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EFFECT ON BACK KNOWLEDGE AMONG RECRUITS

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Summary

Problem

To address the high prevalence and costs associated with low back pain, U.S. Navy physical therapists currently provide back injury prevention education to requesting commands in the form of the Healthy Back Program. Although the content of the Healthy Back Program has face validity and is similar to other back education interventions, no explicit evaluation of its effectiveness has been conducted. Because of the need to develop effective and practical health interventions, a formal study is needed.

Objective

A broader evaluation study will make use of a longitudinal, treatment-control group design to test the effects of the Healthy Back Program on back injuries among Navy recruits. The primary purposes of the present study are to: (a) present findings examining the immediate effect of the Healthy Back Program in changing knowledge about back injury prevention, and (b) provide a baseline assessment of back problems among incoming recruits. Correlates of back pain also are examined to suggest factors that may be amenable to intervention.

Approach

A group of intervention recruits (n=1,772) received the Healthy Back Program brief, which is a slide presentation that focuses largely on information about back injury and prevention techniques. Immediately following the presentation, intervention subjects completed a short questionnaire assessing recent and distant history of back problems, demographic and health information, back knowledge, and nutrition knowledge (comparison items). Control subjects (n=1,658) completed identical questionnaires but received no presentation.

Results

The intervention group had a significantly higher back knowledge score (67% correct) than controls (50% correct); nutrition knowledge differences were minimal. About 41% of all recruits ever had experienced a back problem, 27% reported at least one back problem within the past year, and 11% reported back pain during recruit training. Lifting, sports participation, and bending were reported as the leading causes of previous back problems. Although better health and fitness status were associated with fewer low back problems, other correlates of back pain reported elsewhere (e.g., smoking, overweight) were not found for this group.

Conclusions

Findings indicate that among this young male recruit population, low back problems are not uncommon. Correlates of low back pain found in other research (e.g., smoking, overweight) were not found in this group, although health/fitness status, sports activity, lifting, and bending were implicated as potential risk factors. An immediate knowledge effect of the brief Healthy Back Program was found, and long-term effects on knowledge and back injury are presently being assessed.

The U.S. Navy Healthy Back Program: Effect on Back Knowledge among Recruits

The high prevalence of low back pain in the United States is well established and has become a cause for concern from both a health and economic perspective. Approximately four out of five individuals will have back pain some time in their lives, and each year approximately two million will experience back pain (Bigos, Spengler, Martin, Zeh, Fisher, & Nachemson, 1986a; Nelson, 1988). It has been estimated that $5 billion is spent annually for relief of back pain; however, these costs are but a fraction of the total estimated $15-23 billion associated with treatment, compensation, and lost earnings related to back pain (Carron & McLaughlin, 1982; Nelson, 1988). Studies indicate that back pain is one of the most common reasons for seeing a physician (Linton, Bradley, Jensen, Spangfort, & Sundell, 1989), yet those who seek medical attention are believed to represent only about ten percent of those afflicted (Nelson, 1988). It is estimated that one-third of all workers' compensation claims and 60 percent of long-term disability payments are related to the care of back injuries (Nelson, 1988). It is no wonder that, because of its high prevalence and staggering social and financial costs, back pain prevention and management has become an issue of great interest to both the nation and the U.S. Navy.

Despite considerable progress toward understanding some aspects of low back pain, the etiology, diagnosis, and prognosis of acute and chronic low back pain remain obscure (Moffett, Chase, Portek, & Ennis, 1985; Linton et al., 1989). Furthermore, a wide variety of treatments, both traditional and unorthodox, have had limited success, at best. Rest, exercise, traction, passive mobilization, physical strengthening, physiotherapy, drugs, surgery, hypnosis, psychotherapy, behavior modification, and skills training are but a few of the approaches used to treat low back pain. Because there is no agreed-upon therapeutic regimen, the usual course of treatment involves trying different strategies in a trial-and-error fashion until one is effective, or until the condition subsides (Morrison & Roberts, 1988).

