Research Report 1375

An Evaluation of Physical Readiness Training in Armor One Station Unit Training

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This research effort compared the effectiveness of a recently developed physical readiness training program with the standard readiness training. The existing program had soldiers do as many pushups or situps as possible in 2 minutes on alternating days. The new Kersey program, which is based on behavior modification principles, had each soldier repeat a gradually increasing number of sets of pushups, with each set being 50% of his maximum number. Soldiers also recorded their own performance data individually. (Continued)

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Soldiers who used the Kersey program showed greater increases in upper body strength. When the program was implemented brigade-wide, there was a substantial decrease in the number of failures on the Army Physical Readiness Test (APRT). The report also examines the relationship of a variety of demographic and performance factors to physical fitness performance, as well as discussing the relative importance of the pushup, situp, and 2-mile run subtests in the APRT.

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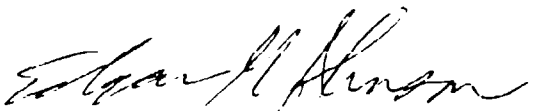
FOREWORD

The research reported here was performed by the Army Research Institute (ARI) as Technical Advisory Service for the 1st Armor Training Brigade. ARI's Fort Knox Field Unit assisted in the evaluation of a newly developed Physical Readiness Training Program which has now been implemented.

The new training program involves the application of techniques currently popular in psychology and sports medicine. These include procedures drawn from behavior modification, such as goal setting and personal record keeping. The new program also demonstrates that the "no pain, no gain" philosophy, which is often espoused in sports or muscular training, is a fallacy. In addition, the research shows that the traditional physical training program for the most part only increases the performance of those soldiers who are not initially strong enough to pass the Army Physical Readiness Test (APRT). By comparison, the new program results in nearly equal gains in upper body strength for all of the participants regardless of their initial strength.

The report describes the validation of this new training program, and documents the reduction in APRT failures realized since the program's implementation. The program and its payoffs will be of interest to the U.S. Army Training and Doctrine Command Headquarters and other schools and training centers considering possible adoption in their physical training programs.



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AN EVALUATION OF PHYSICAL READINESS TRAINING
IN ARMOR ONE STATION UNIT TRAINING

EXECUTIVE SUMMARY

Requirement:

To evaluate the effectiveness of a newly developed Physical Fitness Training Program in Armor One Station Unit Training (OSUT) and to identify variables that predict Army Physical Readiness Test (APRT) performance.

Procedure:

The research compares the effectiveness of the Kersey program, based on behavior modification, with that of a standard physical training program. The Keysey program has each soldier repeat multiple sets of pushups, with each set being 50% of the soldier's maximum, and also has the soldier keep personal records of his progress. This is in contrast to traditional programs, which are based on group standards and have soldiers overload their muscles.

Through regression analyses, the paper examines the relationship of AFQT, weight, and percent body fat with APRT performance and discusses the relative importance of the pushup, situp, and 2-mile run subtests in the APRT.

Findings:

Soldiers receiving the Kersey program showed a greater increase in the number of pushups they could perform than those in the Control Condition. Also, the soldiers in the Control Training Group who were initially strong showed little improvement. By comparison, there was improvement across the board for the Kersey Group. When the Kersey program was implemented brigade wide, there was a large reduction in the number of APRT failures, and it was reported that the program was well received by the cadre and by the soldiers who participated.

The majority of APRT failures were due to failures on the pushup subtest. By comparison, the 2-mile run standards are inappropriately easy, which results in an underweighting in the total APRT score. In addition, AFQT scores were not related to physical readiness performance. Percentage of body fat was found to be a better predictor of the APRT than was weight.

Utilization of Findings:

The results of this research have been used by the 1st Armor Training Brigade in restructuring their physical training program. The success of this program clearly is not limited to Armor, and the paper includes a description

of how the program can be implemented in other units. Recommendations are also made as to how the APRT standards might be modified.

AN EVALUATION OF PHYSICAL READINESS TRAINING
IN ARMOR ONE STATION UNIT TRAINING

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AN EVALUATION OF PHYSICAL READINESS TRAINING IN ARMOR ONE STATION UNIT TRAINING

INTRODUCTION

Despite the increasing sophistication of military technology and hardware, the physical fitness of the individual soldier remains a key factor in the readiness of the United States Army. It is clear that on future battlefields, and as was recently seen in Grenada, that physical strength and endurance are as important as ever. It is essential therefore that continuing efforts are made to upgrade the physical readiness training within the Army. While such programs have always existed, the effectiveness of the training programs as well as the soldiers' attitude toward the training has varied across time and units. In addition, these programs have not for the most part taken advantage of advances in instructional technology, nor have their standards been adjusted to reflect the changing task demands that are placed on the soldier.

The Army Physical Fitness System addresses these problems by emphasizing five aspects of physical fitness. First there are the familiar physical conditioning drills and tests. In addition, soldiers are given credit for participating in unit sports programs such as intramural basketball and soccer. Secondly, through education programs the soldiers are taught the value of physical fitness, not only as a means to enhance combat effectiveness, but as a general means of maintaining good physical and mental health. The soldiers are taught that good physical fitness means reduced chances of cardiovascular problems and injuries, as well as reduced stress and stress-related problems. This education theoretically is designed so as to enhance the soldier's motivation to actively participate in the training. Third, soldiers are given information on nutrition and diet including information about menu planning. Fourth, the Army Physical Fitness System promotes weight control and supports this with the development of standards and methods. For example, recent standards have been established for the measuring of percent body fat as a function of age and sex. These standards compliment the standard of a weight range based on height (AR 600-9). Lastly, the system promotes research and development of new techniques for achieving and sustaining physical fitness. It is toward this latter point that this paper is addressed, i.e., the validation of a new initial-entry Physical Readiness Training Program in Armor One Station Unit Training (OSUT).

Physical readiness is defined in FM 21-20 as including those factors which determine a soldier's ability to perform heavy, physical work, and those that maintain good health and appearance. The factors or components of readiness include:

1. Muscle strength or the amount of force a muscle or muscle group can exert.

2. Muscle endurance or the ability of a muscle group to repeat the same movements or exert the same pressure over time without undue fatigue.

3. Cardiorespiratory endurance (aerobics) which is the ability of the body's circulatory and respiratory systems to deliver oxygen to the cells of the body. This enables the body to recover from the effects of exercise or work in a short period of time.

While each of these factors clearly are related to one another, the present study principally measures muscle endurance via the Army Physical Readiness Test (APRT). The APRT results in a composite score based on a two-minute pushup test, a two-minute situp test, and a timed 2-mile run weighted as a function of age and sex; a table of the current standards may be seen in Appendix A. For each of the three subtests, there is a minimum required score of 60 points. As can be seen in Appendix A, for a male 17 to 25 years of age, these minimum scores of 60 correspond to 40 pushups, 40 situps, and a 2-mile run time of 18 minutes or less. Conversely, a maximum score of 300 would be obtained by doing at least 68 pushups in two minutes, 69 or more situps, and running the two miles in less than 13:12.

