Effect of a Lower Extremity Preventive Training Program on Physical Performance Scores in Military Recruits

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Abstract

Peck, KY, DiStefano, LJ, Marshall, SW, Padua, DA, Beutler, AI, de la Motte, SJ, Frank, BS, Martinez, JC, and Cameron, KL. Effect of a lower extremity preventive training program on physical performance scores in military recruits. *J Strength Cond Res* 31(11): 3146–3157, 2017–Exercise-based preventive training programs are designed to improve movement patterns associated with lower extremity injury risk; however, the impact of these programs on general physical fitness has not been evaluated. The purpose of this study was to compare fitness scores between participants in a preventive training program and a control group. One thousand sixty-eight freshmen from a U.S. Service Academy were cluster-randomized into either the intervention or control group during 6 weeks of summer training. The intervention group performed a preventive training program, specifically the Dynamic Integrated Movement Enhancement (DIME), which is designed to improve lower extremity movement patterns. The control group performed the Army Preparation Drill (PD), a warm-up designed to prepare soldiers for training. Main outcome measures were the Army Physical Fitness Test (APFT) raw and scaled (for age and sex) scores. Independent *t* tests were used to assess between-group differences. Multivariable logistic regression models were used to control for the influence of confounding variables. Dynamic Integrated Movement Enhancement group participants completed the APFT 2-mile run 20 seconds faster compared with the PD group ($p < 0.001$), which corresponded with significantly higher scaled scores ($p < 0.001$). Army Physical Fitness Test push-up scores were significantly higher in the DIME group ($p = 0.041$), but there were no significant differences in APFT sit-up scores. The DIME group had significantly higher total APFT scores compared with the PD group ($p < 0.001$). Similar results were observed in multivariable models after controlling for sex and body mass index (BMI). Committing time to the implementation of a preventive training program does not appear to negatively affect fitness test scores.

Key Words injury risk, general fitness, athlete development

Introduction

Lower extremity injuries are common among athletes (8,29) and military service members (3,10). These injuries result in lost training time, financial cost, and long-term sequelae (2,16). Recent research demonstrates that lower extremity preventive training programs can be effective in primary injury prevention (11–13,15,18,21,23,33) by addressing errors in movement technique, such as landing with limited sagittal plane motion or excessive frontal/transverse plane motion. Implementation of these programs is encouraged in all physical activity settings.

The time required to perform preventive training programs is often cited as a critical barrier to effective implementation (14,22,31). Coaches, strength and conditioning professionals, and military commanders who commit time to a preventive training program have less time to devote to their sport-specific practice, conditioning, and military-specific training which could lead to a decrease in performance. Contrary to this logic, there is some evidence suggesting that preventive training programs, in addition to decreasing injury risk, can also improve athletic performance; (1,7,12,24,25) however,

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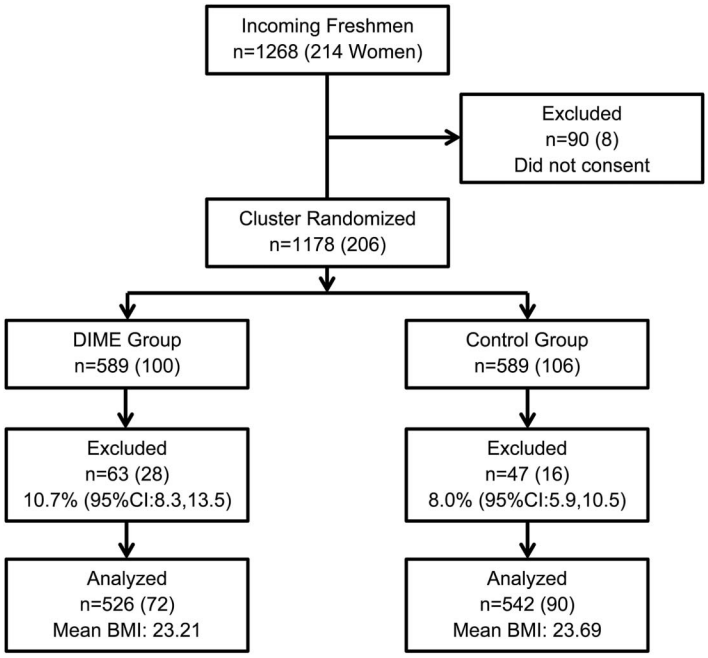

