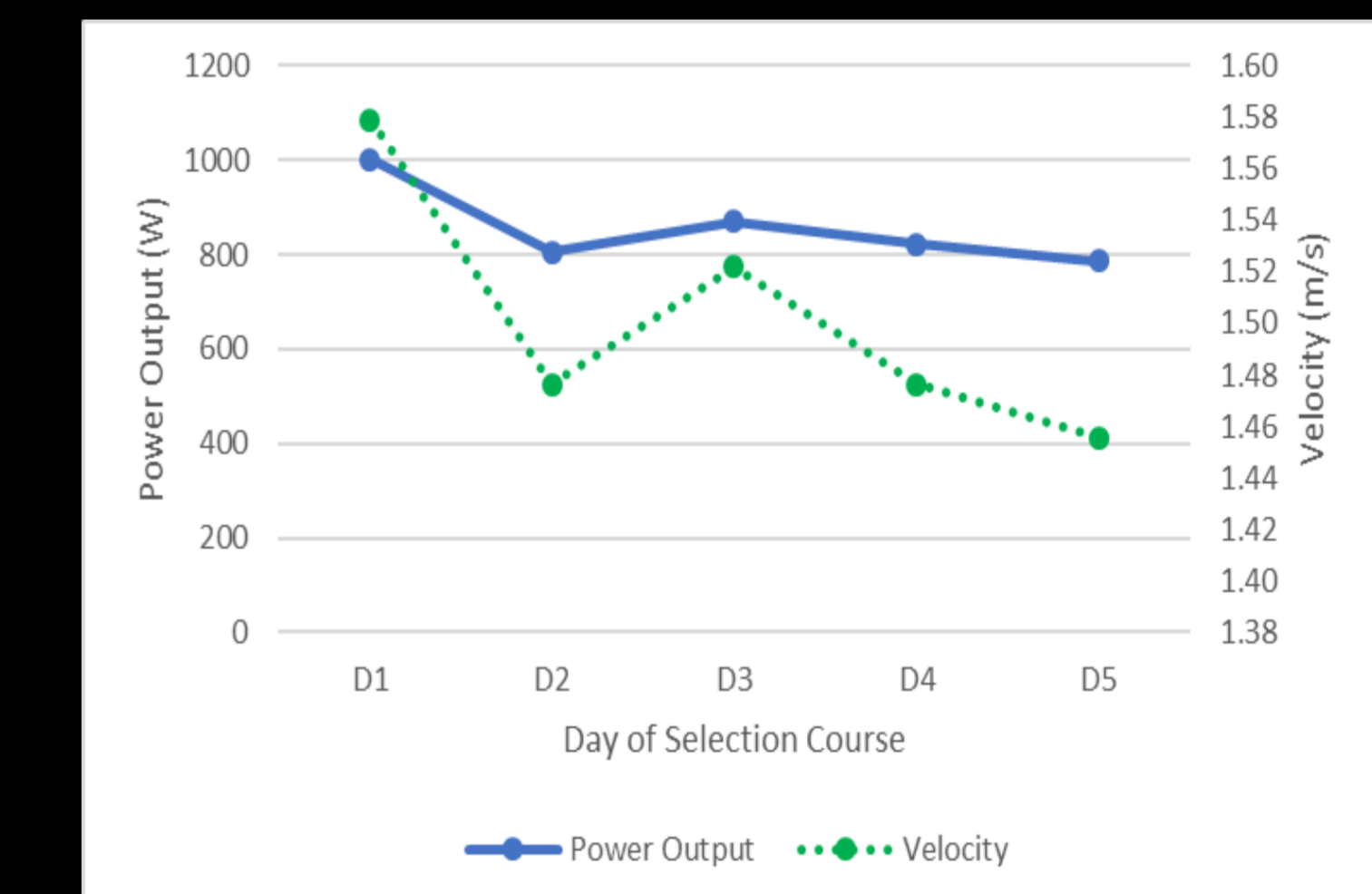


Figure 4: Changes in Vertical Jump

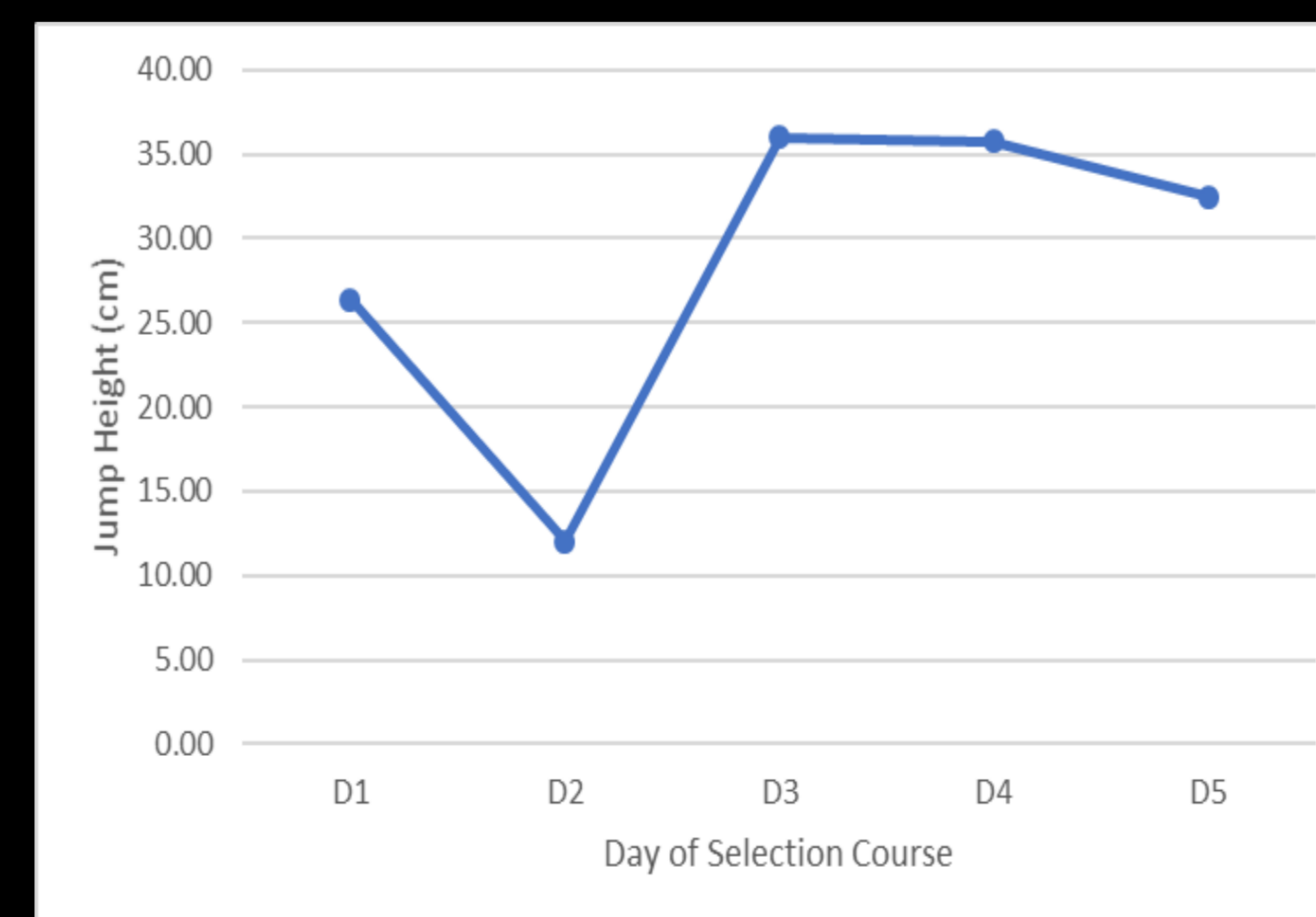


Figure 5: Changes in Vertical Jump height

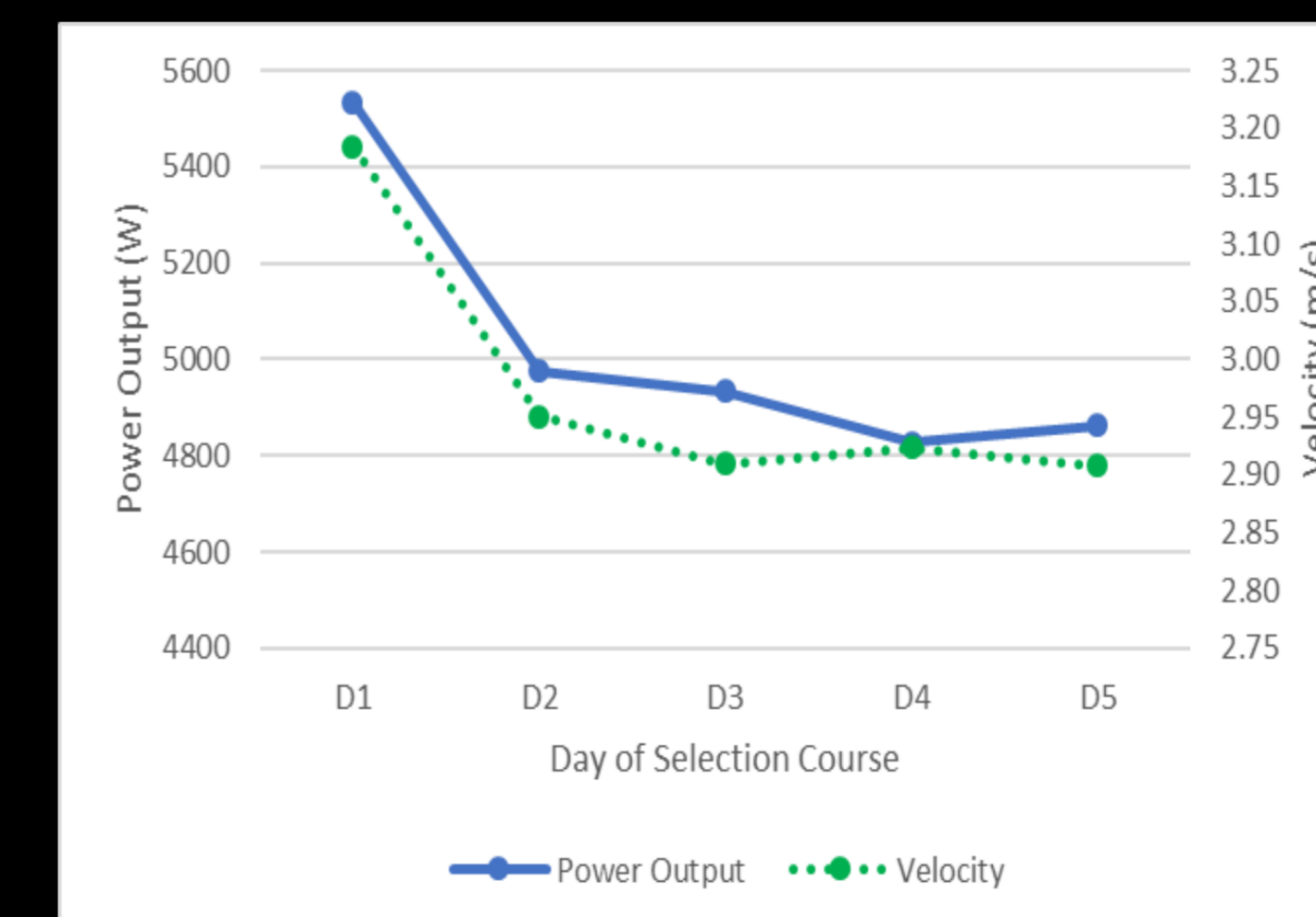


Figure 6: Changes in Bench Throw

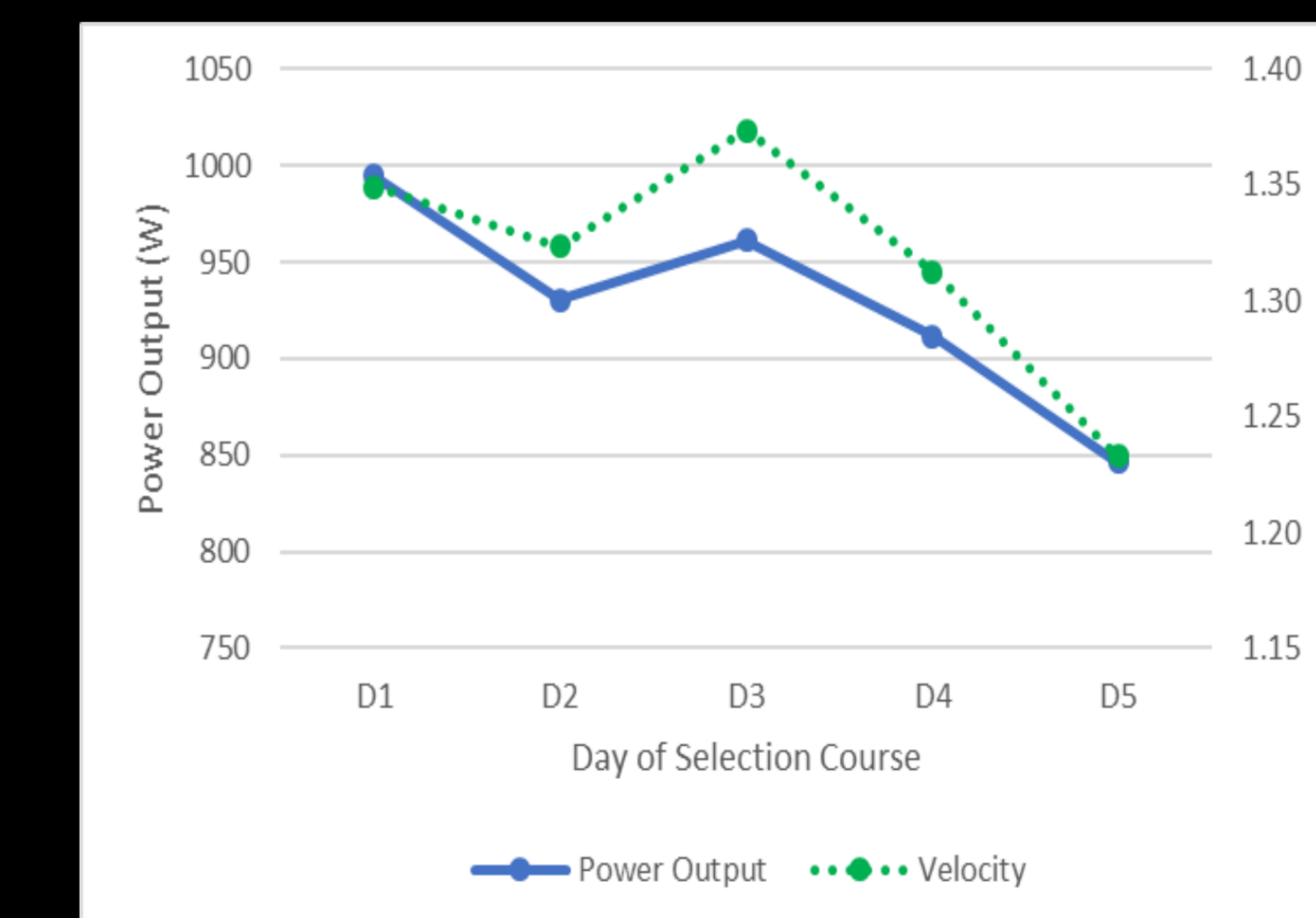


Figure 7: Changes in Bench Pull

Methods: A prospective cohort study was designed where data pertaining to 18 candidates was obtained during a five-day selection course for specialist police selection. Daily measures of weight, grip strength, sit and reach flexibility, vertical jump height and vertical jump power output were performed. Changes in these measures over the course were analyzed with a repeated measures ANOVA.