Based on the performance data of previous OSUT trainees, the Commander of the 5th Cavalry Squadron of the 1st Armor Training Brigade (1ATB) at Ft Knox reports that the primary reason initial entry trainees fail the APRT is their inability to complete the required number of pushups. This failure is attributed primarily to a lack of upper body strength in the major muscle groups, e.g. the pectorals, deltoids, and serratus. In addition, there is a problem with criterion reliability. That is to say that differing pushup forms or techniques among soldiers lead to uncertainty among various evaluators as to what is a "correct" and hence a countable pushup. It was further suggested that while it is indeed possible to teach the "correct" form better than is currently being done, the principle emphasis should be on increasing the upper body strength of the soldier.

The current physical training programs typically have soldiers repeat an exercise, e.g., pushups, until they physically can do no more, or else they have a group of soldiers do a fixed number of repetitions based on some group norm. The basic philosophy in either case is that strength is primarily gained from the overloading of a muscle group, that is "no pain, no gain." While this approach is sometimes effective, it too often leads to injury. Also, it is not surprising that such an approach might result in a poor attitude towards physical fitness. From the soldier's point of view he has an external force, a drill sergeant, standing over him, making him do something which results in pain. It may be difficult to internalize the value of such training.

In an attempt to increase the effectiveness of their physical fitness training, the Commander of the 1st Armor Training Brigade had LTC Douglas Kersey, Chief of Physical Therapy at Ireland Hospital, Ft Knox and also a long distance runner develop a new program. The Kersey Program is based on several relatively simple yet well-founded behavior modification principles. For example, each student must set explicit performance subgoals for each day's training based on that soldier's own level of performance. This process of shaping performance involves a gradual increase in the daily requirement or subgoal. As a result, the soldier is repeatedly reinforced both intrinsically and with verbal encouragement for successfully achieving the daily requirement. This approach also helps to minimize the risk of injury. Other research has shown shaping to be an effective technique for

increasing physical as well as other types of performance (e.g. Kanfer, 1975). In addition, the Kersey Program has the soldier personally record his own progress throughout the training. There is considerable evidence that shows when a person cares about a behavior, in this case improving his own physical fitness, that self-recording of data alone will lead to a change in behavior (Kazdin, 1974).

The purpose of this experiment then is to evaluate the validity of a "new" or revised Physical Readiness Training Program. The primary goal of the program is to maximize the success rate on the APRT by the end of OSUT, i.e. to raise each individual's physical fitness performance to the Army standard as defined by the APRT. The effect of this new program is compared to the performance of a comparable company which received the current Physical Readiness Training Program. In addition, this study examines a variety of demographic and performance variables which may predict success in physical readiness training.

METHOD

Sample

The subjects were 267 initial entry trainees from the 1st Armor Training Brigade at Ft Knox, KY. The control group was comprised of 147 males and the experimental group had 120 males. The men's ages ranged from 17 to 35 years with 87% being 22 years or less.

Procedure

The control group participated in a Physical Readiness Training (PRT) program which consisted of three phases of exercises. First, the soldiers did stretching exercises which included both a toe pull for groins and thighs, and a standing toe touch for legs (DA Pam 350-15). These stretching exercises were repeated at the end of each session. Secondly, on even numbered days the soldiers were to do as many pushups as possible in a 2 minute period, while on odd-numbered days the soldiers did as many sit-ups as possible. Third, the soldiers ran daily in formation in graduated distances from 1 to 2 miles with minimum time standards; these can be seen in Appendix B. On days in which the commander elected to conduct pushups or situps prior to the run, the soldiers additionally did jumping jacks prior to the run.

The Experimental Group received essentially the same training for situps and running. For pushups, however, they received a modified version of a training program developed by LTC Douglas Kersey and it was administered as follows.

During the fillweek prior to the beginning of training, cadre administered a diagnostic APRT to the participating soldiers. Based on the number of pushups done in the 2 minute test, individualized training programs were designed. For the training the soldiers were initially required to do three sets of pushups with each set or number of repetitions being 50% of his maximum that was established from the APRT. For example, if the individual did 40 pushups during the diagnostic test, he would do three sets of 20 pushups

daily. When the trainee along with the Drill Sergeant (DS) felt that he could and should do more, the number of sets was increased up to a maximum of six sets. If additional increases were warranted, the number of repetitions were increased by 25%, e.g. 20 to 25, and the number of sets were reinitiated back to three. At the end of the fourth week and ninth week APRTs were again administered to determine the new maximums, and this entire process was repeated for the four week intervals.

A central element of the Kersey Program is that individuals recorded their own PT data. To this end, the soldiers were each given a PT Data Collection Form by their DS and were urged to carry it with them throughout the day. These cards were used to record the individual's number of daily pushup repetitions and corresponding number of sets.

Variables. As mentioned, a diagnostic APRT was administered at the beginning of the training. This initial APRT score (APRT1) was comprised of an initial pushup score (PU1), an initial situp score (SU1), and an initial run time (RUN1). Similarly a final APRT score (APRT2) was composed of a final pushup score (PU2), a final situp score (SU2), and a final run time (RUN2). Appendix D shows the Applesoft BASIC program which was used to calculate the APRT scores. In addition, a change score was calculated for each (PU CHANGE, SU CHANGE and RUN CHANGE) by subtracting the final score from the initial score. Over the fourteen week training period, every soldier showed at least some positive gains in each of the three categories.

Also, an initial (FAT1) and final (FAT2) percent body fat was also measured using a "pinch" test. This test measures fat folds at four sites on the body: two places on the arm (tricep and bicep), the waist and the sub-capulars (the back). Unfortunately, initial percent body fat scores were not obtained for the Control Group. Therefore Fat Loss scores were only computed for the Kersey Program Group. Similarly, an initial (WT1) and a final weight (WT2) of the soldiers were taken and from this Weight Loss was computed for the Control and Kersey Program groups.

An AFQT score was also obtained for each soldier. The AFQT is a subtest of the Armed Forces Vocational Aptitude Battery (ASVAB) and is believed to be a measure of a "general intelligence" factor. The AFQT specifically measures word knowledge, paragraph completion, arithmetic reasoning, and numerical operations. From this AFQT score which is reported in percentiles, the Army derives mental categories. This breakdown can be seen in Appendix C. For the present study Mental Categories I and II were grouped together as were Mental Categories IV and below, resulting in four groups.

Other subject variables which were examined include: a) Rank E1 through E3, b) Height, c) Component - Regular Army, National Guard, Army Reserve, and d) Years of civilian education. For this latter variable, the soldiers were divided into three groups as to having 11 years of education or less, 12 years, or 13 or more years of education.

The major independent variable was the type of Physical Readiness Training, either the old PRT or the Kersey Program. Another independent variable was created based on the soldiers' Incoming Physical Readiness. This was done by splitting the trainees into Low, Medium, and High Incoming Physical Readiness groups of equal numbers as a function of their diagnostic APRT. The cut scores were 175 and 203 respectively.

RESULTS AND DISCUSSION

The modified Kersey Program was designed to increase upper body strength and hence the number of pushups. The results show that this did, in fact, occur. Table 1 shows the number of pushups before and after training along with the percent increase for the two groups. While the initial number of pushups was greater for the control group, $t_{(233)} = 2.82$, $p < .01$, there was marked advantage in the percent increase for those trainees participating in the Kersey Program, $t_{(233)} = 5.29$, $p < .01$.