Figure 1. CONSORT flow diagram.

the majority of this evidence was found with programs lasting longer than 30 minutes. Consequently, there is a strong need to evaluate if shorter duration programs have an impact on physical performance measures, which are frequently goals of many strength and conditioning programs. Although measures of sport performance, such as vertical jump height and agility time, are important for some sport coaches, the military measures physical performance using a standardized fitness test comprised of push-ups, sit-ups, and a timed run. The results of this test are very important because they are considered when decisions are made regarding retention and promotion. Like coaches, military commanders want to know if implementing a preventive training program during military training time has an impact on these key military fitness indices.

To our knowledge, there is no evidence that preventive training programs designed to improve neuromuscular control can be successfully implemented within a large-scale setting, such as the military, without having an adverse effect on fitness measures. This information is vital to the support of long-term implementation of preventive training programs. Therefore, the purpose of this study was to compare physical performance scores between individuals who participated in a 10-minute lower extremity preventive training program and those who performed a standard warm-up.

Methods

Experimental Approach to the Problem

This study was part of a larger cluster-randomized controlled trial conducted at United States Military Academy. The study population was freshmen cadets who had just arrived at the academy for basic training and had been assigned to one of 8 military training companies. These companies were cluster-randomized into either the injury prevention or standard warm-up group. All cadets performed their specified warm-up activity during the 6-week basic training period, but only those that volunteered to participate in the study and gave informed consent were included in data analyses. This study's outcome measure was the Army Physical Fitness Test (APFT) performed at the conclusion of the basic training period.

Subjects

Cadets report to the United States Military Academy 6 weeks before the start of the academic year, so that they can complete cadet basic training. Approximately 12–15% of these cadets have prior military experience, so they are familiar with military training and fitness assessments; the remaining cadets are new to military-specific training.

Of 1,268 incoming freshman, 1,178 participants ($M = 972$, $F = 206$; age 17–23) consented to participate in this study. Half of the military companies ($n = 4$ companies; 589 participants) were cluster-randomized into the intervention group and half ($n = 4$ companies; 589 participants) were assigned to the active control group. We excluded participants from the final analyses if they did not complete at least 90% of the warm-up sessions or if they did not complete all 3 events of the APFT. This resulted in 1,068 participants ($M = 906$, $F = 162$) included in the final analyses; of these, 526 ($M = 454$, $F = 72$) were in the intervention group and 542 ($M = 452$, $F = 90$) were in the active control group (Figure 1).

This study was approved by the university's Institutional Review Board. All subjects were informed of the benefits and risks of the study before signing an institutionally approved informed consent form. Military cadets who enlist at the age of 17 are considered emancipated and are able to consent as adults.

Procedures

The preventive training program and standard warm-up program both required 10–12 minutes to complete and were performed before their general physical fitness training sessions that occurred at 5:30 AM. Most of these conditioning sessions consisted of running, muscular strength and

Table 1. United States Military Academy Dynamic Integrated Movement Enhancement.

Exercise	Description	Coaching cues
1. Double Leg Squat 	Starting position: Feet shoulder width apart, hands on hip bones.	"Knees over toes"
	Directions: Squat down slowly, sending hips back as if sitting in a chair. Knees bend to 90°. Return to standing. Back stays flat throughout.	"Keep knees from going past toes"
	Cadence: Slow (♩ = 40) Reps: 10	"Toes straight ahead" "Sit back" "Feet shoulder width apart"
2. Squat Jump 	Starting position: Squat position, arms in ready position in back.	"Land softly toe to heel"
	Directions: Jump up for maximum height and return to start position. Land softly toe to heel. Control the landing by bending at the hips, knees and ankles.	"Bend at the hips, knees, and ankles"
	Cadence: Slow (♩ = 60) Reps: 5, rest, 5	"Knees over toes" "Toes straight ahead" "Jump for maximum height"
3. Forward Lunge 	Starting position: Feet shoulder width apart, hands on hips	"Knees over toes"
	Directions: Take a long step forward with left foot and slowly lower back knee toward ground. Push with front leg to return to standing. Alternate legs.	"Keep knees behind toes"
	Cadence: Slow (♩ = 40) Reps: 10	"Bend both knees to 90" "Keep torso upright"

