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Original Research

The Relationship Between Self-Efficacy, Aerobic Fitness, and Traditional Risk Factors for Musculoskeletal Injuries in Military Training: A Prospective Cohort Study

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Background

The United States military strives to prepare soldiers physically and mentally for war while preventing injury and attrition. Previous research has focused on physical injury risk factors but has not prospectively examined psychological risk factors.

Purpose

This study's purpose was to investigate whether self-efficacy is a risk factor for musculoskeletal injury in an initial military training environment and compare it to other known risk factors.

Study Design

Prospective, Longitudinal Cohort Study

Materials and Methods

Shortly after starting cadet basic training, new cadets rated self-efficacy by an 11-point questionnaire. Other risk factor data including injury history, sex, height, weight, body mass index, age, aerobic fitness, upper body muscular endurance, core muscular endurance and previous military experience were collected by self-report questionnaire and military fitness testing. The primary dependent variable was musculoskeletal injury that originated during the seven-week course. Independent variables were compared between participants who were and were not injured using Chi-squared test, t-tests, Cox regression analysis and time to injury was evaluated using Kaplan-Meyer survival analyses.

Results

Seven hundred eighty-one (65.1%) new cadets were eligible and consented to participate. Injured cadets had significantly lower self-efficacy scores (p=0.003 and p=<0.001), shorter height (p=<0.001), lower weight (p=0.036), lower push-up and plank performance (p=<0.001), slower two-mile run performance (p=<0.001), and females sustained a proportionally higher number of injuries than males (p=<0.001). Cadets with low self-efficacy, shorter height, lower hand release push-up performance, lower plank performance and slower two-mile run performance were at greater risk for

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musculoskeletal injury. Cadets with less self-efficacy were also less likely to continue uninjured throughout cadet basic training according to a Kaplan-Meier survival analysis (log rank test<0.002). Multivariable Cox regression revealed that only aerobic fitness predicted musculoskeletal injury (HR=1.005 [1.003-1.006], p=<0.001).

Conclusions

Participants with less self-efficacy sustained injuries earlier and more often than those with greater self-efficacy. However, aerobic fitness alone predicted future injury after controlling for all risk factors. Resolved prior injury was not a risk factor for future injury.

Level of Evidence 2b

Individual cohort study

INTRODUCTION

The steady decline in national physical activity levels and increases in overweight and obese adolescents[1,2] has decreased the number of individuals eligible for military service[3] and widens the physical readiness gap between the general population and military physical demands.[4] This disparity complicates training physically capable recruits without injuring those who are less fit and highlights the need of minimizing preventable attrition such as those from musculoskeletal injury (MSK-I). Despite efforts to improve soldier readiness, more than half of all soldiers experience an injury annually.[5] As many as 58,400 soldiers were not able to deploy in April 2020, which is the equivalent of 13 brigade combat teams.[6] MSK-Is are the leading cause of non-deployability, lost duty days (LDD), medical encounters, military discharge, and disability.[7,8] In 2018 the U.S. Army spent $434 million in direct medical costs to treat MSK-Is.[7]

The leading causes of MSK-Is are the same activities that leaders deliberately conduct to develop physical resilience[9] including running, load carriage, other physical fitness training activities (besides running) and work-related tasks.[8] Physical training results in the highest number of total injuries, while load carriage causes greater injuries per exposure.[10] Other common causes of MSK-Is include overexertion, falls/slips, and occupational accidents.[11]

Researchers have identified multiple physical and behavioral MSK-I risk factors including prior injury, low aerobic endurance,[12-16] high or low body mass index (BMI),[17] and low muscular strength and endurance.[18,19] Multiple previous studies have demonstrated that prior injury strongly predicts future injury[14,16]; however, it is unclear whether these previous injures had fully resolved or not. Female biological sex is a long-accepted risk factor for MSK-I,[20-22] but recent research suggests this may be due to differences in average physical fitness rather than biological sex-exclusive differences.[12,23-26] Military leaders have used these and similar study outcomes to develop injury prevention programs including physical fitness training regimens, MSK-I risk screening, and leader education with mixed results.[10,27-29]

These epidemiological studies summarize the dilemma: service members with prior injury and lower fitness levels tend to get injured while training to improve their physical fitness. It is possible that other modifiable risk factors exist that, if trained, may reduce injuries without such high injury risk.

Albert Bandura (1977) introduced self-efficacy as one's confidence to perform a specific task. In behavioral psychology, this concept helps patients and clinicians establish a therapeutic path by accomplishing individualized, increasingly difficult tasks.[30] Multiple subsequent publications have proposed positive relationships between self-efficacy and self-regulation,[31] performance,[31-33] goal-setting,[34] and motor learning.[35]

Researchers have also found that psychological factors predict military performance outcomes.[32,36,37] Gruber et al. found that for every one point increase on the new general self-efficacy scale, participants were 77.7% less likely to voluntarily withdraw assuming the other factors remained constant. Self-efficacy did not predict medical withdrawal; however, this study did not report injury statistics.[36] In an initial entry Army training environment, Moran et al. found that psychological burnout was predictive of MSK-I, but did not measure self-efficacy.[38] To date, no studies have reported the prospective relationship between self-efficacy, other known risk factors, and MSK-I in an initial entry military training environment.

Cadet basic training at the United States Military Academy (USMA) is a seven-week initial entry training course with physical demands similar to basic combat training. Many traditional risk factors for MSK-I have been investigated previously in service academy cadets, but the relationship between self-efficacy and injury has not. This study's purpose was to investigate whether self-efficacy is a risk factor for MSK-I in an initial military training environment and compare it to other known risk factors. The researchers hypothesized that self-efficacy (overall and task-specific) would be lower among new cadets who sustain an MSK-I and negatively associated with MSK-I over time throughout cadet basic training.

METHODS

STUDY DESIGN

This was a prospective cohort study investigating the relationships between self-efficacy, other known intrinsic and extrinsic risk factors and MSK-I in an initial entry military setting.

STUDY SIZE AND APPROVAL

All 1,200 incoming USMA new cadets were eligible to participate in this study. The Portsmouth Naval Medical Center Institutional Review Board (IRB) and USMA administrators reviewed and approved the study procedures prior to initiation. Participation was voluntary.

PARTICIPANTS AND SETTING

All participants were USMA new cadets completing cadet basic training from June to August 2022. Cadet basic training introduces new cadets to military skills while physically and psychologically preparing them to be service academy cadets and future officers. Some of the most strenuous and injury-causing events include running and strength training during morning physical fitness training (every week), the Army Combat Fitness Test (ACFT) (Weeks 5-6), land navigation (Weeks 3-4), and the final 12-mile ruck march (Week 7). Cadets also practice tactical skills including individual movement techniques, basic marksmanship, water survival, communication skills, and emergency medical treatment. The researchers recruited participants and collected all demographic, injury history, and self-efficacy data on Day 8 of 44 following a verbal study explanation and written description.