Results: From an initial 18 candidates, 11 completed the selection week with two self-withdrawing and five medically withdrawn. Demographics and initial measures of those who did and did not complete the selection course can be seen in Table 1. Despite those who completed the week on average being younger and shorter than those who did not complete the week, the differences were not significant. The only significant difference in initial measures between those who did and did not complete the selection course was body mass, with those who completed the course being significantly lighter than those who did not complete the course ($F=0.042$, $t=2.934$, $p=0.010$).

Conclusion: Overall, successful candidates were younger, shorter and lighter than unsuccessful candidates. Through the course over a period of one week, declines were seen in body mass, grip strength, flexibility, and power output. Given that there are documented declines in these measures, strength and conditioning coaches who are working with candidates should ensure they train strength, flexibility and power for as much redundancy as possible and where able, expose themselves to periods of sleep and nutritional deficit and understand how their performance is affected under prolonged periods of stress. Likewise, agencies should be aware that when they put candidates under the required level of fatigue, sleep and nutritional deprivation, they may be concurrently increasing injury risk. Agencies should plan for adequate breaks post selection course for recovery of these parameters before launching into any reinforcement or tactical skills validation cycles of continuing training.

Operational Relevance: This study highlights the declines in performance may be associated with an increased risk of injury during a five-day selection course. Health professionals working with police who are planning on attending selection courses should plan for these decreases and build redundancy in these areas to minimize their effect, to decrease injury risk and maximize chances of success.

References:

- [1] Hunt, A.P.; Orr, R.M.; Billing, D.C. Developing physical capability standards that are predictive of success on special forces selection courses. *Mil Med* 2013, 178, 619-624.
- [2] Maddi, S.R.; Matthews, M.D.; Kelly, D.R.; Villarreal, B.; White, M. The role of hardiness and grit in predicting performance and retention of usma cadets. *Mil Psychol* 2012, 24, 19-28.