4. Side Plank 	Starting position: Side lying on left side, elbow under shoulder, feet stacked.	"Straight line, head to toes"
	Directions: Lift your hips, bringing them in a straight line with shoulder and feet. Brace abs and glutes. Hold 30 s, maintaining straight line head to spine	"Keep hips perpendicular with ground"
	Cadence: Stationary 30 count each side	"Brace abs and squeeze your glutes" "Elbow directly under shoulder"
5. Push-Up 	Starting position: Front leaning rest.	"Keep back flat, don't sag"
	Directions: Maintain a flat back and brace the abs. Lower body to ground, keeping elbows in. Push up to starting position.	"Keep abs braced" "Hands directly under shoulders"
	Cadence: Moderate Reps: 10	"Don't lock elbows"
6. Single Leg Reach 	Starting position: Standing on left leg with knee slightly bent.	"Hips Level"
	Directions: Extend arms by ears and tip forward at the hips, extending right leg to the rear. Keep hips level. Return to standing. Left leg stays slightly bent.	"Keep back flat"
	Cadence: Slow (♩ = 40) Reps: 5 each side	"Keep your balance" "Tip forward at the hip" "Rear leg reaches back"
7. Side Hop to Balance 	Starting position: Left foot with knee bent, hands on hips.	"Land *softly* toe to heel"
	Directions: Hop sideways, as if over a hurdle, and land on opposite foot. Bend at hips, knees and ankles. Hold balance for 2 s. Hop back to other side and repeat.	"Keep center of gravity low"
	Cadence: Slow (♩ = 40) Reps: 5/10, rest, 5/10	"Knees over toes" "Toes straight ahead" "Keep your balance"

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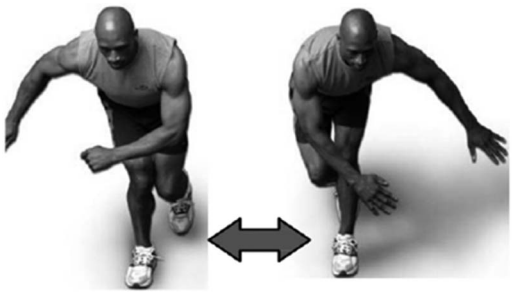
8. Ice Skater 	Starting position: Left leg with knee bent, ready position.	"Hop and land *softly*"
	Directions: Hop sideways and land softly on the opposite foot, bending at hips, knees, and ankles. Hop immediately back to starting foot. Control the landing, maintain balance and stay low.	"Keep center of gravity low"
	Cadence: Slow (♩ = 60) Reps: 10	"Knees over toes" "Explode back to other side"
9. "L" Hop 	Starting position: Left foot with knee bent, hands on hips.	"Hop and land *softly*"
	Directions: Hop forward and land softly on left foot, bending at hips, knees, and ankles. Hop quickly back to start position. Hop to the left and back to start. Repeat for 5 reps. Repeat on the right leg in the opposite direction (forward, backward, right, back to start)	"Bend hips, knees, and ankles"
	Cadence: Slow (♩ = 40) Reps: 5 each side	"Keep your chest over your foot" "Get off the ground when hopping"