INCLUSION/EXCLUSION CRITERIA

All English-speaking new cadets qualified to begin cadet basic training were eligible for inclusion. Cadets were excluded only if they declined to participate, had not fully recovered from a previous injury, were already injured at the time of the consent/survey, or attritted from cadet basic training for reasons other than MSK-I. All participants under 18 years old were considered emancipated minors and did not require parental consent. All participants who consented for this study also consented participation to a randomized controlled trial by Scott et al. related to back pain beliefs and maximum deadlift. All randomization and interventions for this study were conducted separately and included same-day back pain resilience education for all participants to prevent subsequent pain avoidance behaviors during Week 5 or 6 of cadet basic training.[39]

Reporting prior injuries is a sensitive topic due to fear of administrative disqualification, so the researchers assured the new cadets' confidentiality whenever asked to self-report prior or current injury. All participants who reported a history of injury within the past year classified themselves as either completely recovered (1), mostly recovered (2), or not recovered (3) and completed the Single Assessment Numeric Evaluation (SANE). The SANE required the participants to rate the previously injured body part on a scale of 0% to 100% and has demonstrated reliability and concurrent validity with other injury-specific outcome measures.[40-43] Patient Acceptable Symptom State (PASS) thresholds for SANE scores range from 65.5% to 82.5%, but there is no evidence-based threshold when an injured individual has fully recovered.[44-46] In the present study, participants were excluded if they described themselves as "not recovered" regardless of SANE score or if they described themselves as "mostly recovered" or "completely recovered" with a SANE score of less than 80%. This was to ensure the unresolved prior injuries (or a currently injured state) did not affect participants' self-efficacy to complete CBT and specific events without injury.

OUTCOME MEASURES

The primary outcome of interest was either new injury or recurrence of a previously resolved musculoskeletal or neurological injury. Systemic conditions, skin reactions, and infections were excluded as well as blisters and ingrown toenails which are commonly treated by on-site U.S. Army medics without duty limitations. The researchers operationally defined injuries as a neuromusculoskeletal condition which required care at a medical treatment facility, with or without duty limitations.[20,21,47] This definition eliminated recall bias and the difficulty of obtaining self-reported injury status, which might not have been serious enough to seek medical treatment. Time was recorded as the number of days from study consent to the initial medical encounter.

PROCEDURES AND VARIABLES

The primary independent variable of interest was the participants' self-efficacy to complete cadet basic training without injury and self-efficacy to complete the three most injury-causing and physically demanding events without injury (land navigation physical demands, the 12-mile ruck march, and the ACFT). Although scales for general and pain self-efficacy exist, these scales lack task-specific concordance with the cadet basic training events.[48] The researchers developed task-specific self-efficacy questions (Appendix A) following guidance from Bandura and other previous studies.[32,49] The consent form and survey were piloted among a group of first-year cadets to ensure clarity, accuracy and cultural appropriateness. The participants rated their self-efficacy prospectively on Day 8 via the questionnaire with an 11-point numerical rating scale from 0 (no confidence) to 10 (fully confident). The combined event-specific self-efficacy item combined the three scores from land navigation athletic demands, the 12-mile ruck march, and the ACFT for a maximum score of 30 (items 2-4, Appendix A). Prior to collecting data, the researchers selected approximately 70% as the cut-off for low self-efficacy based on previous research.[50,51] We also planned on visually inspecting the data in quartiles and tertiles in comparison with our cut-off score.[32,52] Participants completed this questionnaire immediately after consenting to participate. The baseline questions survey demonstrated good internal consistency according to Cronbach's alpha (0.817).

Other independent variables included age, biological sex, height, weight, previous military experience, performance motivation, athletic intentions, history of injury within the past year, current level of relative function (only for those with a history of previous injury), baseline aerobic fitness (2-mile run time), baseline upper body muscular endurance (hand release push-ups in 2 minutes), and anterior core muscular endurance (maximum plank duration). Age and sex were both self-reported and verified with the participants' medical record. Injury history, previous military experience, academy overall performance motivation, athletic intentions (intending to participate in division 1, club or intramural athletics), height, and weight were also collected by self-report. Self-reported height and weight has previously demonstrated validity in the military population.[53] The service academy cadet basic training cadre and instructors conducted the 2-mile run, hand release push-up and plank performance assessments according to military testing standards[54] on days 3 to 5.

DATA SOURCES/MEASUREMENTS

The researchers received demographic and performance information from USMA administrators. Participants self-reported additional demographic information, previous experiences, previous injury, and self-efficacy using a paper-based survey. The researchers collected new injury data individually using the Armed Forces Health Longitudinal Technology Application (AHLTA) and the Cadet Injury and Illness Tracking System (CIITS). CIITS is a program unique to this service academy for all participation-limiting injuries. To protect from bias, all other variable data (including self-efficacy data) were hidden during injury surveillance. Additionally, 10% of all questionnaire responses and injury designation data were checked by another researcher for accuracy.

The injury study period lasted 36 days during cadet basic training and the injury surveillance additionally lasted for the entire following semester (174 total days from start to finish). This additional surveillance time was to capture injuries that began during cadet basic training but either received delayed medical care, did not resolve with time alone or worsened during the fall semester. The additional surveillance time did not include any injuries that occurred after cadet basic training ended. The researchers also captured days until the approximate onset of symptoms and days between the onset of symptoms until the medical encounter.

DATA ANALYSIS

After excluding ineligible participants (Figure 1), the researchers conducted descriptive analyses to compare the independent variables between injured and non-injured participants. Missing values were excluded with pairwise deletion. The researchers recorded and analyzed all data using Statistical Package for the Social Sciences (SPSS), version 28 (IBM Corps, Armonk, NY, 2021).

The independent samples t-test was used to compare continuous data, chi-square test was used to compare categorical data, and effect sizes were calculated with Cohen's d and phi.

The researchers used a Kaplan-Meier survival analysis to determine whether the risk of injury throughout cadet basic training was different between those with low or high self-efficacy. New cadets who reported self-efficacy of 7/10 or less to complete all of cadet basic training or 24/30 or less to complete the three combined specific events without injury were identified as having low self-efficacy and compared to new cadets with 8/10 or 25/30 or higher self-efficacy, respectively. The new cadet population was a fixed-sized, closed cohort that began and ended training on the same days. There were some differences in daily training schedules, but the cohort completed training events within the same week. Kaplan-Meier analysis assumptions were met by excluding all new cadets with current or unresolved injuries, beginning the surveillance period simultaneously, defining the censoring event as the first medical encounter date, and by terminating survival at the day of the first medical encounter or right-censoring at 174 days. Subsequent injuries sustained by the same participant were not included in the analysis. The researchers used the log-rank test ($\alpha < 0.05$) to determine whether the time to event was statistically significant between new cadets with high versus low self-efficacy.