Back-Injury Risk Factors

Although in many cases the cause of low back pain is not discernable, investigators have attempted to identify potential risk factors by examining consistent correlates of low back injury and pain. A variety of demographic and physical characteristics have been suggested as possible predisposing factors. Younger individuals, divorced people, those of lower socioeconomic status, women, individuals of lower health and fitness status, and those of above average height and weight have been reported to be at increased risk (Cady, Bischoff, O'Connell, Thomas, & Allen, 1979; Heliovaara, 1989; Hrubec & Nashold, 1975; Bigos et al., 1986a). However, other studies have reported that height, weight, and cardiovascular fitness are not consistent independent correlates of back problems, and that equal proportions of men and

women suffer from back pain (Fisk, Dimonte, & Courington, 1983; Battie, Bigos, Fisher, Hansson, Nachemson, Spengler, Wortley, & Zeh, 1989; Bigos et al., 1986a; Kelsey, Githens, & Rowe, 1965). Activity in sports may be a risk factor (Ferguson, 1974; Jackson, Wiltse & Cirinciore, 1976), as may, conversely, the lack of physical activity (Kelsey, 1975). Most experts in the area agree that attitudinal and psychological factors (e.g., stress, anxiety, depression, job dissatisfaction) play a role, although studies to date have not established whether these variables are antecedents or outcomes of low back pain (Heliovaara, 1989; Frymoyer, Pope, Costanza, Rosen, Goggin, & Wilder, 1980). Low back pain has been consistently associated with several occupational factors, including manual handling tasks, excessive loads, vibration, stooping, and falling (Bigos et al., 1986b; Morrison & Roberts, 1988; Heliovaara, 1989). In addition, length of time on the job is inversely related to back injuries (Bigos et al., 1986a). In general, those working in physically demanding jobs are considered susceptible to back injury, although occupations that involve long periods of sitting also present risks (Kelsey, 1975). Smoking is a consistently reported predictor of back problems (Battie et al., 1989); however, the physiological mechanisms involved (e.g., diminished bone mineral content, excessive coughing, changed discal metabolism) are not well understood (Frymoyer et al., 1980).

Epidemiology and Costs of Low Back Problems in the Navy

Although the extent of back problems in the Navy is not known with certainty, Woodruff and Conway (1992) recently reported that about half of a sample of Navy active duty personnel undergoing required routine physical examinations had ever experienced at least one back problem. Further, 15% of this nonpatient sample reported currently having back pain. This percent is identical to that obtained from a 1988 health and lifestyle survey of a random sample of the Navy in which 15% reported experiencing at least some back problems within the last seven days (Conway, Trent, & Conway, 1989).

Information regarding the costs associated with back injury in the Navy is lacking, although some data documenting the extent of utilization of medical resources for back problems are available. In a year-long study examining Navy outpatient clinic utilization for back problems, Chesson and Conway (1990) reported that visits for low-back problems represented 4.4% of the total outpatient case load. This modest percentage should be considered an underestimate of the actual prevalence of back problems in the Navy, however, because it is likely that the great majority of individuals suffering low back pain do not seek medical intervention (Schuchmann, 1988).

In an investigation of hospitalizations among Navy enlisted men during 1965-1976 for job-related sprain/strain injuries, Marcinik (1981) reported that 56% of 5,584 such injuries were back-related. Considering days hospitalized, back injuries accounted for 55% of the total 82,451 non-effective days due to sprain/strain injuries. Navy enlisted men working in physically demanding ratings (e.g., builder,

steelworker) had the highest rates of hospitalization for back injuries. Marcinik (1981) further speculated that those in the lower paygrades, Navy women in nontraditional ratings, shipboard personnel, and recruits may be vulnerable to back injury because of the high muscular demands of Navy operational and training tasks for which these individuals are unprepared.

A later Navy study explored hospitalizations among enlisted active duty personnel during 1974-1983 with low-back problems as the primary diagnosis (Chesson & Hilton, 1988). Back-problem cases represented 3% of all hospitalizations over the time period. One occupational risk factor identified in this study was length of service: Back injuries were more likely to occur within the first year of Navy service soon after the servicemember's arrival at their first job. Based on these findings, the authors recommended that a well-back program should be presented early in one's Navy career, possibly during recruit training.