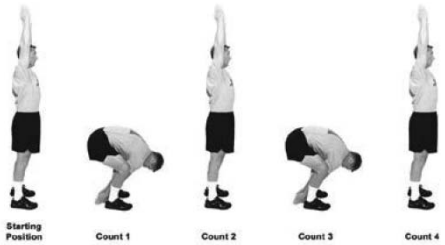
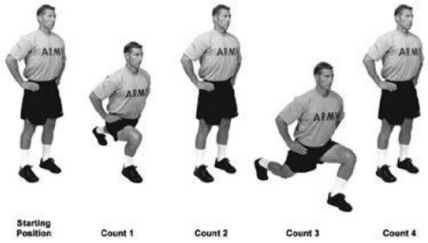
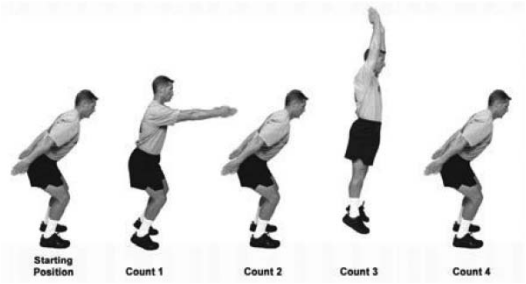
endurance exercises, and some high-intensity training. Upper class students who had been at the academy for at least 2 years were in leadership positions (cadre) over the freshmen cadets and implemented both programs during the intervention period. Because the leadership positions are part of the overall leadership training, military officers provided close oversight and feedback to the cadre as they executed each program. In addition, study personnel including athletic trainers, physical therapists, and physicians gave feedback to the cadre who executed the preventive training program. The implementation of this study protocol was approved by the academy leadership. Both the cadets and the cadre received a grade at the end of the summer for their performance as either a trainee or as a leader in basic training so they were motivated to perform well.

Those in the intervention group performed the Dynamic Integrated Movement Enhancement (DIME) preventive training program that has shown promise in reducing lower extremity musculoskeletal injuries (4); this program consists of 9 exercises designed to improve lower-extremity alignment, decrease ground reaction forces during landing, and increase balance and core strength (Table 1) (27). The DIME requires only a large flat surface (grass, turf, or gym floor) and does not require any equipment. The active control group performed the Army Preparation Drill (PD), which consists of 10 callisthenic exercises designed to ready soldiers for more intense physical training activities (5). The objectives are to increase body temperature and heart rate, increase pliability of joints and muscles, and increase responsiveness of nerves and muscles (Table 2) (5). Both the DIME group and the PD group performed the warm-up drill 3 to 4 times per week, which was verified by study staff. The programs were executed at different locations but were always performed on flat grass-covered athletic fields. Because this study took place in a military setting, all sessions were carried out as scheduled.

Outcome Measures

The APFT is typically administered to all Army personnel every 6 months and final scores are scaled for age and sex (5). All participants in this study completed the APFT at the end of the intervention period. The APFT has 3 components that are designed to assess overall fitness: push-ups, sit-ups, and a 2-mile run. Participants had 2 minutes to complete as many correct repetitions as they could for the push-up and sit-up assessments (muscular endurance). The final assessment is a timed 2-mile run that has been shown to correlate with measures of $\dot{V}O_2$max and cardiorespiratory endurance (19,28,32). All participants took this test outdoors on one of 2 consecutive days during their

TABLE 2. Army Preparation Drill.

Exercise	Starting point	Check points
Bend and reach 	Straddle stance with arms overhead, palms facing inward, fingers and thumbs extended and joined	From the starting position, ensure that soldiers have their hips set, their abdominals tight, and their arms fully extended overhead. The neck flexes to allow the gaze to the rear. This brings the head in line with the bend of the trunk The heels and feet remain flat on the ground. On counts 2 and 4, do not go past the starting position.
Rear lunge 	Straddle stance with hands on hips	Maintain straightness of the back by keeping the abdominal muscles tight throughout the motion. After the foot touches down, allow the body to continue to lower. This promotes flexibility of the hip and trunk. On counts 1 and 3, step straight to the rear, keeping the feet directed forward. When viewed from the front, the feet maintain their distance apart both at the starting position and at the end of counts 1 and 3. Keep the rear leg as straight as possible but not locked and the rear heel off the ground.
High jumper 	Forward leaning stance, palms facing inward, fingers and thumbs extended and joined	At the starting position, the shoulders, the knees, and the balls of the feet should form a straight vertical line. On count 1, the arms are parallel to the ground. On count 3, the arms should be extended fully overhead. The trunk and legs should also be aligned. The soldier is jumping on each count. On counts 1, 2, and 4, the jumps are only 4–6 inches off the ground. On count 3, the soldier jumps higher (6–10 inches) while maintaining the posture pictured.