Individual variables predictive of future injury were identified using univariable Cox proportional hazard ratios. The researchers purposefully selected variables similar to methods in previous literature based on previously established risk factors.[32,55] Variables that were statistically significant ($\alpha < 0.05$) were compared using correlation coefficients (Pearson's and Spearman rho for continuous and categorical data, respectively) to identify potential collinearity. Variables that did not statistically predict MSK-I or demonstrated moderate to high (> 0.5) correlation were considered for omission from the multivariable analysis. Finally, a multivariable Cox proportional hazard ratio was used to construct a model that predicted MSK-I between all variables of interest and the dependent variable of time to injury.

RESULTS

Of 1200 new cadets, 903 (75.3%) consented to participate in the study. The baseline demographic information revealed that 22 participants had "not recovered" from pre-existing injuries and 43 reported an injury within the last year with SANE of less than 80%. Injury surveillance revealed that 49 new cadets received medical treatment for injuries prior to consent and self-efficacy data collection. Eight included participants left cadet basic training for either non-musculoskeletal medical reasons or by voluntary withdrawal. In total, 122 participants were excluded, leaving 781 new cadets for analysis (Figure 1).

During the 36 days following the survey, 136 (17.4%) new cadets sustained at least one MSK-I that required medical attention with or without work limitations. The most injured regions were the knee (38, 27.9%), ankle (27, 19.9%), lower leg (22, 16.1%), foot (13, 9.6%), and hip/pelvis (9, 6.6%). The most common injury natures were ligament sprains (33, 24.3%), bone stress injuries (23, 16.9%), joint synovitis (20, 14.7%), and tendinopathy (20, 14.7%). The most common injury causes were aerobic physical training/running (41, 30.1%), ruck marching (24, 17.6%), land navigation (19, 14.0%), gradual onset (14, 10.3%), and orga-

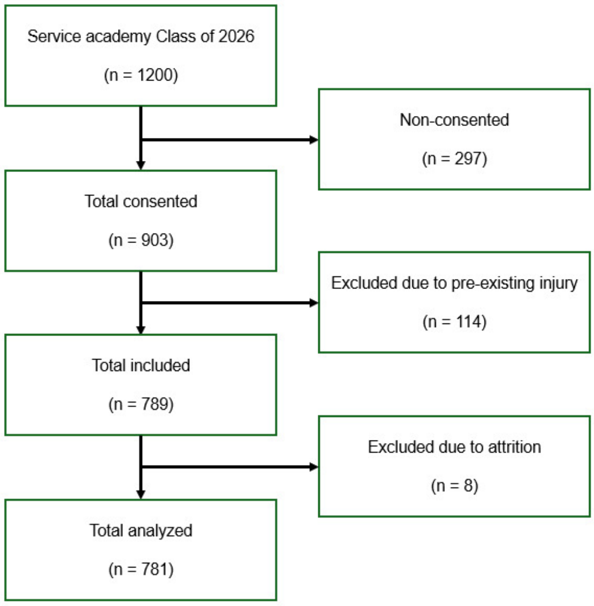

Figure 1. Graphic depicting the total number of cadets attending cadet basic training in 2022 (n = 1200), consented participants (n = 903), excluded participants due to injury at the time of the initial survey or attrition (n = 122) and the total number of participants included (n = 781).

nized athletics (8, 5.9%). Appendix B contains the complete injury and associated activity analysis.

The average class self-efficacy score was 8.2/10 to complete cadet basic training without injury and 26.0/30 to complete the combined task-specific events without injury. The lowest tertile responded at or below 7/10 to complete all of cadet basic training without injury and at or below 24/30 to complete the three combined specific events without injury. The researchers used these cutoff scores to differentiate between low and high self-efficacy.

Statistical results comparing injured and uninjured participants are summarized in Table 1. Two-mile run performance was the only statistically significant variable with a large (Cohen's d>0.8) effect size (t(764)=-9.40, p=<0.001). Independent variables with a positive and statistically significant but small effect size (Cohen's d<0.5) included self-efficacy to complete cadet basic training without injury (t(773)=2.94, p=0.002), combined event-specific self-efficacy (t(770)=4.08, p=<0.001), sex (X^2(1, N=781)=41.28, p=<0.001), hand release push-up performance (t(773)=4.00, p<0.001), plank performance (t(772)=3.88, p=<0.001), height (t(765)=5.00, p=<0.001), and weight (t(762)=2.01, p=0.036). Age, BMI, injury history (only including those above an 80% SANE), athletic intentions, personal performance goals, and prior military experience were not statistically different between those who experienced an injury and those who did not. Although attending the service academy preparatory school was found to be significantly different between injured and uninjured new cadets, it was not carried forward in the analysis due to internal differences (higher athletics participation) between cadets with and without this extra year of training.[21]

The Kaplan-Meier survival curves in Figures 2 and 3 display MSK-I occurrences over time by participants with low (blue line) and high self-efficacy (green line) to complete cadet basic training uninjured (Figure 2) and the combined specific events uninjured (Figure 3). Under both conditions, new cadets with self-efficacy scores of 7/10 or less (Figure 2) or task-specific combined self-efficacy of 24/30 or less (Figure 3) demonstrated a significantly reduced probability (p=0.004 and p=<.001, respectively) to continue training without injury over time according to the log-rank test.

All variables that demonstrated statistically significant difference between new cadets with and without MSK-I resulted in statistically significant univariable hazard ratios (HR). History of a resolved prior injury again was not a hazard for injury during cadet basic training. Correlation analysis (Table 2) demonstrated a moderate (>0.5) correlation between height and weight (r=0.68), sex and height (r=0.60), and sex and hand release push-up (r=0.58). Using a selective stepwise method, height and weight were excluded from the subsequent multivariable analysis due to correlation with each other, sex, and hand release push-up. There was also a moderate to strong correlation between self-efficacy to complete cadet basic training and combined specific events (r=0.63). The multivariable Cox proportional hazard ratio analysis was conducted using two different models to account for collinearity between the self-efficacy variable, each with a self-efficacy variable included.

Tables 3 and 4 depict results from the univariable and multivariable Cox proportional hazard analyses. The univariable analysis demonstrated that height, weight, hand release push-up performance, plank performance, and both self-efficacy measures were all individually protective against MSK-I risk over time. Compared to males, females had a greater injury risk over time. Lastly, new cadets with slower 2-mile run times were also at a greater MSK-I risk over time (Table 3). Of the other variables statistically significant in the univariable models, only slower 2-mile run time predicted injury risk over time (HR=1.004 [1.003-1.006], p=<0.001) in the multivariable model (Table 4).

Although injury history did not demonstrate a statistical significance, the researchers decided to include it in the multivariable analysis due to strong historical prediction for future injury. When included in the multivariable analysis, it was again not predictive of future MSK-I (HR=1.19 [0.83-1.70], p=0.335).

DISCUSSION

The primary purpose of this study was to test the strength of association and predictive value between self-efficacy and future MSK-I. The results support the hypothesis that new cadets who sustained an MSK-I had significantly less self-efficacy than those who remained uninjured and had a shorter survival time during cadet basic training. However, when controlling for other known risk factors, only aerobic fitness (2-mile run time) predicted MSK-I.