As might be predicted, there was a greater increase in the number of pushups for those in the low and middle Initial Physical Readiness Group, than for those trainees in the high group. An Analysis of Variance (ANOVA) substantiates the difference between the mean increase in the number of pushups for the low group, $M = 21.7$, the middle group; $M = 16.4$; and the high group, $M = 11.0$, $F(2,224) = 25.33$, $p < .01$. While this pattern exemplifies regression towards the mean, it is perhaps better explained by the soldier's motivation to improve. Members of the low Initial Physical Readiness Group needed large improvements in their pushup performance if they were to pass the APRT. On the other hand, trainees with high diagnostic APRT, (i.e. members of the High Initial Physical Readiness Group) actually needed little improvement in that they were already capable of exceeding the minimum APRT criteria.

Table 1

Number of Pushups, Situps, and 2-Mile Runtime
Before and After Training

	Before	After	% Change
Pushups			
Control	33.8	47.2	39.6%
Kersey Program	29.5	48.9	65.8%
Situps			
Control	44.9	56.4	25.6%
Kersey Program	43.7	59.1	35.2%
Two Mile Runtime			
Control	15:58	13:55	12.8%
Kersey Program	16:42	14:14	14.7%

The ANOVA also yielded an interaction between the Initial Physical Readiness Groups and the two training programs for increase in number of pushups $F(2,224) = 3.64$, $p < .05$. This interaction can be seen in Figure 1. Newman-Keuls post hoc tests show the Kersey Program to be essentially flat across the three groups. By comparison, the increase in the number of pushups is lower for the middle and high Initial Physical Readiness Groups in the Control Condition. This interaction shows that trainees receiving the Kersey Program improved about the same regardless of their baseline level of performance. In contrast, soldiers in the control group who were initially physically fit showed considerably smaller gains than did the others. These data are consistent with other studies in the training and behavior modification literature which show that individual record keeping, goal-setting, and the reinforcement of successive approximations toward a goal are good techniques for improving performance regardless of the level of baseline performance.

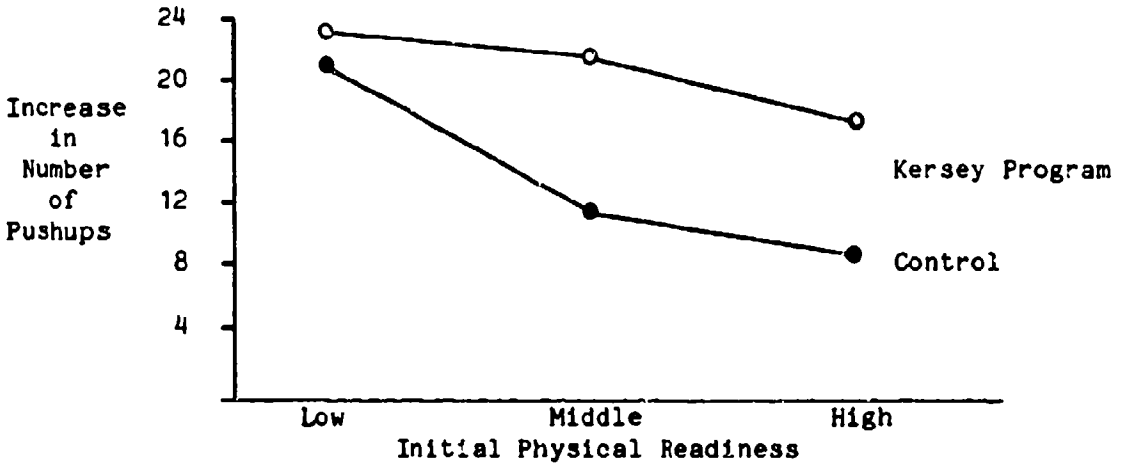

Figure 1. Increase in number of pushups at the end of training by initial physical readiness groups.

Table 1 also shows the mean number of situps and the mean 2-mile run times for the two groups along with the percent change. Given that the training was essentially the same for both groups, it is not surprising that the results show a similar pattern for the two groups. Unlike the pushup data, Initial Physical Readiness was not related to situp or running performance. Note, however, that the mean initial situp scores and mean initial runtimes are above the APRT standards.

The before training and after training situp, pushup, and runtime score yield an APRT composite score and these are shown in Table 2. There was a significant advantage in the percent change for the Kersey Program, $t_{(230)} = 3.92$, $p < .01$. This is primarily due to the change in pushups. It is possible, however, that the increased motivation in the pushup training carried over to the situps for Kersey Program Group.

Table 2

Mean APRT Scores for the Two
Training Groups Before and After Training

	Before	After	% Change
Control	192	238	24.0%
Kersey Program	184	244	32.6%

Multiple regression analyses additionally substantiate that differences in the increases in number of pushups (PU CHANGE) and APRT scores (APRT CHANGE) are the result of training. In predicting PU CHANGE from Component, Height/Weight Ratio, AFQT, Years of Education, and Training Group, only Training Group (Beta = .28) and Component (Beta = .14) significantly loaded into the equation. Similarly with APRT CHANGE as the criterion, again only Training Group (Beta = .20) and Component (Beta = .22) were significant predictors. The reason Component loaded into the equations is that soldiers in the sample from the Army Reserve had higher initial pushup and APRT scores than did soldiers in the Regular Army and National Guard; they subsequently showed less increase. Essentially these regression analyses show that training still principally accounted for the differences in the final pushup and APRT scores when the other factors were statistically controlled.

APRT Subtests

Another way of looking at the results is in terms of the number or percentage of individuals who passed the three pushup, situp, and 2-mile run tests. Again, the APRT scoring standards are shown in Appendix A with the minimum passing score being 60 for each test.

Overall, 73.5% (175 out of 231) failed at least one portion of the diagnostic APRT. This failure rate was reduced to 7.2% (19 out of 267) at the end of the training. Table 3 shows a breakdown of the percent passing the three subtests by training group.

As can be seen, 29 of the 267 trainees who took the final APRT did not take the initial test. In several cases this was due to injury or illness. Of the 19 who failed the final test, four were from this group. Disregarding these individuals, less than 7% failed the final test. Several points are clear. First and as was predicted, the vast number of failures were the result of poor pushup performance; only 29% passed the initial test. While this was greatly increased by the end of training to 94%, pushups still accounted for most of failures. Of the 19 soldiers who failed the final APRT, 17 failed the pushup test. Second, the training programs were quite successful at getting soldiers to pass the APRT. This "ceiling effect" is a problem if one is trying to discriminate between groups. But in as much as one of the primary initial-entry training goals is to get everyone to meet Army

standards via the APRT, both programs were successful. As one would expect, the individual differences in physical fitness of the trainees were greatly reduced as a result of the training.

Finally, the time standards for the 2-mile run are very easy. Only 13% failed to make the standard on the diagnostic APRT and 0% failed in the final test. The means for the diagnostic and final runtimes are 16:17 and 14:03 respectively. The minimum APRT standards is over 18:00. In as much as running is one of the principle ways of increasing cardiorespiratory endurance and that cardiorespiratory endurance is thought to be the single most critical factor of a soldier's physical condition (DA Pam 350-15), these data suggest a reevaluation of the current APRT standards for the 2-mile run.

