The Fitness Training Unit in U.S. Army Basic Combat Training: Physical Fitness, Training Outcomes, and Injuries

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This study involved a retrospective examination of physical fitness, training outcomes, and injury rates among personnel in the Fitness Training Unit (FTU). Personnel were assigned to the FTU based on low performance on push-ups, sit-ups, and/or a 1-mile run (N = 44 men, 95 women) and received an augmented physical fitness program before basic combat training (BCT). They were compared with 712 men and 379 women who took the same test but were not assigned to the FTU and went directly to BCT. FTU and non-FTU personnel trained in the same battalions. Army Physical Fitness Test scores and BCT outcomes (discharged or completed BCT in 8 weeks) were obtained from unit training records. Injuries during BCT were documented from a review of the medical records. On entry to BCT, FTU women had similar 2-mile run times compared with non-FTU women (21.6 vs. 21.5 minutes, respectively; p = 0.86); FTU men were considerably slower on the 2-mile run than non-FTU men (20.3 vs. 17.3 minutes; p < 0.01). FTU women and non-FTU women had similar graduation success (60% vs. 68%, respectively; p = 0.14) and time-loss injury rates (1.3 vs. 1.4 people injured/100 person-days, respectively; p = 0.90). FTU men were less likely to graduate than non-FTU men (55% vs. 82%; p < 0.01) and more likely to suffer a time-loss injury (1.2 vs. 0.7 people injured/100 person-days; p < 0.01). Efforts should be directed toward providing a sufficient training stimulus to improve the aerobic fitness level of men (as well as women) in the FTU.

Introduction

The Fitness Training Unit (FTU) is a specialized training element with the mission of improving the fitness level of new recruits before basic combat training (BCT). Individuals are assigned to the FTU if they do not pass a special Reception Station Physical Fitness Test administered within 1 or 2 days of arrival. If trainees pass the test, they go on directly to BCT. Test criteria at Fort Jackson, South Carolina, during the summer of 1998 are listed in Table I. The goals of the FTU are to better prepare new trainees for the physical demands of BCT and to reduce injuries during BCT.

Trainees who enter the FTU perform a specific physical training program, which includes running, weight training, push-up and sit-up improvement, road marching, and developmental stretching. They also participate in military training, such as customs and courtesies, drill and ceremony, wearing of the uniform, Uniformed Code of Military Justice, and Army values. Criteria to exit the FTU and go on to BCT differ from the initial test and are also listed in Table I (summer 1998). If a trainee was sent to the FTU for a push-up or sit-up failure, he or she could go on to BCT after passing the exit criteria for that event; tests are given three times per week. If the trainee was a run failure in the summer of 1998, he or she had to stay in the FTU for a mandatory 3-week period and pass the exit criteria before entry to BCT.

Few studies have examined the effectiveness of the FTU in reaching its stated goals. One investigation[1] found that FTU personnel had higher sick call rates and lower end-of-cycle fitness measures but had similar discharge rates compared with non-FTU personnel. However, when that study was conducted, the only criterion to enter BCT was 1 or more push-ups for women and 13 or more push-ups for men; the test given in the summer of 1998 involved three events (Table I). An investigation conducted when the three-event test was in place was limited by a very small sample size.[2] Data from this latter study suggested that the injury incidence for FTU and non-FTU women was identical. Male FTU participants had a higher injury incidence than men not in the FTU, but this was not statistically significant because of the small sample of FTU men (N = 7).

Because of changes in the fitness criteria and the limited data on the effectiveness of the FTU, further investigation was clearly warranted. The purposes of the present study were to compare and contrast physical fitness, training outcomes, and injury rates between personnel entering BCT from the FTU and those entering BCT directly without attending the FTU.