Table 1. Demographics and Personal Characteristics of Injured and Non-Injured New Cadets

Variables	Non-Injured	Injured	p-value	Effect Size[a]
Total Analyzed, n (%)	645 (82.5%)	136 (17.4%)		
Age (years), average (sd)	18.25 (0.89)	18.37(1.05)	0.168	-0.13 (-0.32-0.06)
Sex**			<0.001	0.23
Male, n (%)	535 (82.9%)	79 (58.1%)		
Female, n (%)	110 (17.1%)	57 (41.9%)		
Anthropometrics				
Height (cm), average (sd)**	177.1 (8.4)	175.5 (10.7)	<0.001	0.47 (0.29-0.67)
Weight (kg), average (sd)	74.5 (12)	72.0 (14.2)	0.036	0.20 (0.013-0.39)
BMI, average (sd)	23.7 (2.86)	23.9 (2.96)	0.382	-0.084 (-0.27-0.10)
<20 (underweight) n, (%)	46 (7.3%)	10 (7.5%)	0.196	.065
20-29.99 n, (%)	567 (90.3%)	116 (87.2%)		
>30 (obese) n, (%)	15 (2.4%)	7 (5.3%)		
History of Injury in the Last Year			0.610	0.018
No, n (%)	408 (63.4%)	83 (61%)		
Yes, n (%)	236 (36.6%)	53 (39%)		
Preparatory school attendance*			0.013	0.089
No, n (%)	582 (90.4%)	113 (83.1%)		
Yes, n (%)	62 (9.6%)	23 (16.9%)		
Prior military service, n (%)			0.082	0.062
No, n (%)	605 (92.8%)	120 (88.2%)		
Yes, n (%)	47 (7.2%)	16 (11.8%)		
Self-Efficacy, avg (sd)				
CBT Without Injury**	8.28 (1.6)	7.8 (2.1)	0.003	0.28 (0.09-0.46)
CBT Despite Injury	7.8 (2.1)	7.66 (1.9)	0.651	0.04 (-0.14-0.23)
Combined Event-Specific Without Injury**	26.3 (3.8)	24.7 (5.6)	<0.001	0.39 (0.20-0.57)
Future Performance Goals			0.158	0.082
Top 5%, n (%)	205 (32.2%)	44 (32.6%)		
Whatever It Takes to Graduate, n (%)	287 (45.1%)	71 (52.6%)		
Best Effort, n (%)	138 (21.7%)	20 (14.8%)		
Unsure, n (%)	6 (0.9%)	0 (0%)		
Athletic Competition Goals			0.478	0.057
NCAA/Division I, n (%)	198 (30.9%)	43 (31.6%)		
Competitive Clubs, n (%)	210 (32.8%)	52 (38.2%)		
Company Athletics, n (%)	147 (23%)	24 (17.6%)		
Unsure, n (%)	85 (13.3%)	17 (12.5%)		
Physical Performance				
Hand-Release Push Up, reps (sd)**	33.9 (10.5)	29.8 (12.4)	<0.001	0.39 (0.19-0.56)
Plank, avg time (s) (sd)**	174.9 (47.4)	157.3 (50.1)	<0.001	0.37 (0.18-0.55)
2-Mile Run, avg time (s) (sd)**	870.7 (112.2)	980.0 (160.6)	<0.001	-0.90 (-0.70—1.10)

Cadet basic training (CBT), Body Mass Index (BMI), National Collegiate Athletic Association (NCAA)
[a]Cohen's d (95% CI) for continuous data, phi for categorical data
*p=<0.05
**p=<0.001

These results are the first to prospectively demonstrate that self-efficacy to complete strenuous military training without injury was lower among new cadets who sustained an MSK-I. Those with lower self-efficacy also had reduced time to injury compared to new cadets with high self-efficacy. However, self-efficacy is not predictive of future MSK-Is when controlling for other important covariates. This is not surprising considering that the six sources of self-

Table 2. Correlations Between Independent Risk Factors with Significant Univariable Cox Proportional Hazard Ratios

	Height	Weight	Sex	Injury History	Hand Release Push-Up	Plank	2-Mile Run	SE Basic Training Uninjured	SE Event-Specific Uninjured
Height	1								
Weight	**.684****	1							
Sex	**-.566****	**-.526****	1						
Injury History	.027	.083*	-.025	1					
Hand Release Push-Up	.214**	.329**	**-.538****	.038	1				
Plank	-.046	-.083*	-.217**	.008	.397**	1			
2-Mile Run	-.295**	-.036	.443**	-.031	-.386**	-.398**	1		
SE, Basic Training Uninjured	.171**	.203**	-.156**	-.109**	.228**	.137**	-.199**	1	
SE Event-Specific Uninjured	.227**	.223**	-.248**	-.011	.345**	.229**	-.323**	**.622****	1

Self-efficacy (SE)
**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)
Bold = Moderate to high correlation (>0.5)

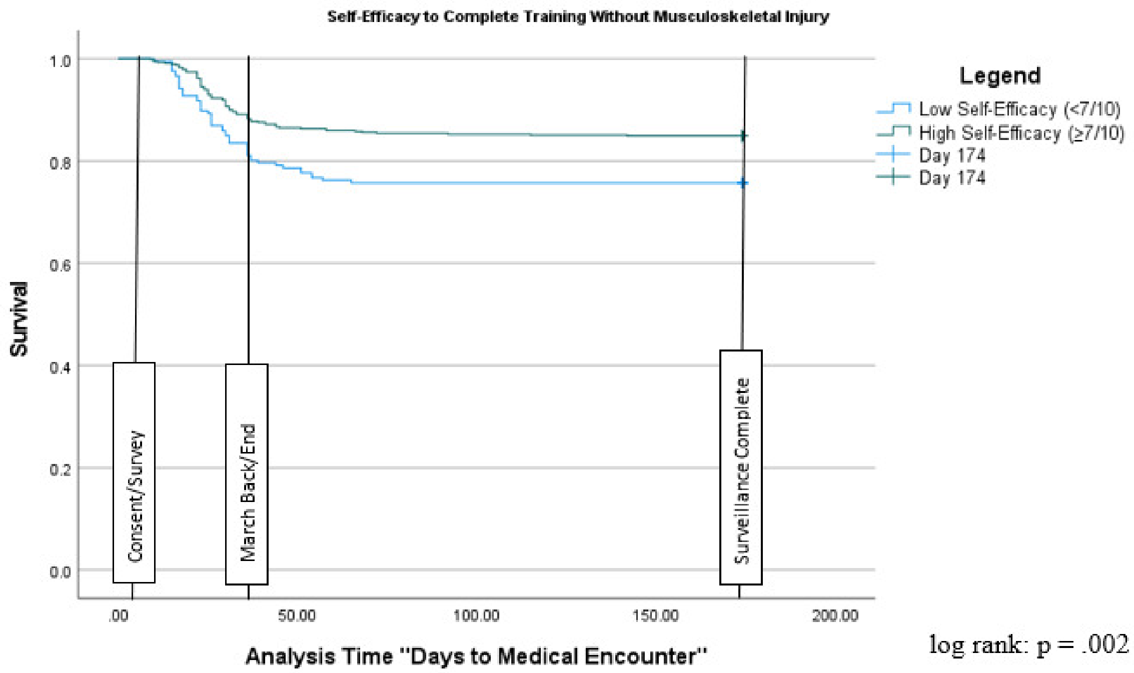

Figure 2. Kaplan-Meier Survival Curve to MSK-I By Self-Efficacy to Complete Cadet Basic Training Without MSK-I.

efficacy[56] might interact with the other risk factors. For instance, individuals with lower aerobic fitness might report lower self-efficacy due to the perceived level of necessary exertion to perform specific tasks. Future research is needed to determine how previous injury affects self-efficacy, the interactions between self-efficacy sources and performance, and how self-efficacy affects injury, performance, and other important risk factors.