Table 3

Percent Passing Sections of APRT
Before and After Training

	Pushups	
	Before	After
Control	32% (n=131)	95% (n=147)
Kersey Program	18% (n=107)	92% (n=120)
Combined	26%	94%

	Situps	
	Before	After
Control	70%	96%
Kersey Program	74%	98%
Combined	71%	97%

	Two Mile Run	
	Before	After
Control	88%	100%
Kersey Program	84%	100%
Combined	87%	100%

Table 4 shows the percentage of trainees under 25 years of age who would have passed the run portion of the APRT had the various times been used as minimum standards. Most likely the runtimes would have been even faster had

the standards been more demanding. Based on these data, a 2-mile minimum standard of around 16:00 would be more comparable to pass rates for pushups and situps.

Mental Categories and Physical Fitness

The mean APRT scores for before and after training were broken down by mental categories and these are show in Table 5. As is quite apparent from the data, physical fitness performance does not seem to be related to mental categories as determined by AFQT scores. There were no significant differences between the mental category groups at the beginning of training nor at the end of training. This same pattern holds for the separate pushup, situp, and run components as well as for the before and after weight and percent body fat measures. Similarly, of the 17 correlations shown with AFQT in Table 7, none were significant. The mean absolute value (i.e. the minus sign was ignored) for these correlations was .05.

Table 4

Percent of Trainees Under 25 Who Would "Pass" 2-mile Run at Various Minimum Standards

Time	Initial Run	Final Run
15:00	29	79
15:10	33	83
15:20	36	88
15:30	40	89
15:40	44	90
15:50	49	94
16:00	52	94
16:10	54	94
16:20	58	97
16:30	62	98
16:40	65	99
16:50	69	99
17:00	72	99
17:10	74	100
17:20	75	100
17:30	76	100
17:40	80	100
17:50	83	100
18:00	87	100

Recently there has been considerable discussion about raising the mental category requirements in armor as AFQT and similar measures have been shown to be related to various combat measures as well as trainability (Campbell & Black, 1982). In particular, AFQT scores have been shown to be positively related to the performance of mid- and end-of-cycle tests administered in M1 OSUT training. In contrast, the current data show that AFQT is not a valid predictor of physical fitness performance. This is not, however, to say that as the armor community is striving to assess and build excellence, it should not use the AFQT as a predictor. Obviously, the job requirements of a tank crewman include much more than physical fitness.

Fat and Weight Analyses

Table 6 gives the correlations between the initial and final weight and percent body fat and the various performance measures. Due to the relatively large number in the samples, small correlations were statistically significant. As a rule of thumb, only correlations greater than plus or minus (+/-) .30 should be regarded as meaningful. The data show that weight and percent body fat are most related to the 2-mile run time and to a lesser degree to pushup performance. In general, percent body fat is more highly correlated with the performance measures than is weight. Also the initial fat and weight measures are more highly correlated with the performance measures than are the final fat and weight. This is due in part to a smaller range of weights and percent body fat in that the heavier and fatter individuals lost the most weight and fat during training.

Table 5

Mean APRT Before and After Training
Broken Down by Mental Categories

	Cat 1 & 2	Cat 3a	Cat 3b	Cat 4
Before	190 (n=67)	187 (n=57)	192 (n=54)	187 (n=18)
After	242 (n=72)	239 (n=64)	242 (n=65)	243 (n=18)

As mentioned before the initial percent body fat was only obtained for the Kersey Program Group. For this group, there was an expected loss of percent body fat from the beginning of training $\underline{M}$ = 14.7% to the end, $\underline{M}$ = 14.0% $t_{(111)} = 2.21$, $\underline{p} < .05$.

A multiple regression analysis was also performed to separate the effects of weight and body fat. These results are shown in Table 7. As can be seen in the prediction of the initial and final APRT scores from weight and percent body fat, only the percent body fat significantly predicted the

criteria. This supports the notion that percent body fat is a better general measure of physical fitness and health than is weight.

Prediction of Physical Fitness Performance

Additional stepwise regression analyses were performed to include the other predictors and these can be seen in Table 8. These analyses were run with the restriction that only those predictor variables which significantly increased the multiple R would be included in the equation. Several observations can be made. First, in predicting final APRT scores from the performance on the initial test (equations 2, 5 and 6), pushups and situps accounted for considerably more of the variance than did the initial runtime. This is due in part to greater variability in the pushup and situps, in that more individuals are receiving maximum scores for the 2-mile run. Second and as can be seen in equation 4, WT1 is the only subject variable which is predictive of the criterion. When the initial performance variables (PU1, SU1, and RUN1) are, however, added into the equation (equation 2), the contribution of WT1 is roughly cut in half.

Table 6

Correlations of Weight and Fat Measures with AFQT and with APRT Performance Measures

	PU1	SU1	RUN1	PU2	SU2	RUN2	PU CHANGE	SU CHANGE	RUN CHANGE
WT1	-.18	-.08	.25	-.27	-.09	.29	-.066	-.01	.11
WT2	-.21	-.05	.21	-.27	-.07	.27	-.02	.00	.08
WT LOSS	-.03	-.06	.20	-.11	-.05	.16	-.08	0.0	.15
FAT 1*	-.29	.11	.53	-.33	.01	.57	.07	.13	.37
FAT 2	-.22	-.19	.26	-.29	-.20	.38	-.04	.01	.08
FAT LOSS*	.04	-.05	.12	.04	-.06	.06	-.07	.02	.09
AFQT	-.05	.11	.03	-.01	.09	-.07	.03	-.04	-.06

	WT1	WT2	WT LOSS	FAT1*	FAT2	FAT LOSS*	APRT1	APRT2
WT1	1.0	.93	.51	.62	.55	.21	-.21	-.25
WT2	.93	1.0	.15	.48	.52	.07	-.21	-.24
WT LOSS	.51	.15	1.0	.51	.26	.18	-.12	-.09
FAT1*	.62	.48	.51	1.0	.81	.23	-.44	-.39
FAT2	.55	.52	.26	.88	1.0	.06	-.29	-.34
FAT LOSS*	.21	.07	.18	.23	.06	1.0	-.06	-.03
AFQT	.08	.07	.04	.02	.06	.08	.01	0.0

*FAT1 and FAT LOSS data for Kersey Program Group only.

Table 7

Regression Analyses with Weight
and Percent Body Fat

Criterion	Predictors		R	R^2
APRT1	FAT1	WT1		
	Beta -.50	.03 (n.s.)	.48	.23
APRT2	FAT1	WT1		
	Beta -.38	.01 (n.s.)	.39	.15
APRT2	FAT2	WT2		
	-.53	.12 (n.s.)	.47	.23

A similar pattern is seen in equation 5 for the Kersey program group where FAT1 is included as a predictor. In the previous discussion of fat and weight (Table 7), it was shown that FAT1 wiped out the predictive effects of WT1. Equation 5 shows that the initial performance predictors likewise eliminated the predictive effects of FAT1 as well as WT1. The point here is that while initial weight and percent body fat weakly predict final APRT performance when taken alone, these subject variables are very poor predictors as compared to the initial performance variables. Lastly, AFQT did not significantly load into any of the equations.