Methods

Study Design and Subjects

This study involved a retrospective review of training data and medical records on two battalions of basic trainees with a total of 1240 individuals. There were 756 men, 474 women, and 10 trainees excluded from the analysis because their gender was not present in their medical records. There were 44 men and 95 women who trained in the FTU then entered one of these 2 battalions. There were 712 men and 379 women who directly entered BCT without training in the FTU. The BCT training cycle was 8 weeks in length. One battalion began training on 8 May 1998 and graduated 1 July 1998 while the other began training on 15 May 1998 and graduated 9 July 1998. The training location was Fort Jackson, South Carolina.

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TABLE I

MINIMUM CRITERIA TO PASS THE RECEPTION STATION FITNESS TEST AND MINIMUM CRITERIA TO EXIT THE FTU (SUMMER 1998)

	Event	Men	Women
Reception Station Fitness Test passing Criteria	Push-ups (repetitions)	13	3
	Sit-ups (repetitions)	17	17
	One-mile run (minutes)	9.0	11.0
Minimum criteria to exit the FTU	Push-ups (repetitions)	20	6
	Sit-ups (repetitions)	21	21
	One-mile run (minutes)	9.0	11.0

Army Physical Fitness Test (APFT) Data

Company records provided raw scores for push-ups, sit-ups, and a 2-mile (3.2-km) run.[3] The push-up and sit-up tests involved the maximum number that could be completed in separate 2-minute periods. For the maximal effort 2-mile run, the time it took to complete the distance was the performance measure. The first diagnostic APFT was administered within a few days of arrival in the BCT battalion; the final (record) APFT was administered in the sixth week of training, although in rare cases the test could be administered in the seventh or eighth week.

Training Outcomes

Two types of training outcomes were examined: (1) on-time completion of BCT (i.e., after 8 weeks), and (2) discharges. Trainees were on-time graduates if they were included on the training roster on the first day of battalion training and were not discharged, removed from training for injuries, or sent to another battalion to complete training (i.e., newstarted or recycled).

Discharge data were obtained by reviewing discharge packets at the Fort Jackson Transition Point Headquarters, where the records of all discharged personnel were processed. The reasons for discharge as well as medical record data (described below) were recorded. Discharge data were cross-checked with summary rosters provided by the training battalion S-1 (Personnel Section) to ensure that the data were complete and accurate.

There were numerous reasons for which a trainee could be discharged, but most fell into two major categories: medical conditions that existed prior to service (EPTS discharge) or inadequate entry-level performance. The latter category was often called an entry-level separation (ELS) or Chapter 11 discharge. ELS discharges were most often the result of trainees' inability to adapt to the military environment because of lack of ability (could not adequately perform critical military tasks) or psychological reasons (inability to follow orders, personality problems, etc.).

Injury Data

For each trainee in the two battalions under study, we extracted information for each visit to a medical care provider from the trainee's medical record (Department of the Army [DA] Form 3444-6). This information included the date of the visit, diagnosis, body part injured, disposition, and any days of limited duty. This information was typically available on one of three forms: (1) DA Form 5181-R (Screening Note of Acute Medical Care), (2) Standard Form 600 (Chronological Record of Medical Care), or (3) Standard Form 558 (Emergency Care and Treatment Form).

An injury case was defined as an event that resulted in physical damage to the body[4] for which the trainee visited a medical care provider and the encounter was recorded in the medical record. Injuries could be caused by overuse (cumulative microtrauma) or acute trauma (sudden overload). Overuse injuries included musculoskeletal pain (not otherwise specified), stress fractures, stress reactions, tendinitis, bursitis, fasciitis, overuse syndromes, and strains. Traumatic injuries included sprains, dislocations, fractures, blisters, abrasions, lacerations, and contusions. Environmental injuries (heat injuries, cold injuries, and insect bites) were collected but not included in the analysis (this category accounted for less than 3% of all injuries).