These findings support prior research that low aerobic physical fitness, as identified in a one to two mile running assessment, is the strongest predictive risk factor for MSK-I during initial entry training.[13,14,24,57,58] In this cohort, a one second increase in 2-mile run time increased the MSK-I hazard ratio by 0.5%. This can be interpreted as for every one minute increase in 2-mile run time, there was a 30% increased risk of sustaining an MSK-I. This study's injury surveillance echoes the classic training conundrum: aerobic physical training (running) and ruck marching accounted for 47.1% of all training injuries. This implies that military leadership and instructors should continue to use low aerobic fitness performance to identify at-risk populations, conduct appropriately programed training such as ability group-based running,[59,60] and consider improving the other independent factors that were associated, although not predictive of MSK-I.

Previous injury is one of the most widely accepted risk factors for future injury, but was not significantly different between the injured and non-injured population in this cohort. This may have been due to either the previous injury timeframe (one year) or distinguishing between resolved and unresolved previous injuries. The researchers surveyed previous injuries within the past year in order to capture relatively common athletic injuries such as anterior cruciate ligament tears, which can take a year to fully resolve. Previous studies surveyed previous injuries within the prior three to six months.[18,47] The longer timeframe might have resulted in including more positive responses for mild to moderate previous injuries with more time to fully resolve.

This study uniquely distinguished between resolved and unresolved previous injuries by requiring participants to rate their current level of function according to the SANE. The researchers chose this method to control for unresolved previous injuries at the time of the survey but expected previous injury again to strongly predict future injury. This finding presents a potential need to differentiate between resolved and unresolved previous injuries at the beginning of an injury surveillance study and might emphasize the importance of "finishing" rehabilitation to prevent future injury. The plethora of previous research on prior injury as an MSK-I risk factor necessitates future research with the same and related populations before elucidating the relationship between prior injury, injury resolution, and future injury.

Other independent variables that were significantly different between the injured and non-injured groups (associated with MSK-I) but did not collectively predict MSK-I included height, weight, biological sex, plank, and hand release push-up performance. Biological sex and height are both intrinsic factors which have previously demonstrated association with MSK-I during military training. This study adds to a substantial body of evidence that when controlling for other injury risk factors, biological sex alone does not predict future injury.[12,14,24,26,57] However, females may exhibit higher injury risk due to physiological traits that predispose all soldiers to injury, such as slower 2-mile run

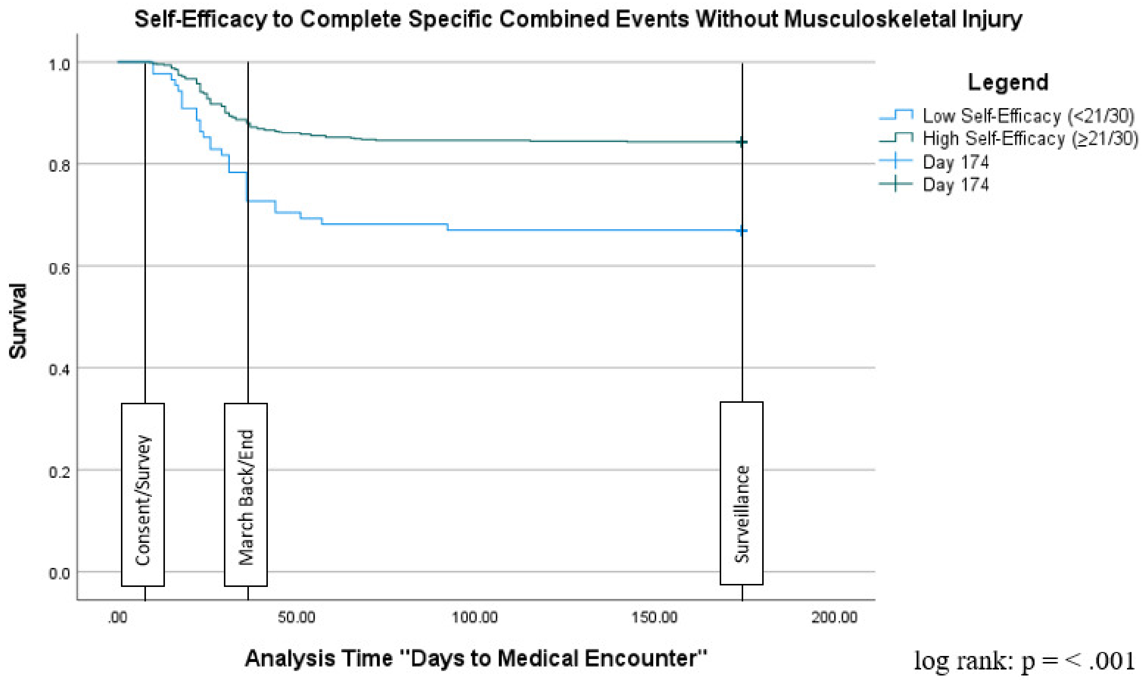

Figure 3. Kaplan-Meier Survival Curve to MSK-I By Self-Efficacy to Complete Combined Specific Events Without MSK-I.

Table 3. Univariable Cox Proportional Regression Analysis and MSK-I

Variable	Univariable HR (95% CI)	p-value
Height	0.89 (0.85-0.93)	<0.001
Weight	0.99 (0.98-0.999)	0.041
Sex	2.91 (2.07-4.09)	<0.001
Injury History	1.12 (0.79-1.58)	0.528
Hand Release Push-Ups	0.97 (0.96-0.99)	<0.001
Plank	0.99 (0.990-0.997)	<0.001
2-Mile Run	1.005 (1.004-1.006)	<0.001
Self-Efficacy, Basic Training Uninjured	0.88 (0.81-0.96)	0.002
Self-Efficacy, Combined Event-Specific Uninjured	0.93 (0.90-0.96)	<0.001

Confidence interval (CI), Hazard Ratio (HR)

times, shorter height, lower weight, and lower hand-release push-up performance.[18,22]

Hand release push-up and plank performance were significantly different between the injured and non-injured groups and were predictive of MSK-I individually, but not when controlling for the other risk factors. De la Mott et al. previously found strong and moderate evidence of relationships between upper body and core muscular endurance respectively and both have demonstrated value as part of a prospective injury screen.[18,60] However, when controlling for other risk factors, Moran et al. also did not find push-up endurance to be predictive of injury.[38] Because of this association, but not predictive value, military instructors should continue to train upper body muscular endurance, but it is unclear whether the hand release push-up nor the plank should be included in injury prevention screening. This is the first known study to identify hand release push-up performance as a potential MSK-I risk factor based on univariable analysis.