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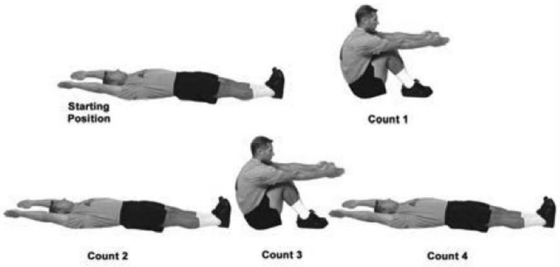
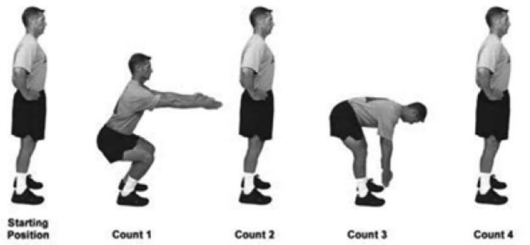
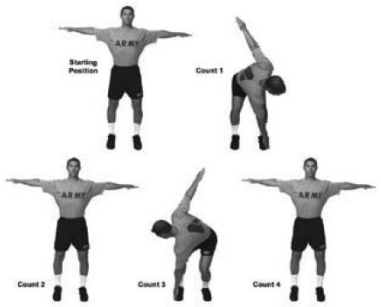
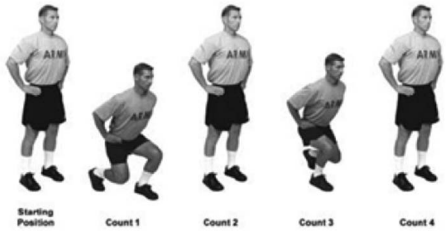
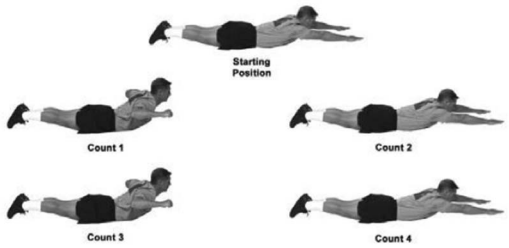
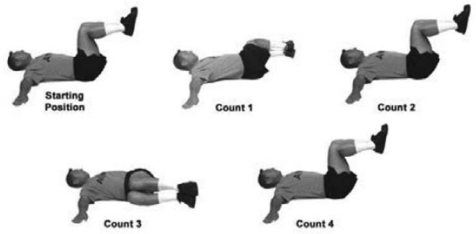
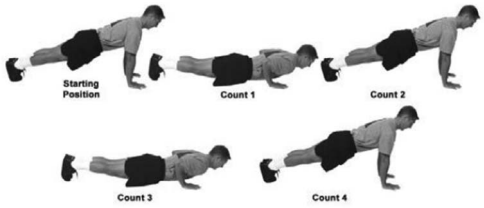
Rower		Supine position, arms overhead, feet together and pointing upward. The chin is tucked and the head is 1–2 inches above the ground. Arms are shoulder-width, palms facing inward with fingers and thumbs extended and joined.	At the starting position, the low back must not be arched excessively off the ground. To prevent this, tighten the abdominal muscles to tilt the pelvis and low back toward the ground. At the end of counts 1 and 3, the feet are flat and pulled near the buttocks. The legs stay together throughout the exercise and the arms are parallel to the ground.
Squat bender		Straddle stance with hands on hips	At the end of count 1, the shoulders, knees, and the balls of the feet should be aligned. The heels remain on the ground and the back is straight. On count 3, bend forward, keeping the head aligned with the spine and the knees slightly bent. Attempt to keep the back flat and parallel to the ground.
Windmill		Straddle stance with arms sideward, palms facing down, fingers and thumbs extended and joined.	From the starting position, feet are straight ahead, arms parallel to the ground, hips set, and abdominals tight. On counts 1 and 3, ensure that both knees bend during the rotation. Head and eyes are directed to the rear on counts 1 and 3.
Forward lunge		Straddle stance with hands on hips	Keep the abdominal muscles tight throughout the motion. On counts 1 and 3, step straight forward, keeping the feet directed forward. When viewed from the front, the feet maintain their distance apart both at the starting position and at the end of counts 1 and 3.