Three levels of injury were examined that involved progressively increasing severity. The first level (any injury) included visits to a health care provider for any type of injury. The second level, a time-loss injury, involved one or more days of limited duty (a profile). The third level was an injury that resulted in a recommendation that the trainee be temporarily removed from training and sent to the Physical Training and Rehabilitation Program (PTRP). In general, a PTRP recommendation was made by the Physical Therapy Clinic of the hospital if the trainee had a physical limitation that would result in missing 1 week or more of training or if the trainee had been given repeated short-term profiles. In the PTRP, the trainee received modified training while recovering from the injury, and then he or she returned to BCT. Individuals who were recommended to the PTRP could decline to be sent there and request an ELS discharge, which was usually granted.

Physical Characteristics

Trainee physical characteristics were obtained from DA Form 88 (Report of Medical Examination) in the medical records. These characteristics included gender, date of birth (for age), stature, and body mass. These data were typically recorded in the Military Entrance Processing Station and thus represent information gathered before arrival at Fort Jackson. Body mass index (BMI) was calculated as body mass/stature^2.[5]

Data Analysis

Comparisons of physical characteristics and first diagnostic APFT scores between FTU and non-FTU groups were made using Student's t test for independent samples. Analyses of groups on the first diagnostic and final APFT scores were conducted using a two-way mixed-model analysis of variance (independent groups, repeated measures on the diagnostic and final APFT). Training outcomes and PTRP recommendations were compared between groups using the χ^2 statistic; where expected cell sizes were less than 5, the Fisher exact test was used. The Statistical Package for the Social Sciences (version 10.0.5, SPSS, Chicago, Illinois) and EpiInfo (version 6.04b, Centers for Disease Control and Prevention, Atlanta, Georgia) were used for these analyses.

Because of subject attrition during the course of the investigation, person-time injury incidence rates and survival analysis were used for analysis of most of the injury data. Person-time injury incidence rates were calculated as subjects with one or more injuries (numerator) divided by the total number of days in BCT (denominator). To obtain people injured/100 person-days,

TABLE II

PHYSICAL CHARACTERISTICS AND FIRST DIAGNOSTIC APFT SCORES OF FTU TRAINEES AND NON-FTU TRAINEES

Gender	Group	Age (years)	Stature (cm)	Body Mass (kg)	BMI (kg/m²)	Push-ups (repetitions)	Sit-Ups (repetitions)	2-Mile Run (minutes)
Men	FTU	23.1 ± 4.7	175.3 ± 11.1	81.5 ± 16.7	26.4 ± 4.5	23 ± 13	38 ± 16	20.3 ± 3.2
	Non-FTU	21.4 ± 3.4	176.1 ± 7.2	74.9 ± 13.0	24.1 ± 3.7	33 ± 14	41 ± 13	17.3 ± 2.8
	p value[a]	<0.01	0.49	<0.01	<0.01	<0.01	0.24	<0.01
Women	FTU	21.9 ± 4.2	165.2 ± 6.1	65.6 ± 12.0	23.9 ± 3.6	8 ± 9	30 ± 15	21.6 ± 2.7
	Non-FTU	21.3 ± 3.7	164.0 ± 6.6	61.3 ± 10.1	22.7 ± 3.1	11 ± 10	36 ± 15	21.5 ± 3.0
	p value[a]	0.15	0.12	<0.01	<0.01	0.03	<0.01	0.86

[a] From independent-samples *t* test.

this number was multiplied by 100. Individuals who left BCT before completion of the study were included; their total time in the study was added to the denominator and, if they had an injury, they were included in the numerator. Log linear analysis adjusting for the time in BCT produced a χ^2 statistic that tested the differences between groups. The general linear model procedure in STATA (version 6.0, Stata Corporation, College Station, Texas) was used for this analysis.

Kaplan-Meier survival analysis was used to compare times to first injury between FTU and non-FTU trainees. Once a trainee had an injury, his or her time was considered to be terminated. Those not completing BCT had their times censored at the day they left the unit. Survival curves were plotted, and the log rank test was used to compare the equality of the survival distributions. SPSS version 10.0.5 was used for this analysis.