Failed Then Passed/Failed Twice Analyses

Another set of analyses were performed in which differences were examined between those who failed the initial APRT and then passed the final APRT (N=168, 64%) and those who failed twice (N=19, 7%). Somewhat surprisingly the mean number of initial pushups and situps were the same for the two groups. The initial runtimes were, however, different with the mean for the failed than passed group being 16:33 and the mean for the failed twice groups being 17:52, $t_{(177)} = 2.20, p < .05$. This variable of initial runtime has then some predictive value of discriminating between those who fail initially and then pass and those who fail at the end of training. For example, of those trainees who had a time of over 17:30 for the initial run, 7 out of 57 (12%) failed the final APRT. Of those trainees who had a time over 20:00, 2 of 10 (20%) failed the final test. These percentages should be compared to an overall failure rate of 7%. Clearly, this only slightly improves the prediction of failure.

Table 8

Regression Equations Predicting APRT Scores

	Criterion	Predictors					Constant	R	R^2
(1.)	APRT1	SU1	PU1	RUNTIME1	WT1	AFQT			
	B	1.32	1.30	-.116	-	-	201.3	.99	.98
	Beta	(.46)	(.44)	(-.39)					
(2.)	APRT2	SU1	PU1	RUN1	WT1	AFQT			
	B	.71	.53	-.03	-.14	-	242.0	.66	.44
	Beta	(.36)	(.27)	(-.14)	(-.14)				
(3.)	APRT2	SU2	PU2	RUN2	WT2	AFQT			
	B	1.21	1.19	.10	-	-	194.2	.96	.93
	Beta	(.50)	(.49)	(-.30)					
(4.)	APRT2	WT1	AFQT	HEIGHT	AGE	RANK	EDUC		
	B	-.27					283.8	.28	.08
	BETA	(-.28)							
Kersey Program Group Only									
(5.)	APRT2	SU1	PU1	RUN1	WT1	FAT1	AFQT		
	B	.63	1.14	-.05	-	-	-	230.8	.60	.36
	Beta	(.30)	(.47)	(-.27)					
Control Group Only									
(6.)	APRT2	SU1	PU1	RUN1	WT1	AFQT			
	B	.80	.39	-.02	-.14	-		236	.68	.47
	Beta	(.43)	(.21)	(.11)	(.14)				

Other Variables

Analyses of the other subject variables yielded no real surprises. For rank, there were no significant differences in the initial or final APRT scores for those trainees promoted to E1, E2, and E3. As for Component, there were initially higher APRT scores for those in the Army Reserve (M=227) as compared to the Regular Army (M=186) and National Guard (M=190), $F(2,229) = 3.42$ $p < .05$. These differences were, however, eliminated by the end of training with means of 242, 238, and 241 respectively.

There were also no differences in initial or final pushup, situp, runtimes, or APRT scores between the trainees who had 11 or less years of education, 12 years, or 13 or more Years of Education. Somewhat interesting is that the AFQT scores were higher for those with 13 or more Years of Education ($\underline{M}$=68) as compared to 12 years ($\underline{M}$=53) and 11 years or less ($\underline{M}$=57), $F(2,216) = 5.44$, $\underline{p} < .01$. There is, however, no difference in the AFQT scores between those who had 12 years of education and those trainees who had less. This suggests, at least for the enlisted population, that the primary factors for determining who will complete 12 years of schooling are other than mental aptitude.

These analyses taken together show that is is difficult to predict who will fail the APRT at the end of OSUT training based on their initial APRT measures and demographic information. This is not so bad in that there is a 93% success rate based on these data. The 7% failure rate is most likely the result of poor motivation or some physiological limitation, failures resulting from motivation can possibly be reduced by restructuring reward/punishment contingencies. It is recommended, however, that the training system assume there will be a small number of failures, and focus on the improvement of the others.

GENERAL DISCUSSION

Overall, the Kersey Program was successful at increasing the ability of the OSUT trainees to do pushups. The biggest advantage of the program seems to be in that all of the trainees improved, regardless of how strong they were at the beginning of the program. To accomplish this, the Kersey Program has the soldier do multiple sets of pushups with each set being 50% of the soldier's established maximum. The number of sets along with the number of repetitions within a set are gradually increased over the duration of training. The program is based on the notion that the most strength can be gained with less injuries if the muscles are not overloaded.

The Kersey Program also takes advantage of the reactive effects of individual record keeping by requiring the soldier to record his own performance and weight data. In doing so, the soldier is more actively involved in the process and is able to easily see the progress that is resulting from the training. Also, it is likely that this self-monitoring enhances the soldier's motivation to work harder at improving his performance (Mahoney, 1977). It must be stressed, however, that the trainee should be educated as to the personal value of physical fitness. By comparison, it is likely that soldiers too often view physical readiness training as a form of punishment or that the primary reason for passing the APRT is to avoid punishment.

A caveat in interpreting these results is still, however, necessary. Despite the fact that the Kersey Program is built on well-established behavior modification principles and that considerable effort was made to equate the testing conditions for the two groups, it is still possible that the advantages seen for Kersey Program are the result of a Hawthorne effect (Sommer, 1968). That is to say that the soldiers receiving the Kersey Program showed extra motivation or worked harder, not because of the structure of the program, but simply because they were aware that they were participating in an experimental program and that they were receiving special attention.

While this clearly is a threat to the validity of these results, it is doubtful that the Hawthorne effect accounted for all of the difference, given the demonstrated robustness of behavior modification in general. Nevertheless, the real value of the Kersey Program will be seen when it is implemented at the brigade level.

This study also demonstrates that the time standards for the two mile portion are perhaps inappropriately, too easy, and that the run is under weighted in the total APRT score. In addition, the study lends additional credibility to using percent body fat as a measure of physical fitness as opposed to weight.

The Army has been using behavior modification programs and principles for some time (Fry, 1974). Despite this, the reputation still stands that the Army principally operates with a classical or heavy-handed, management style. The need for individualized training programs such as the one evaluated are now becoming more and more important in that the Army personnel is all volunteer. Lastly, individualized training programs such as this are needed in that they help all trainees to improve, regardless of their incoming level of performance. This is in contrast to other programs which focus on minimizing failures at the low end of the distribution. Improvement across the board is essential if the force is to attain the goal of being an "Army of Excellence".

IMPLEMENTATION OF KERSEY PROGRAM

Following the apparent initial success of the Kersey Program for improving upper body strength, the 1st Armor Training Brigade implemented the training program brigade wide in FY84. In doing so they adapted the procedure previously discussed to include situps as well as pushups; the running portion of the training while essentially the same has been expanded toward a final goal of 5 miles in 40 minutes.

Table 9

Percent Failing Final ARPT
by Quarter in 1ATB

Quarter	Old Program (FY83)	Kersey Program (FY84)	% Decrease
1st	20.7	15.7	24%
2nd	19.8	11.0	44%
3rd	13.4	---	---
4th	14.9	---	---

Table 9 shows the percentage who failed the APRT at the end of OSUT for the four quarters of FY83 and the first two quarters of FY84. As can be seen, the Kersey Program led to a very substantial decrease in number of failures including a 44% decrease in the second quarter. These are, of course, statistically significant differences with the number of soldiers trained in each quarter exceeding 2000. For the 1st quarter, $^{2}_{(1)} = 18.01$, $p < .001$, and for the 2nd quarter, $^{2}_{(1)} = 70.24$, $p < .001$. These data do, however, represent the soldiers' first attempt at the final APRT and those soldiers which failed were given retests. The final failure rates, therefore, are somewhat lower. Not surprisingly, these data also show a seasonal trend with the lowest failure rates occurring in the warmer months. The mean APRT scores for these same groups are shown in Table 10. Again there is a clear advantage for those soldiers who received the Kersey Program.