Prone row 	Prone position with the arms overhead, palms down, fingers and thumbs extended and joined, 1–2 inches off the ground and toes pointed to the rear.	At the starting position, the abdominal muscles are tight and the head is aligned with the spine. On counts 1 and 3, the forearms are parallel to the ground and slightly higher than the trunk. On counts 1 and 3, the head is raised to look forward but not skyward. Throughout the exercise, the legs and toes remain in contact with the ground.
Bent-leg body twist 	Supine position with the hips and knees bent to 90°, arms sideward and palms down. The knees and feet are together.	Tighten the abdominal muscles in the starting position and maintain this contraction throughout the exercise. The head should be off the ground with the chin slightly tucked. Ensure that the hips and knees maintain 90° angles. Keep the feet and knees together throughout the exercise. Attempt to rotate the legs to about 8–10 inches off the ground. The opposite shoulder must remain in contact with the ground.
Push-up 	Front leaning rest position	The hands are directly below the shoulder with fingers spread (middle fingers point straight ahead). On counts 1 and 3, the upper arms stay close to the trunk, elbows pointing rearward. On counts 2 and 4, the elbows straighten but do not lock. To prevent the trunk from sagging, tighten the abdominal muscles while in the starting position and maintain this contraction throughout the exercise.

normal physical training time (5:30 AM). Therefore, outside temperatures, nutrition, hydration levels, and sleep schedules were similar for all participants.

Statistical Analyses

The main outcome measures were raw and scaled (for age and sex) scores for the 2 APFT events (push-ups, sit-ups, and a 2-mile run) and the total score (5). Initially, independent t tests were used to assess between-group differences (DIME, PD) for each dependent variable. The data for these dependent variables were normally distributed and all assumptions for parametric statistics were satisfied. Sex and BMI were carried forward into multivariable linear regression models to control for the influence of these potential confounding variables. All analyses were performed using Stata/SE version 10.1 (StataCorp., College Station, TX, USA) using an a priori alpha level of $p < 0.05$.

Results

Participants in the DIME group completed the 2-mile run 20 seconds (95% CI: 9.27–31.14) faster when compared to the PD group ($p < 0.001$). Participants in the DIME group completed the run in 808 (±79) seconds compared with the PD group who completed the run in 828 (±102) seconds (Table 3). This corresponded with significantly higher scaled scores for the 2-mile run in the DIME group ($p < 0.001$). Although the

Table 3. APFT scores.

	Control	DIME	95% CI	*p*
Raw Scores				
Push-ups	63.57 (SD = 33.36)	65.34 (SD = 16.07)	−4.90, 1.36	0.267
Sit-ups	72.72 (SD = 46.28)	72.44 (SD = 41.13)	−4.97, 5.54	0.916
2-mile Run	13:48 (SD = 1:42)	13:28 (SD = 1:19)	9.27, 31.14	>0.0001*
Scaled Scores				
Push-ups	91.08 (SD = 14.16)	92.80 (SD = 13.27)	−3.36, −0.07	0.041*
Sit-ups	85.89 (SD = 15.58)	86.53 (SD = 15.11)	−2.48, 1.20	0.496
2-mile Run	92.45 (SD = 13.97)	95.38 (SD = 11.73)	−4.47, −1.38	>0.001*
Total Score	269.43 (SD = 33.79)	274.71 (SD = 31.97)	−9.23, −1.33	0.009*
Grade	C+	B−		

*Statistically significant

Table 4. Regression analysis for 2-mile run times by intervention group controlling for BMI and sex.