Results

Physical Characteristics and APFT Data

Physical characteristics were obtained on 729 men (96% of the male sample) and 449 women (95% of the female sample). Initial APFT data were available on 693 men (92% of the male sample) and 393 women (83% of the female sample). Final APFT data were available on 619 men and 319 women. Where initial APFT data were not available, the training personnel had deleted the data from their computer system before it was requested or the trainee had a medical profile on the test day. Where final APFT data were not available, the trainee had not completed the training cycle for a variety of reasons (discharged, sent to the PTRP, or newstarted).

Table II shows a comparison of the physical characteristics and first diagnostic APFT scores of the FTU and non-FTU trainees. Remember that the physical characteristics were obtained from medical records and reflect values before entry into the FTU or BCT; the APFT scores reflect fitness on entry into BCT (after completion of the FTU). Male FTUs were older, heavier, had a higher BMI, performed fewer push-ups, and ran the 2 miles slower than their non-FTU counterparts. Female FTUs were heavier, had a higher BMI, and performed fewer push-ups and sit-ups than non-FTU women. The average 2-mile run times of the FTU and non-FTU women were almost identical.

Table III shows a comparison of FTU and non-FTU groups on the first diagnostic and final APFT. Both FTU and non-FTU groups improved significantly on all events from the first diagnostic test to the final test. The non-FTU group demonstrated higher performance than the FTU group on all APFT events except on the women's 2-mile run. On push-ups and sit-ups, there were no significant interactions in the analysis of variance for men or women, indicating that similar improvements occurred in both FTU and non-FTU personnel. However, there was

TABLE III

COMPARISON OF FTU AND NON-FTU PERSONNEL ON FIRST DIAGNOSTIC AND FINAL (RECORD) APFT

						ANOVA *p* Values[a]		
Gender	Event	Group	*N*	Diagnostic APFT (mean ± SD)	Final APFT (mean ±SD)	Diagnostic vs. Final APFT Main Effect	FTU vs. Non-FTU Main Effect	APFT by FTU/ Non-FTU Interaction
Men	Push-ups	FTU	29	24 ± 13	38 ± 13	<0.01	<0.01	0.80
		Non-FTU	590	34 ± 14	48 ± 12			
	Sit-ups	FTU	29	39 ± 14	52 ± 11	0.05	<0.01	0.23
		Non-FTU	588	42 ± 13	57 ± 10			
	2-Mile run	FTU	26	20.1 ± 3.4	16.4 ± 2.0	<0.01	<0.01	0.04
		Non-FTU	568	17.2 ± 2.8	14.5 ± 1.4			
Women	Push-ups	FTU	61	9 ± 9	22 ± 8	<0.01	<0.01	0.15
		Non-FTU	258	12 ± 10	26 ± 10			
	Sit-ups	FTU	59	31 ± 16	47 ± 12	<0.01	<0.01	0.13
		Non-FTU	245	37 ± 15	56 ± 11			
	2-Mile run	FTU	57	21.2 ± 2.5	18.4 ± 1.7	<0.01	0.19	0.01
		Non-FTU	237	21.2 ± 2.8	17.7 ± 1.5			

Push-up and sit-up units are repetitions; 2-mile run units are minutes. ANOVA, analysis of variance.

[a] From two-way mixed-model analysis of variance.

TABLE IV

TRAINING OUTCOMES AMONG FTU AND NON-FTU TRAINEES

Outcome	Group	Men: Proportion in Outcome Category (%)	Men: p Value[a]	Women: Proportion in Outcome Category (%)	Women: p Value[a]
Completed BCT in 8 weeks	FTU	54.5	<0.01	60.0	0.14
	Non-FTU	82.3		68.1	
Discharged	FTU	27.3	<0.01	23.2	0.92
	Non-FTU	12.6		22.7	
Discharged (ELS[b])	FTU	20.5	0.03	13.7	0.60
	Non-FTU	9.6		15.8	
Discharged (declined PTRP[c])	FTU	4.5	0.20	5.3	0.77
	Non-FTU	1.8		6.1	
Discharged (EPTS[d])	FTU	6.8	0.16	8.4	0.47
	Non-FTU	2.9		6.3	
Discharged (declined PTRP and EPTS)	FTU	11.4	0.07	13.7	0.73
	Non-FTU	4.8		12.4	