It is important to emphasize how self-efficacy concepts should and should not be incorporated into training. First, this study did not find that low self-efficacy was able to predict future injury when controlling for other known risk factors and therefore, should not be used in isolation to identify at-risk populations. However, based on mean differences and univariable relationships, self-efficacy may be a modifiable extrinsic risk factor. Self-efficacy is a psychological concept, but training could include strategies beyond talking and thinking about confidence. Training strategies could include leveraging the six sources of self-efficacy: enhancing mastery experiences (prior success), vicarious experiences (seeing others succeed), physiological state (including nutrient timing and adequate sleep), affective state, verbal persuasion, and mental imagery.[56] More specific intervention strategies are beyond the scope of this analysis and future studies should explore intervention effectiveness.

One strength of this study was the researchers' thorough injury surveillance through multiple electronic medical record reviews, including all musculoskeletal patient encounters, radiology reports, and physical screenings. Working in the same facility as the other medical providers allowed the authors to clarify injury diagnoses when medical documentation was unclear. This resulted in very few classifications as "other" or "unknown" injury causes. Injury trends were otherwise similar to prior initial entry training environment research.[20,21]

The researchers chose to develop a task-specific self-efficacy assessment to ensure concordance[48] with cadet basic training events and it demonstrated strong internal consistency. The low self-efficacy cutoff scores based on the lowest tertiles were consistent with findings on the Pain Self-Efficacy Questionnaire (40/60 [67%])[48] and the Return to Work Self-Efficacy (RTW-SE) Questionnaire (4.6/6 [77%]).[49] Although the items were developed following guidance by Bandura, a limitation of our study is that it was not validated with another accepted self-efficacy scale. Future studies should consider validating custom self-efficacy questionnaires with either the Pain[50] or General[36] Self-Efficacy Scales.

Another limitation to this study included consent and survey timing. Due to the demanding cadet basic training schedule, study consent and survey took place 1 week after cadet basic training commencement, which was the soonest available opportunity. Although this occurred prior to high-demand physical training events except for a portion of the ACFT (only push ups, plank and 2-mile run), 26% of all known injuries during cadet basic training occurred prior to the beginning of data collection and therefore were not a part of the analyzed data set. It is reasonable to assume that these cadets, who were the first to sustain injuries, may have been a valuable addition. Future studies should prioritize surveying participants as early as possible for overall self-efficacy.

Self-selection bias both when consenting to the study and in seeking medical care was another considerable limitation. The reasons for only 903 (75.3%) of the 1200 new cadets agreeing to participate in this study despite no additional time requirements could have been related to reporting prior injuries, consenting to medical records review, or having to consent to two separate studies simultaneously. Also, new cadets had the ability to choose whether or to seek medical care except in emergency situations.

Lastly, this study was limited to the relationship between self-efficacy and MSK-I, but as a psychological trait, may have a broader reach. Individuals with lower self-efficacy might exhibit decreased resilience to illness or psychological stress, leading to more medical or mental health encounters. Future studies might consider examining the relationship between self-efficacy and all medical encounters.

CONCLUSION

There was a significant, although small relationship between new cadets who reported low self-efficacy and future MSK-I during initial entry training. Self-efficacy could potentially be a modifiable risk factor, but further research is necessary to validate these findings and identify beneficial interventions. At this time, self-efficacy assessments should not be used alone to identify those with higher MSK-I risk. Additionally, this study strongly supports the body of literature that aerobic performance can be used to identify at-risk populations and proposes using the SANE to differentiate between resolved and unresolved injuries for injury surveillance research.

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Table 4. Multivariable Cox Proportional Regression Analysis and MSK-I

Variable	Model 1: CBT Uninjured Multivariable HR (95% CI)	p-value[a]	Model 2: Combined Event-Specific Multivariable HR (95% CI)	p-value[b]
Sex	1.50 (0.90-2.49)	0.120	1.51 (0.90-2.51)	0.117
Injury History	1.19 (0.83-1.70)	0.335	1.22 (0.86-1.75)	0.257
Hand Release Push-Ups	1.01 (0.99-1.04)	0.197	1.02 (0.99-1.04)	0.188
Plank	1.00 (0.99-1.003)	0.536	0.999 (0.995-1.003)	0.576
2-Mile Run	1.005 (1.003-1.006)	<0.001	1.004 (1.003-1.006)	<0.001
Self-Efficacy, Basic Training Uninjured (0-10)	0.94 (0.86-1.04)	0.231	--	--
Self-Efficacy, Combined Event-Specific Uninjured (0-30)	--	--	0.98 (0.94-1.02)	0.331

Hazard ratio (HR)
[a]Model 1 demonstrated statistical significance (χ^2 = 77.24, p=<0.001)
[b]Model 2 demonstrated statistical significance (χ^2 = 76.76, p=<0.001)

REFERENCES

1. Center for Disease Control and Prevention. Trends in the prevalence of obesity and dietary behaviors, National Youth Behavior Survey 1991-2019. Division of Adolescent and School Health, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. 2020. Accessed February 4, 2022. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/trends/2019_obesity_trend_yrbs.pdf

2. Knapik JJ, Sharp MA, Steelman RA. Secular trends in the physical fitness of United States Army recruits on entry to service, 1975–2013. *J Strength Cond Res*. 2017;31(7):2030-2052. doi:10.1519/JSC.0000000000001928

3. Maxey H, Bishop-Josef S, Goodman B. Unhealthy and unprepared. Council for a Strong America. 2018. Accessed April 24, 2023. https://strongnation.s3.amazonaws.com/documents/484/389765e0-2500-49a2-9a67-5c4a090a215b.pdf?1539616379&inline;%20filename=%22Unhealthy%20and%20Unprepared%20report.pdf%22

4. Alemany JA, Pierce JR, Bornstein DB, Grier TL, Jones BH, Glover SH. Comprehensive physical activity assessment during U.S. Army basic combat training. *J Strength Cond Res*. 2022;36(12):3505-3512. doi:10.1519/JSC.0000000000004114

5. U.S. Army Public Health Center. 2021 Health of the Force. 2022. Accessed April 24, 2022. https://phc.amedd.army.mil/topics/campaigns/hof

6. U.S. Army Center for Initial Military Training. *The U.S. Army Holistic Health and Fitness Operating Concept*. U.S. Army Training and Doctrine Command; 2020. Accessed September 8, 2024. https://www.army.mil/e2/downloads/rv7/acft/h2f_operating_concept.pdf

7. Molloy JM, Pendergrass TL, Lee IE, Chervak MC, Hauret KG, Rhon DI. Musculoskeletal injuries and United States Army readiness part I: Overview of injuries and their strategic impact. *Mil Med*. 2020;185(9-10):e1461-e1471. doi:10.1093/milmed/usaa027

8. Roy LTC, Faller TN, Richardson MD, Taylor KM. Characterization of limited duty neuromusculoskeletal injuries and return to duty times in the U.S. Army during 2017-2018. *Mil Med*. 2021;00:9.