Variable	*B*	*SE B*	*t*	95% CI	*p*
Intervention Group	−12.82	4.63	−2.77	−21.90, −3.73	0.006
BMI	7.72	0.78	9.96	6.20, 9.24	<0.001
Sex	140.66	6.49	21.68	127.92, 153.39	<0.001

Table 5. Regression analysis for 2-mile run scaled scores by intervention group controlling for BMI and sex.

Variable	*B*	*SE B*	*t*	95% CI	*p*
Intervention Group	2.33	0.76	3.06	0.84, 3.82	0.002
BMI	−1.38	0.13	−10.90	−1.63, −1.14	<0.001
Sex	−0.68	1.06	−0.64	−2.77, 1.41	0.525

Table 6. Regression analysis for push-up scale score by intervention group controlling for BMI and sex.

Variable	*B*	*SE B*	*t*	95% CI	*p*
Intervention Group	1.93	0.85	2.28	0.27, 3.59	0.023
BMI	−0.08	0.14	−0.58	−0.36, 0.20	0.564
Sex	3.68	1.18	3.11	1.35, 6.00	0.002

Table 7. Regression analysis for APFT total scale score by intervention group controlling for BMI and sex.

Variable	*B*	*SE B*	*t*	95% CI	*p*
Intervention Group	4.54	1.99	2.28	0.63, 8.46	0.023
BMI	−2.33	0.33	−6.97	−2.98, −1.67	<0.001
Sex	−1.22	2.79	−0.44	−6.70, 4.27	0.663

scaled scores for both push-ups and sit-ups were higher in the DIME group, these differences were only statistically significant for the push-up ($p = 0.041$). Significantly higher total APFT scaled scores were also observed in the DIME group (275 ± 32) when compared to the PD group (269 ± 34) ($p < 0.001$). This higher scaled score translated to a mean academic grade that was a half-grade level higher for the DIME group (B−) than for the PD group (C+).

Similar results were observed in multivariable linear regression models after controlling for sex and BMI (Tables 4–7). Participants in the DIME group completed the 2-mile run 12.82 seconds faster than the control group (Table 4) and scored 2.33 points higher on the 2-mile run scale (Table 5) after controlling for the influence of sex and BMI. Participants in the DIME group also scored 1.92 points higher on the push-up scale (Table 6) and 4.54 points higher on the total APFT scale (Table 7) after controlling for sex and BMI.

Discussion

Preventive training programs have shown early promise in decreasing injury rates (11,15,18,21,33), but the logistics of implementing these programs outside of the research setting can be challenging. Additionally, it is sometimes hard to achieve buy-in from coaches, military commanders, and other decision makers. The results of this study show that a 10–12 minute lower extremity preventive training program can be implemented in a large-scale setting without having an adverse effect on fitness measures.

This program was implemented in a controlled, structured environment with highly motivated individuals and program leadership; the interventions were scheduled at regular intervals and the military setting ensured compliance. The environment in this current study is unique because the participants and their cadre leadership are both assigned a grade based on their compliance to the program. The reality of implementing a preventive training program in other settings might be different. However, these results are encouraging for promoting the use of these preventive training programs in a variety of settings both within and outside of the military.

We observed faster 2-mile run times in a group of cadets performing a lower extremity preventive training program warm-up as compared to a control group who performed the standard Army warm-up. A few other studies have also shown improvements in general cardiorespiratory endurance after a preventive training program (24–26). However, these programs were 90–120 minutes in length and included events that were designed to improve cardiovascular fitness, such as sprints and shuttle runs. The current study is consistent with these results using a less time-intensive program (10–12 minutes per session). We hypothesize that the DIME program may improve movement efficiency similar to the work of DiStefano et al. (6), which could translate to improved 2-mile run times and total APFT scores.