[a] From χ^2 statistic or Fisher exact test.
[b] ELS, entry level separation (Chapter 11).
[c] PTRP, Physical Training and Rehabilitation Program.
[d] EPTS, medical condition that existed prior to service.

a significant interaction for the run among both men and women. For the men, the interaction indicated that the FTU group improved relatively more than the non-FTU group. For the women, the interaction indicated the opposite, that the FTU women did not improve as much as non-FTU women.

Training Outcomes

Table IV shows a comparison of training outcomes between FTU trainees and non-FTU trainees. Men coming from the FTU were less likely to graduate and more likely to be discharged. When specific reasons for discharge were examined, FTU men were more likely to be an ELS discharge (Chapter 11) or discharged for medically related reasons (declined PTRP and EPTS combined). FTU men were 2.5 times more likely to be discharged for declining PTRP than non-FTU men, but this was not statically significant. Likewise, FTU men were 2.3 times more likely to be discharged for a medical condition that existed prior to service than non-FTU men, but this too was not statistically significant.

Table IV shows that FTU women had considerably more favorable training outcomes than FTU men. Both FTU and non-FTU women had a similar likelihood of completing the cycle and of being discharged for any reason. Even when specific reasons for discharge were examined, there was no difference between FTU and non-FTU women.

Injuries

Medical records were reviewed on a total of 733 men (97% of the male sample) and 452 women (95% of the female sample); this included 44 FTU men (100% of the male FTU sample) and 89 FTU women (94% of the female FTU sample).

Table V shows the person-time injury incidence rate analysis. Overall, the injury rate among FTU men was 1.7 and 2.0 times higher than among non-FTU men (any injury and time-loss injury, respectively). The injury rates among men who completed BCT were 1.7 times higher among the FTU men than among the non-FTU men (both any injury and time-loss injury). Injury rates were similar among FTU and non-FTU men who did not complete BCT. The injury incidence rate among FTU women did not differ from that among non-FTU women.

Although FTU men were twice as likely to be recommended to the PTRP compared with non-FTU men (9.1% vs. 4.5%), the difference was not statistically significant ($p = 0.17$). Similarly, FTU women were about 1.6 times more likely than non-FTU women to be recommended to the PTRP (16.9% vs. 10.7%), and, like the men, this difference was not statistically significant ($p = 0.11$).

Figure 1 shows the survival curves from the Kaplan-Meier analysis for the men. The log-rank test indicated that the survival distributions differed for the FTU and non-FTU men ($p < 0.01$); the FTU men demonstrated less cumulative survival (i.e., fewer men without injuries) over time. The mean survival time was 36 days (95% confidence interval [CI] = 30–42 days) for the FTU men and 42 days (95% CI = 40–43 days) for the non-FTU men. Figure 2 shows the survival curves for the women. The log-rank test indicated that the survival distributions were similar for the FTU and non-FTU women ($p = 0.63$). The mean

TABLE V

PERSON-TIME INJURY INCIDENCE RATES (PEOPLE INJURED/100 PERSON-DAYS) FOR FTU AND NON-FTU TRAINEES

Group or Subgroup	Men: Any Injury	Men: Time-Loss Injury	Women: Any Injury	Women: Time-Loss Injury
FTU	1.20[a]	1.05[a]	1.32	1.15
Completed BCT	0.93[b]	0.69[b]	1.09	0.93
Did not complete BCT	1.69	1.69	1.93	1.76
Non-FTU	0.70	0.53	1.35	1.16
Completed BCT	0.56	0.40	1.07	0.89
Did not complete BCT	2.04	1.79	2.54	2.31

[a] $p < 0.01$ compared with respective non-FTU group.
[b] $p < 0.10$ compared with respective non-FTU group.