9. Jones BH, Hauschild VD, Canham-Chervak M. Musculoskeletal training injury prevention in the U.S. Army: Evolution of the science and the public health approach. *J Sci Med Sport*. 2018;21(11):1139-1146. doi:10.1016/j.jsams.2018.02.011

10. Lovalekar M, Hauret K, Roy T, et al. Musculoskeletal injuries in military personnel—Descriptive epidemiology, risk factor identification, and prevention. *J Sci Med Sport*. 2021;24(10):963-969. doi:10.1016/j.jsams.2021.03.016

11. U.S. Army Public Health Center. Health of the Force 2020. 2021. Accessed January 20, 2022. https://phc.amedd.army.mil/Periodical%20Library/2020-hof-report.pdf

12. Rappole C, Grier T, Anderson MK, Hauschild V, Jones BH. Associations of age, aerobic fitness, and body mass index with injury in an operational Army brigade. *J Sci Med Sport*. 2017;20:S45-S50. doi:10.1016/j.jsams.2017.08.003

13. Blacker SD, Wilkinson DM, Bilzon JLJ, Rayson MP. Risk factors for training injuries among British Army recruits. *Mil Med*. 2008;173(3):278-286. doi:10.7205/MILMED.173.3.278

14. Dos Santos Bunn P, de Oliveira Meireles F, de Souza Sodré R, Rodrigues AI, da Silva EB. Risk factors for musculoskeletal injuries in military personnel: A systematic review with meta-analysis. *Int Arch Occup Environ Health*. 2021;94(6):1173-1189. doi:10.1007/s00420-021-01700-3

15. Lisman PJ, de la Motte SJ, Gribbin TC, Jaffin DP, Murphy K, Deuster PA. A systematic review of the association between physical fitness and musculoskeletal injury risk: Part 1—Cardiorespiratory endurance. *J Strength Cond Res*. 2017;31(6):1744-1757. doi:10.1519/JSC.0000000000001855

16. Molloy JM. Factors influencing running-related musculoskeletal injury risk among U.S. Military recruits. *Mil Med*. 2016;181(6):512-523. doi:10.7205/MILMED-D-15-00143

17. Hruby A, Bulathsinhala L, McKinnon CJ, et al. BMI and lower extremity injury in U.S. Army Soldiers, 2001–2011. *Am J Prev Med*. 2016;50(6):e163-e171. doi:10.1016/j.amepre.2015.10.015

18. de la Motte SJ, Gribbin TC, Lisman P, Murphy K, Deuster PA. Systematic review of the association between physical fitness and musculoskeletal injury risk: Part 2-Muscular endurance and muscular strength. *J Strength Cond Res*. 2017;31(11):3218-3234. doi:10.1519/JSC.0000000000002174

19. Jones BH, Hauret KG, Dye SK, et al. Impact of physical fitness and body composition on injury risk among active young adults: A study of Army trainees. *J Sci Med Sport*. 2017;20:S17-S22. doi:10.1016/j.jsams.2017.09.015

20. Epstein Y, Fleischmann C, Yanovich R, Heled Y. Physiological and medical aspects that put women soldiers at increased risk for overuse injuries. *J Strength Cond Res*. 2015;29 Suppl 11:S107-110. doi:10.1519/JSC.0000000000001079

21. Hearn DW, Kerr ZY, Wikstrom EA, et al. Lower extremity musculoskeletal injury in US Military Academy cadet basic training: A survival analysis evaluating sex, history of injury, and body mass index. *Orthop J Sports Med*. 2021;9(10):232596712110398. doi:10.1177/23259671211039841

22. Kucera KL, Marshall SW, Wolf SH, Padua DA, Cameron KL, Beutler AI. Association of injury history and incident injury in cadet basic military training. *Med Sci Sports Exerc*. 2016;48(6):1053-1061. doi:10.1249/MSS.0000000000000872

23. Anderson AB, Braswell MJ, Pisano AJ, et al. Factors associated with progression to surgical intervention for lumbar disc herniation in the military health system. *Spine*. 2021;46(6):E392-E397. doi:10.1097/BRS.0000000000003815

24. Bell N. High injury rates among female Army trainees: A function of gender? *Am J Prev Med*. 2000;18(1):141-146. doi:10.1016/S0749-3797(99)00173-7

25. Bunn PDS, Rodrigues AI, Bezerra da Silva E. The association between the functional movement screen outcome and the incidence of musculoskeletal injuries: A systematic review with meta-analysis. *Phys Ther Sport Off J Assoc Chart Physiother Sports Med*. 2019;35:146-158. doi:10.1016/j.ptsp.2018.11.011

26. Schram B, Canetti E, Orr R, Pope R. Injury rates in female and male military personnel: A systematic review and meta-analysis. *BMC Womens Health*. 2022;22(1):310. doi:10.1186/s12905-022-01899-4

27. Canham-Chervak M, Cowan DN, Pollack KM, Jackson RR, Jones BH. Identification of fall prevention strategies for the military: A review of the literature. *Mil Med*. 2015;180(12):1225-1232. doi:10.7205/MILMED-D-14-00673

28. Molloy JM, Pendergrass TL, Lee IE, Hauret KG, Chervak MC, Rhon DI. Musculoskeletal injuries and United States Army readiness. Part II: Management challenges and risk mitigation initiatives. *Mil Med*. 2020;185(9-10):e1472-e1480. doi:10.1093/milmed/usaa028

29. Terry AC, Thelen MD, Crowell M, Goss DL. The musculoskeletal readiness screening tool- Athlete concern for injury and prior injury associated with future injury. *Int J Sports Phys Ther*. 2018;13(4):595-604. doi:10.26603/ijspt20180595

30. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev*. 1977;84(2):191-215. doi:10.1037/0033-295X.84.2.191

31. Bandura A. Self-efficacy mechanism in human agency. *Am Psychol*. 1982;37(2):122-147. doi:10.1037/0003-066X.37.2.122

32. Benedict TM, Grier TL, Roy TC, Toussaint MN, Jones BH. Demographic, psychosocial, and physical fitness predictors of successful graduation from U.S. Army Ranger School. *Mil Psychol*. 2023;35(2):180-191. doi:10.1080/08995605.2022.2094174

33. Feltz DL, Chow GM, Hepler TJ. Path analysis of self-efficacy and diving performance revisited. *J Sport Exerc Psychol*. 2008;30(3):401-411. doi:10.1123/jsep.30.3.401

34. Brinkman C, Baez SE, Genoese F, Hoch JM. Use of goal setting to enhance self-efficacy after sports-related injury: A critically appraised topic. *J Sport Rehabil*. 2020;29(4):498-502. doi:10.1123/jsr.2019-0032