Table 10

Mean APRT by Quarter in 1ATB

Quarter	Old Program (FY83)	Kersey Program (FY84)	Points Increase
1st	228.4	238.6	10.2
2nd	228.1	243.1	15.0
3rd	234.5	-	-
4th	231.1	-	-

Overall, the Kersey Program appears to be quite an improvement over the previous physical training program. Any reservations about the increases in performance being do to a Hawthorne-like effect are minimized by the relatively large differences seen in the brigade wide implementation of the program. If anything, tne Control Group's performance in the experiment was considerably better than the FY83 averages for soldiers receiving the same training. That is to say, the Kersey Program looks even better after implementation.

One of the biggest advantages of the Kersey Program, as well as other behavior modification programs, is that the start up costs are quite small. Usually all that is required is a restructuring of the presently available resources. In the present case, no additional instructors, equipment or facilities were required. Considering that approximately 12,000 soldiers are trained annually in the 1st Armor Training Brigade, and that the Kersey Program reduced the percentage of failures on the order of 30% based on two quarters' data, the benefit of the Kersey Program greatly exceeds its cost. Lastly and as would be predicted, COL Phillips, Commander of the 1st Armor Training Brigade reports that in addition to the performance gains, the cadre enjoyed administering the program and there seemed to be fewer complaints from the soldiers than before.

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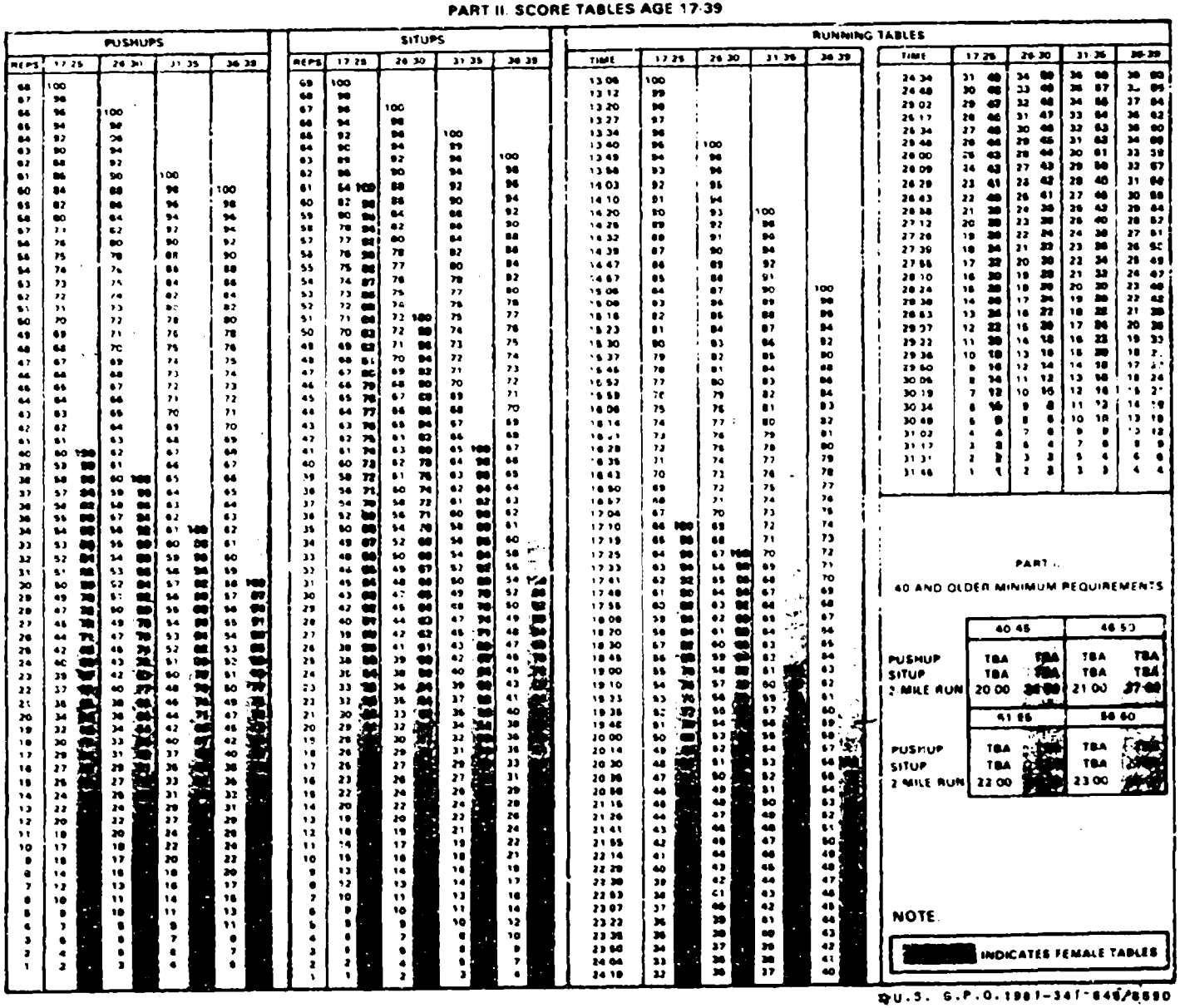
APPENDIX A

APRT SCORE TABLES

PART II. SCORE TABLES AGE 17-39



PUSHUPS

REPS	17-25	26-30	31-35	36-39
68	100			
67				
66				
65				
64				
63				
62				
61				
60				
59				
58				
57				
56				
55				
54				
53				
52				
51				
50				
49				
48				
47				
46				
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44				
43				
42				
41				
40				
39				
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28				
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25				
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23				
22				
21				
20				
19				
18				
17				
16				
15				
14				
13				
12				
11				
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				

SITUPS

REPS	17-25	26-30	31-35	36-39
69	100			
68				
67				
66				
65				
64				
63				
62				
61				
60				
59				
58				
57				
56				
55				
54				
53				
52				
51				
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49				
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47				
46				
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43				
42				
41				
40				
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37				
36				
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32				
31				
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16				
15				
14				
13				
12				
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8				
7				
6				
5				
4				
3				
2				
1				