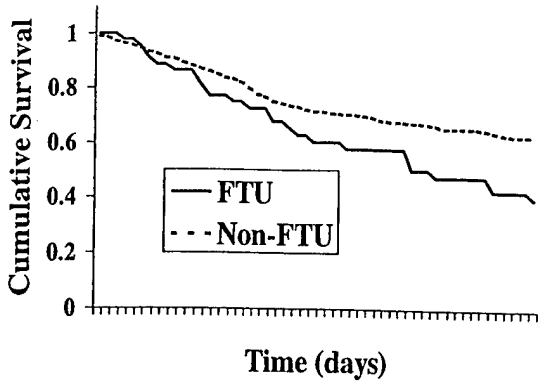

Fig. 1. Kaplan-Meier survival curves for FTU and non-FTU men.

survival time was 32 days (95% CI = 28–36 days) for the FTU women and 30 days (95% CI = 28–32 days) for the non-FTU women.

Discussion

At the start of this investigation, we assumed that FTU personnel would have less favorable training outcomes and/or a higher injury incidence compared with non-FTU personnel for at least two reasons. First, FTU personnel are selected for their low fitness level. It is known that lower fitness levels are associated with a higher incidence of injury[2,6–9] and discharge.[10] Because the FTU is designed to increase fitness only minimally, FTU individuals may still be at higher risk of injury and discharge than their more fit counterparts. The second reason to expect higher injury rates in FTU personnel was the additional exposure time. Individuals who enter the FTU perform physical training for a longer period than individuals who go directly to BCT. This additional time may increase exposure to injury-producing events.[11,12]

Despite these expectations, FTU women completed BCT with outcomes very similar to non-FTU women. FTU and non-FTU women had similar graduation success, similar discharge incidence, similar injury rates, and similar injury survival curves. On the other hand, FTU men did not fare as well. When FTU and non-FTU men were compared, the FTU men were less likely to graduate, were more likely to be discharged, and had higher injury rates. These data suggest that the FTU (as structured in the summer of 1998) was considerably more effective for women than for men.

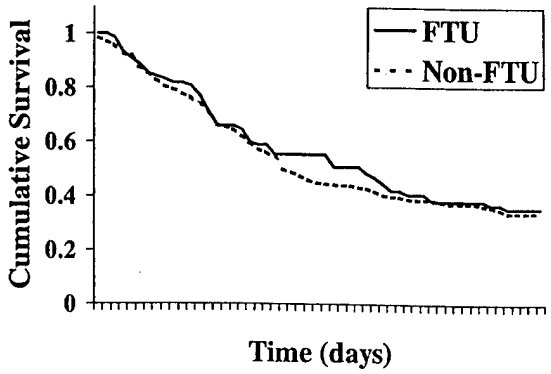

Fig. 2. Kaplan-Meier survival curves for FTU and non-FTU women.

One possible reason the FTU women had injury rates and training outcomes similar to non-FTU women may be related to their aerobic fitness level on arrival at BCT. Although FTU women performed fewer push-ups and sit-ups than non-FTU women, the two groups had equal aerobic fitness, as indicated by performance on the diagnostic 2-mile run. Because past studies have indicated that aerobic fitness is strongly associated with injury rates in BCT,[2,6–8] it is reasonable to expect that the FTU and non-FTU women with similar aerobic fitness would experience similar injury risk. This suggests that emphasis should be placed on this component of physical fitness while individuals are training in the FTU.