35. Beattie S, Fakehy M, Woodman T. Examining the moderating effects of time on task and task complexity on the within person self-efficacy and performance relationship. *Psychol Sport Exerc*. 2014;15(6):605-610. doi:10.1016/j.psychsport.2014.06.007

36. Gruber KA, Kilcullen RN, Iso-Ahola SE. Effects of psychosocial resources on elite soldiers' completion of a demanding military selection program. *Mil Psychol*. 2009;21(4):427-444. doi:10.1080/08995600903206354

37. Ledford AK, Dixon D, Luning CR, et al. Psychological and physiological predictors of resilience in Navy SEAL training. *Behav Med*. 2020;46(3-4):290-301. doi:10.1080/08964289.2020.1712648

38. Moran DS, Evans R, Arbel Y, et al. Physical and psychological stressors linked with stress fractures in recruit training: Stress fractures in combat recruits. *Scand J Med Sci Sports*. 2013;23(4):443-450. doi:10.1111/j.1600-0838.2011.01420.x

39. Scott KM, Kreisel BR, Florkiewicz EM, et al. The effect of cautionary versus resiliency spine education on maximum deadlift performance and back beliefs: A randomized control trial. *J Strength Cond Res*. 2024;38(7):e341-e348. doi:10.1519/JSC.0000000000004783

40. Dumont GD, Glenn RL, Battle NC, Thier ZT. Correlation of the Single-Assessment Numeric Evaluation (SANE) score with hip-specific patient-reported outcome measures. *Arthrosc Sports Med Rehabil*. 2021;3(2):e435-e440. doi:10.1016/j.asmr.2020.10.008

41. Thigpen CA, Shanley E, Momaya AM, et al. Validity and responsiveness of the single alpha-numeric evaluation for shoulder patients. *Am J Sports Med*. 2018;46(14):3480-3485. doi:10.1177/0363546518807924

42. Williams GN, Gangel TJ, Arciero RA, Uhorchak JM, Taylor DC. Comparison of the single assessment numeric evaluation method and two shoulder rating scales. *Am J Sports Med*. 1999;27(2):214-221. doi:10.1177/03635465990270021701

43. Williams GN, Taylor DC, Gangel TJ, Uhorchak JM, Arciero RA. Comparison of the single assessment numeric evaluation method and the Lysholm score. *Clin Orthop*. 2000;373:184-192. doi:10.1097/00003086-200004000-00022

44. Gowd AK, Charles MD, Liu JN, et al. Single Assessment Numeric Evaluation (SANE) is a reliable metric to measure clinically significant improvements following shoulder arthroplasty. *J Shoulder Elbow Surg*. 2019;28(11):2238-2246. doi:10.1016/j.jse.2019.04.041

45. Puzzitiello RN, Gowd AK, Liu JN, Agarwalla A, Verma NN, Forsythe B. Establishing minimal clinically important difference, substantial clinical benefit, and patient acceptable symptomatic state after biceps tenodesis. *J Shoulder Elbow Surg*. 2019;28(4):639-647. doi:10.1016/j.jse.2018.09.025

46. O'Halloran B, Cook CE, Oakley E. Criterion validation and interpretability of the single assessment numerical evaluation (SANE) of self-reported recovery in patients with neck pain. *Musculoskelet Sci Pract*. 2021;56:102467. doi:10.1016/j.msksp.2021.102467

47. Helton GL, Cameron KL, Zifchock RA, et al. Association between running shoe characteristics and lower extremity injuries in United States Military Academy cadets. *Am J Sports Med*. 2019;47(12):2853-2862. doi:10.1177/0363546519870534

48. Moritz SE, Feltz DL, Fahrbach KR, Mack DE. The relation of self-efficacy measures to sport performance: A meta-analytic review. *Res Q Exerc Sport*. 2000;71(3):280-294. doi:10.1080/02701367.2000.10608908

49. Bandura A. Guide for Construction Self-Efficacy Scales. In: Urdan T, Pajares F, eds. *Self-Efficacy Beliefs of Adolescents*. Vol 5. Information Age Publishing; 2006:307-337.

50. Ferrari S, Vanti C, Costa F, Fornari M. Can physical therapy centred on cognitive and behavioural principles improve pain self-efficacy in symptomatic lumbar isthmic spondylolisthesis? A case series. *J Bodyw Mov Ther*. 2016;20(3):554-564. doi:10.1016/j.jbmt.2016.04.019

51. Gjengedal RGH, Lagerveld SE, Reme SE, Osnes K, Sandin K, Hjemdal O. The Return-To-Work Self-Efficacy questionnaire (RTW-SE): A validation study of predictive abilities and cut-off values for patients on sick leave due to anxiety or depression. *J Occup Rehabil*. 2021;31(3):664-673. doi:10.1007/s10926-021-09957-8

52. Isaac V, Wu CY, McLachlan CS, Lee MB. Associations between health-related self-efficacy and suicidality. *BMC Psychiatry*. 2018;18(1):126. doi:10.1186/s12888-018-1705-z

53. Martin RC, Grier T, Canham-Chervak M, et al. Validity of self-reported physical fitness and body mass index in a military population. *J Strength Cond Res*. 2016;30(1):26-32. doi:10.1519/JSC.0000000000001026

54. Department of the Army. *Holistic Health and Fitness Testing.*; 2020. Accessed March 29, 2023. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN35869-ATP_7-22.01-002-WEB-5.pdf

55. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. *Source Code Biol Med*. 2008;3(1):17. doi:10.1186/1751-0473-3-17

56. Shipherd AM, Renner KB, Samson A, Duncan CK. An examination of the sources of self-efficacy in runners throughout training: A mixed methods study. *J Sport Behav*. 2021;44(1):144-164. Accessed March 29, 2023. https://www.journalofsportbehavior.org/index.php/JSB/article/view/65

57. Anderson MK, Grier T, Dada EO, Canham-Chervak M, Jones BH. The role of gender and physical performance on injuries: An Army study. *Am J Prev Med*. 2017;52(5):131-138. doi:10.1016/j.amepre.2016.11.012

58. Jones BH, Bovee MW, Harris JMcA, Cowan DN. Intrinsic risk factors for exercise-related injuries among male and female Army trainees. *Am J Sports Med*. 1993;21(5):705-710. doi:10.1177/036354659302100512

59. Knapik JJ, Scott SJ, Sharp MA, et al. The basis for prescribed ability group run speeds and distances in U.S. Army basic combat training. *Mil Med*. 2006;171(7):669-677. doi:10.7205/MILMED.171.7.669

60. Sefton JM, Lohse KR, McAdam JS. Prediction of injuries and injury types in Army basic training, infantry, armor, and cavalry trainees using a common fitness screen. *J Athl Train*. 2016;51(11):849-857. doi:10.4085/1062-6050-51.9.09

SUPPLEMENTARY MATERIALS

Appendix B

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Appendix A

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