RUNNING TABLES

TIME	17-25	26-30	31-35	36-39
13:08	100			
13:12	99			
13:20	98			
13:27	97			
13:34	96			
13:40	95	100		
13:49	94	99		
13:56	93	98		
14:03	92	97		
14:10	91	96		
14:20	90	95	100	
14:26	89	94	99	
14:32	88	93	98	
14:39	87	92	97	
14:47	86	91	96	
14:57	85	90	95	
15:06	84	89	94	100
15:09	83	88	93	99
15:16	82	87	92	98
15:23	81	86	91	97
15:30	80	85	90	96
15:37	79	84	89	95
15:45	78	83	88	94
15:52	77	82	87	93
15:58	76	81	86	92
16:06	75	80	85	91
16:14	74	79	84	90
16:21	73	78	83	89
16:28	72	77	82	88
16:35	71	76	81	87
16:43	70	75	80	86
16:50	69	74	79	85
16:57	68	73	78	84
17:04	67	72	77	83
17:10	66	71	76	82
17:18	65	70	75	81
17:25	64	69	74	80
17:33	63	68	73	79
17:41	62	67	72	78
17:48	61	66	71	77
17:55	60	65	70	76
18:03	59	64	69	75
18:10	58	63	68	74
18:20	57	62	67	73
18:30	56	61	66	72
18:40	55	60	65	71
19:00	54	59	64	70
19:10	53	58	63	69
19:23	52	57	62	68
19:38	51	56	61	67
19:46	50	55	60	66
20:00	49	54	59	65
20:14	48	53	58	64
20:30	47	52	57	63
20:36	46	51	56	62
20:56	45	50	55	61
21:15	44	49	54	60
21:26	43	48	53	59
21:41	42	47	52	58
21:55	41	46	51	57
22:14	40	45	50	56
22:28	39	44	49	55
22:38	38	43	48	54
22:53	37	42	47	53
23:07	36	41	46	52
23:22	35	40	45	51
23:35	34	39	44	50
23:50	33	38	43	49
24:04	32	37	42	48
24:19	31	36	41	47
24:34	30	35	40	46
24:48	29	34	39	45
25:02	28	33	38	44
25:17	27	32	37	43
25:34	26	31	36	42
25:48	25	30	35	41
26:00	24	29	34	40
26:09	23	28	33	39
26:29	22	27	32	38
26:43	21	26	31	37
26:58	20	25	30	36
27:12	19	24	29	35
27:26	18	23	28	34
27:39	17	22	27	33
27:55	16	21	26	32
28:10	15	20	25	31
28:24	14	19	24	30
28:38	13	18	23	29
28:53	12	17	22	28
29:07	11	16	21	27
29:22	10	15	20	26
29:36	9	14	19	25
29:50	8	13	18	24
30:04	7	12	17	23
30:19	6	11	16	22
30:34	5	10	15	21
30:48	4	9	14	20
31:02	3	8	13	19
31:17	2	7	12	18
31:31	1	6	11	17
31:46		5	10	16
		4	9	15
		3	8	14
		2	7	13
		1	6	12
			5	11
			4	10
			3	9
			2	8
			1	7
				6
				5
				4

PART ...

40 AND OLDER MINIMUM REQUIREMENTS

	40-45		46-50	
PUSHUP	TBA	TBA	TBA	TBA
SITUP	TBA	TBA	TBA	TBA
2 MILE RUN	20:00	[illegible]	21:00	[illegible]
	51-55		**56-60**	
PUSHUP	TBA	[illegible]	TBA	[illegible]
SITUP	TBA	[illegible]	TBA	[illegible]
2 MILE RUN	22:00	[illegible]	23:00	[illegible]

NOTE:

[illegible] INDICATES FEMALE TABLES

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APPENDIX B

RUNNING STANDARDS FOR TRAINING GROUPS

WEEK	DISTANCE (Miles)	TIME
1	1.0	12:00
2	1.0	10:00
3	1.5	14:30
4	1.5	13:30
5	2.0	19:00
6	2.0	18:30
7	2.0	18:00
8	2.0	17:45
9	2.0	17:30
10	2.0	17:00
11	2.0	16:30
12	2.0	16:00
13	2.0	16:00
14	2.0	16:00

APPENDIX C

ARMY MENTAL CATEGORIES DERIVED FROM AFQT* AND MENTAL CATEGORY GROUPS USED IN EXPERIMENT

Army Mental Categories	AFQT (Percentiles)	Experimental Groups
I	93-100	
II	65-92	I & II
IIIa	50-64	IIIa
IIIb	31-49	IIIb
IVa	21-30	IV & below
IVb	16-20	
IVc	10-15	
V	1-9	

*Taken from Bloedorn, G.W. Improving Soldier Training: An Aptitude Treatment Interaction Approach, Naval War College, June 1979.

APPENDIX D

APPLESOFT BASIC PROGRAM USED TO COMPUTE APRT SCORES FOR MALES

```
1  REM  THIS PROGRAM GIVES APRT SCORES FOR MALES AS A FUNCTION OF AGE, NUM
     BER OF PUSHUPS, SITUPS, AND 2-MILE RUN TIME
100   DATA  100,100,100,100
102   DATA  98,100,100,100
104   DATA  96,100,100,100
106   DATA  94,98,100,100
108   DATA  92,96,100,100
110   DATA  90,94,100,100
112   DATA  88,92,100,100
114   DATA  86,90,100,100
116   DATA  84,88,98,100
118   DATA  82,86,96,98
120   DATA  80,84,94,96
122   DATA  78,82,92,94
124   DATA  76,80,90,92
126   DATA  75,78,88,90
128   DATA  74,76,86,88
130   DATA  73,75,84,86
132   DATA  72,74,82,84
134   DATA  71,73,80,82
136   DATA  70,72,78,80
138   DATA  69,71,76,78
140   DATA  68,70,75,76
142   DATA  67,69,74,75
144   DATA  66,68,73,74
146   DATA  65,67,72,73
148   DATA  64,66,71,72
150   DATA  63,65,70,71
152   DATA  62,64,69,70
154   DATA  61,63,68,69
156   DATA  60,62,67,68
158   DATA  59,61,66,67
160   DATA  58,60,65,66
162   DATA  57,59,64,65
164   DATA  56,58,63,64
166   DATA  55,57,62,63
168   DATA  54,56,61,62
170   DATA  53,55,60,61
172   DATA  52,54,59,60
174   DATA  51,53,58,59
176   DATA  50,52,57,58
178   DATA  49,51,56,57
180   DATA  47,50,55,56
182   DATA  45,49,54,55
184   DATA  44,47,53,54
186   DATA  42,45,52,53
188   DATA  40,43,51,52
190   DATA  39,42,50,51
192   DATA  37,40,48,50
194   DATA  35,38,46,49
196   DATA  34,36,44,47
198   DATA  32,34,42,45
200   DATA  30,33,40,42
202   DATA  29,31,37,40
204   DATA  27,29,35,38
206   DATA  25,27,33,36
208   DATA  24,26,31,33
```

```
210   DATA  22,24,29,31
212   DATA  20,22,27,29
214   DATA  19,20,24,26
216   DATA  17,18,22,24
218   DATA  15,17,20,22
220   DATA  14,15,18,20
222   DATA  12,13,16,17
224   DATA  10,11,14,15
226   DATA  9,10,11,13
228   DATA  7,8,9,11
230   DATA  5,6,7,8
232   DATA  4,5,6,7
234   DATA  2,3,4,5
300   DATA  100,100,100,100
302   DATA  98,100,100,100
304   DATA  96,100,100,100
306   DATA  94,98,100,100
308   DATA  92,96,100,100
310   DATA  90,94,98,100
312   DATA  88,92,96,100
314   DATA  86,90,94,98
316   DATA  84,88,92,96
318   DATA  82,86,90,94
320   DATA  80,84,88,92
322   DATA  78,82,86,90
324   DATA  77,80,84,88
326   DATA  76,78,82,86
328   DATA  75,77,80,84
330   DATA  74,76,78,82
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334   DATA  72,74,76,78
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340   DATA  69,71,73,75
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350   DATA  64,66,68,70
352   DATA  63,65,67,69
354   DATA  62,64,66,68
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364   DATA  52,56,60,62,50,54,58,61
366   DATA  49,52,56,60,48,50,54,58
368   DATA  46,49,52,56,45,48,50,54
370   DATA  43,47,49,52,42,45,48,50
372   DATA  40,44,47,49,39,42,45,48
374   DATA  38,41,43,47,36,39,42,46
376   DATA  35,38,40,45,33,36,39,43
378   DATA  32,35,37,41,30,33,35,40
380   DATA  29,32,34,38,28,30,32,36
382   DATA  26,29,31,35,25,27,29,33
384   DATA  23,26,27,31,22,24,26,29
386   DATA  20,22,24,28,19,20,22,26
388   DATA  18,19,21,24,16,17,19,22
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```
390  DATA  15,16,18,21,13,14,16,19
392  DATA  12,13,14,17,10,11,13,16
394  DATA  9,10,11,14,8,9,10,12
396  DATA  6,7,8,10.5,5,6,9
398  DATA  2,4,5,7,1,2,3,4
500  DATA  1305,100,100,100,100
502  DATA  1312,99,100,100,100
504  DATA  1320,98,100,100,100
506  DATA  1327,97,100,100,100
508  DATA  1334,96,100,100,100
510  DATA  1340,95,100,100,100
512  DATA  1349,94,98,100,100
514  DATA  1356,93,96,100,100
516  DATA  1403,92,95,100,100
518  DATA  1410,91,94,100,100
520  DATA  1420,90,93,100,100
522  DATA  1425,89,92,98,100
524  DATA  1432,88,91,96,100
526  DATA  1439,87,90,94,100
528  DATA  1447,86,89,92,100
530  DATA  1457,85,88,91,100
532  DATA  1505,84,87,90,100
534  DATA  1508,83,86,89,98
536  DATA  1516,82,85,88,96
538  DATA  1523,81,84,87,94
540  DATA  1530,80,83,86,92
542  DATA  1537,79,82,85,90
544  DATA  1545,78,81,84,88
546  DATA  1552,77,80,83,86
548  DATA  1559,76,79,82,84
550  DATA  1606,75,78,81,83
552  DATA  1614,74,77,80,82
554  DATA  1621,73,76,79,81
556  DATA  1628,72,75,78,80
558  DATA  1635,71,74,77,79
560  DATA  1643,70,73,76,78
562  DATA  1650,69,72,75,77
564  DATA  1657,68,71,74,76
566  DATA  1704,67,70,73,75
568  DATA  1710,66,69,72,74
570  DATA  1719,65,68,71,73
572  DATA  1725,64,67,70,72
574  DATA  1733,63,66,69,71
576  DATA  1741,62,65,68,70
578  DATA  1748,61,64,67,69
580  DATA  1755,60,63,66,68
582  DATA  1808,59,62,65,67
584  DATA  1820,58,61,64,66
586  DATA  1830,57,60,63,65
588  DATA  1845,56,59,62,64
590  DATA  1900,55,58,61,63
```