We do not know the specific APFT events that sent subjects to the FTU or the length of time they were in the FTU, because these data were not available. The FTU orderly room provided us with global data on 30,636 receptees who took the Reception Station Physical Fitness Test from January to August 1998. These data are presented in Table VI. If the sample from the present study is representative of the FTU in general, then men were about equally likely to be sent to the FTU for failing push-ups or the run, whereas women were more likely to be sent for failing push-ups alone. A proportionally smaller number of women were sent to the FTU for low running performance.

Table VI also shows that the Reception Station Physical Fitness Test sent an uneven proportion of men and women to the FTU. Only 7% of male recruits were sent to the FTU, whereas 24% of female recruits were sent. The average FTU man was in a much lower gender-specific fitness percentile than the average FTU woman. One may argue that it was more difficult for this group of men to improve their fitness because they may have had genetically less trainability.[13,14] However, this does not appear to have been the case. On the push-ups or sit-ups, FTU personnel who did take the final (record) APFT improved at a rate similar to non-FTU personnel. On the 2-mile run, FTU men actually showed more improvement than their non-FTU counterparts (Table III). This suggests that the FTU men actually had more aerobic trainability[15] and that this trainability was not fully exploited while the men were in the FTU.

The situation was somewhat different for FTU women. Like the men, FTU and non-FTU women showed similar improvement on push-ups and sit-ups during BCT. Unlike the men, FTU women showed less improvement in BCT on the 2-mile run compared with non-FTU women. This suggests that the FTU women had less aerobic trainability[13] in BCT, possibly attributable to aerobic fitness improvements made in the FTU. Supporting this idea is the similar 2-mile run times of the female FTU and non-FTU trainees on arrival at BCT. One weakness with this evaluation (and that of the men) is that many FTU and non-FTU personnel did not take the final APFT because they dropped out

TABLE VI

PROPORTION OF RECEPTEES FAILING THE RECEPTION STATION PHYSICAL FITNESS TEST (JANUARY TO AUGUST 1998)

Event	Men	Women
Push-ups	3.6%	13.8%
Sit-ups	1.7%	7.7%
One-mile run	3.1%	8.8%
Any test	6.9%	23.9%

of training before it was administered. How these dropouts responded to training in BCT is not known.

For administrative reasons (i.e., lack of training cadre), all personnel in the FTU ran as a single group during physical training while this study was being conducted. Ability group runs (i.e., running in smaller groups that include individuals of similar aerobic fitness) could increase the exercise intensity of men and women who are more aerobically fit because they would be able to run faster. Because men, on average, have more aerobic fitness than women,[16] one would expect that more men would be in the faster ability groups. The faster running speeds presumably would allow the men to increase their aerobic fitness to a greater extent compared with the situation in which ability groups were not present.

One may argue that FTU ability group exercise may result in a short-term increase in injury rates because some studies have suggested that faster running speeds are associated with a higher likelihood of injury.[17,18] However, this may not be the case, because the total training distance (rather than the frequency, duration, or intensity of training) seems to be the training variable most strongly associated with injury incidence.[11,19] Thus, if the total training distance remains the same while the training intensity is increased, injury rates may not change. Furthermore, because more rest time is allowed between training events in the FTU and the overall schedule is less physically demanding, fewer injuries would be expected in the FTU compared with BCT. Once the trainee enters BCT, physical activity is almost continuous and less recovery time is available.

Conclusions

FTU women had similar aerobic fitness, graduation success, and injury rates compared with women directly entering BCT without the FTU. However, FTU men were less aerobically fit, were less likely to graduate, and had higher injury rates compared with men going directly to BCT without the FTU. Higher aerobic fitness may be achieved by instituting ability group runs in the FTU, which can increase the training intensity for both women and men without necessarily increasing injury rates in the FTU. Besides running, alternative forms of exercise that can improve aerobic fitness and are suitable for training large groups of individuals (e.g., aerobic dance, upper body aerobic exercise) also should be considered. This would distribute training stress to other anatomic locations, allowing previously stressed parts of the body more time for recovery. Improved aerobic fitness before BCT is likely to decrease injury rates and improve graduation success.

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