We also observed significantly higher scaled scores for the push-up between groups but no difference in sit-up scores. Several studies have shown improvement in strength (12,20,35), vertical jump (7,20,24–26), balance (7), and speed (20,26) as outcomes of a preventive training program. However, these assessments with improved scores were very similar to the specific movements and exercises of the preventive training program, so it is not surprising that there was improvement. For example, many programs include squatting and jumping movements and the corresponding performance event measured in the study was the vertical jump. In our study, all cadets in both the DIME and the PD groups were engaged in a standardized basic training during this intervention period. Only the warm-up was different between the groups. Push-ups and sit-ups are an integral part of Army culture, so they were performed frequently by both groups during physical training sessions. The absolute difference in the number of push-ups between groups was less than 2, which may not be perceived as a substantial difference for military recruits, but for some soldiers it could mean the difference between passing and failing. This finding also provides further evidence that the preventive training program did not cause any adverse effects on performance.

Prevention programs are only effective if they are implemented correctly at regularly prescribed intervals, and result in changes in biomechanical movement patterns (34). Critical to their success is the commitment from the supervising staff (i.e., coaches, military commanders) who must schedule these programs within their limited training or practice time. Coaches do not seem to be motivated by the injury prevention benefit, but they do appear to be motivated by performance enhancement (31). A large percentage of soccer coaches reported that they were influenced to implement a preventive training program based on their belief that there was a performance

enhancement benefit (14). Nearly 83% of netball coaches reported that the most important perceived advantage for using a preventive training program was "improved athletic attributes" among the players (31). The DIME has shown promise in reducing lower extremity musculoskeletal injury (4), and our current findings show higher performance scores on the APFT as well. The APFT is a key metric of success for the military. This study's findings may be significant for gaining future buy-in and compliance in the military specifically.

Because of the time constraints in this setting, this program was implemented as a 10–12 minute warm-up before training, whereas many other preventive training programs take between 30 and 90 minutes. This is an important aspect of this study for both the military and sport populations because time is frequently described as a possible barrier for program adoption and compliance. More importantly, the current findings show that the time dedicated to performing the preventive training program did not impair fitness, which is a major concern of military commanders and sport coaches alike.

Preventive training programs have become increasingly popular based on preliminary research supporting their efficacy (4,9,15,17,18,21). Our findings suggest that a 10–12 minute preventive training program implemented in a large-scale military setting does not negatively impact general fitness over time and may effectively improve key performance metrics in a military training population. Root et al. (30) observed similar results with no performance decrements immediately after participants performed the program one time. Together, these findings demonstrate that preventive training programs are unlikely to impair athletic performance either in the short or long term. Whether the DIME program influences skill-related fitness remains unclear and warrants further research. We believe the findings of this study may help further encourage the implementation of these programs to reduce injury risk with physical performance benefits.

The posttest only design is a primary limitation in this study. All subjects were cluster-randomized to either the intervention or control group at the beginning of the study to remove selection bias. This randomization frequently acts to remove variability between groups before the intervention; however, it cannot be guaranteed that the groups were similar at baseline. Although all participants in this study completed the APFT at the beginning and end of the intervention period, the initial APFT is a diagnostic assessment that is not graded. Furthermore, the initial APFT is the first time incoming cadets are tested on these types of measures and approximately 50% fail the test on the first attempt. However, less than 5% fail at the subsequent test. The baseline test is often the first time cadets have performed this type of testing resulting in the poor outcomes. Because of the questions surrounding the validity of this initial test, we made a conscious decision to only evaluate the APFT outcomes at the conclusion of the intervention period. In contrast to the initial APFT, the APFT at the conclusion of the intervention period is graded and cadets are motivated to perform well.

Practical Applications

Preventive training programs have become increasingly popular based on preliminary research supporting their efficacy (11,18,21). Our findings suggest that a 10–12 minute preventive training program implemented in a large-scale military setting does not negatively impact general fitness and may effectively improve key performance metrics in a military training population. Strength and conditioning professionals should feel confident in recommending preventive training programs to their clients because they can be an effective and efficient way to help prevent injuries without compromising fitness outcomes. Likewise, Tactical Strength and Conditioning Professionals can assure military commanders that these programs can be implemented with minimal impact on time and without negatively impacting APFT scores. It is still unclear whether the DIME program influences skill-related fitness.

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