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592 DATA 1910,54,57,60,62
594 DATA 1923,53,56,59,61
596 DATA 1935,52,55,57,60
598 DATA 1948,51,54,56,59
600 DATA 2000,50,53,55,58
602 DATA 2014,49,52,54,57
604 DATA 2030,48,51,53,56
606 DATA 2035,47,50,52,55
608 DATA 2058,46,49,51,54
610 DATA 2115,45,48,50,53
612 DATA 2126,44,47,49,52
614 DATA 2141,43,46,48,51
616 DATA 2155,42,45,47,50
618 DATA 2214,41,44,46,49
620 DATA 2229,40,43,45,48
622 DATA 2238,39,42,44,47
624 DATA 2253,38,41,43,46
626 DATA 2307,37,40,42,45
628 DATA 2322,36,39,41,44
630 DATA 2336,35,38,40,43
632 DATA 2350,34,37,39,42
634 DATA 2404,33,36,38,41
636 DATA 2419,32,35,37,40
638 DATA 2434,31,34,36,39
640 DATA 2448,30,33,35,38
642 DATA 2502,29,32,34,37
644 DATA 2517,28,31,33,36
646 DATA 2534,27,30,32,35
648 DATA 2546,26,29,31,34
650 DATA 2600,25,28,30,33
652 DATA 2609,24,27,29,32
654 DATA 2629,23,26,28,31
656 DATA 2643,22,25,27,30
658 DATA 2658,21,24,26,29
660 DATA 2712,20,23,25,28
662 DATA 2726,19,22,24,27
664 DATA 2739,18,21,23,26
666 DATA 2755,17,20,22,25
668 DATA 2810,16,19,21,24
670 DATA 2824,15,18,20,23
672 DATA 2838,14,17,19,22
674 DATA 2853,13,16,18,21
676 DATA 2907,12,15,17,20
678 DATA 2922,11,14,16,19
680 DATA 2936,10,13,15,18
682 DATA 2950,9,12,14,17
684 DATA 3005,8,11,13,16
686 DATA 3019,7,10,12,15
688 DATA 3034,6,9,11,14
690 DATA 3048,5,8,10,13
692 DATA 3102,4,7,9,10
694 DATA 3117,3,5,7,8
696 DATA 3131,2,3,5,6
698 DATA 3146,1,2,3,4
800 REM
900 REM
```

```
1000  DIM P1(68),P2(68),P3(68),P4(68),S1(69),S2(69),S3(69),S4(69),RT(100),
     T1(100),T2(100),T3(100),T4(100)
1020  FOR I = 68 TO 1 STEP  - 1
1030  READ P1(I),P2(I),P3(I),P4(I)
1040  NEXT I
1050  FOR I = 69 TO 1 STEP  - 1
1060  READ S1(I),S2(I),S3(I),S4(I)
1070  NEXT I
1080  FOR I = 100 TO 1 STEP  - 1
1090  READ RT(I),T1(I),T2(I),T3(I),T4(I)
1100  NEXT I
1150  HOME
1200  INPUT "AGE?";A
1210  IF A < 17 OR A > 39 THEN  PRINT "AGE MUST BE BETWEEN 17 AND 39": GOTO
     1200
1250  INPUT "NUMBER OF PUSHUPS?";P
1260  IF P > 68 THEN P = 68
1300  INPUT "NUMBER OF SITUPS?";S
1310  IF S > 69 THEN S = 69
1320  INPUT "RUNNING TIME. E.G. 1430:";R
1340  IF R < 1305 THEN R = 1305
1350  FOR IT = 100 TO 1 STEP  - 1
1360  IF R < RT(IT) GOTO 1369
1368  NEXT IT
1369 IT = IT + 1
1370  IF A < 26 THEN X = P1(P) + S1(S) + T1(IT): GOTO 1500
1380  IF A < 31 THEN X = P2(P) + S2(S) + T2(IT): GOTO 1500
1390  IF A < 36 THEN X = P3(P) + S3(S) + T3(IT): GOTO 1500
1400 X = P4(P) + S4(S) + T4(IT)
1500  PRINT
1501  PRINT
1505  PRINT "APRT SCORE= ";X
1506  PRINT : PRINT : PRINT : PRINT :
1510  INPUT "TO END PROGRAM, TYPE 'QUIT'";Z$
1520  IF Z$ = "QUIT" THEN  END
1530  HOME : GOTO 1200
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