Back Education as Treatment and Prevention

Because of its comparatively low cost and assumed benefits, back education has become a popular treatment and preventive strategy. As a treatment approach, the effectiveness of backcare education has shown mixed results. Positive effects have been reported on a variety of outcome measures such as lost work days, pain assessments, symptom reduction, health care utilization, knowledge, observed body mechanics, and physical capability (Bergquist-Ullman & Larsson, 1977; Fisk, DiMonte, & Courington, 1983; Hall & Iceton, 1983; Moffett et al., 1986; Morrison & Roberts, 1988). On the other hand, a sizable number of studies report no long-term differences between groups of back patients undergoing back education versus control patients (Lindequist, Lundberg, Wikmark, Bergstad, Loof, & Ottermark, 1984; Lankhorst, Van de Stadt, Vogelaar, Van der Korst, & Prevo, 1983; Warner, Wickizer, Wolfe, Schildroth, Samuelson, 1988).

Although there is an abundance of anecdotal and nonexperimental evidence documenting the effectiveness of back education as a preventive strategy, controlled studies are rare and inconclusive. One study considered the effectiveness of three prevention programs that consisted of (a) two 1.5-hour classes of back education and exercise instruction, plus mandatory daily exercise, (b) three 1.5-hour mandatory classes of education and exercise instruction, but no mandatory exercise, and (c) one hour of education and exercise demonstration only (Wollenberg, 1989). At final post-testing, the group undergoing minimal intervention (Group C) unexpectedly showed the greatest gain in correct body mechanics. In contrast to the Wollenberg (1989) finding, a controlled study of the effectiveness of an educational back-injury prevention program offered to 3,424 Boeing Company employees showed no significant difference in the incidence of back pain, and little effect on lost work days between the back education group and controls (Snook, 1988).

A recent evaluation of the effectiveness of Navy health education videotapes in changing knowledge and behavior in a nonpatient population indicated that, of the six videotapes evaluated, only the back injury prevention videotape produced any significant knowledge change (Hurtado, Nice, & Hovell, in press). However, back-care self efficacy, behavioral intentions, and self-reported behavior showed no change as a result of the back injury prevention videotape.

A general conclusion of several investigators has been that back education as a prevention strategy is probably more effective in helping avoid subsequent back pain episodes, but has little effect on preventing initial incidents (Snook, 1988). Regardless of the undetermined effect of back-injury prevention education on health outcomes, back education remains an accepted and relatively inexpensive prevention weapon against low back injury.

U.S. Navy Approach to Healthy Backs

As part of the Department of the Navy's efforts to enhance military readiness and the quality of life of Navy personnel, a comprehensive health promotion program has been implemented that stresses the need for healthful lifestyles and reduction of health risk factors (SECNAV INST 6100.5 of 17 Sep 86). Back injury prevention is one of seven primary health promotion program elements. A specific area of the back-injury prevention program is to provide assistance in the development and maintenance of proper back-care habits among Navy personnel for the purpose of avoiding painful and expensive back injury. As part of this emphasis on prevention, Navy physical therapists provide preventive back education to personnel at the request of Navy commands.

The program presented by physical therapists, the U.S. Navy Healthy Back Program, was developed by the Bureau of Naval Personnel (Pers-60). With an emphasis on prevention, the program is mainly concerned with presenting information on back mechanics and safe lifting techniques. Although there is no consensus regarding the content of back education programs, or even in regard to safe lifting techniques (Anderson & Chaffin, 1986; Garg & Herrin, 1979; Park & Chaffin, 1974), the Healthy Back Program contains information generally considered current and effective.

Purpose of the Study

Although the Healthy Back Program has face value and covers material similar to other back education programs, no formal evaluation of its effectiveness has been conducted. Because of the considerable personal and economic costs associated with back injury and its treatment and prevention, it is important to assess the effectiveness of the Healthy Back Program in affecting immediate and long-term back-related health outcomes. Although part of a prospective study that will evaluate more enduring effects of the Healthy Back Program, the purpose of the present study is to assess the immediate

impact on back-related knowledge in Navy recruits, a population that may be at risk for back injury (Chesson & Hilton, 1988; Marcinik, 1981; Bigos et al., 1986a). In addition, a description of back problems among young men entering the Navy will be provided. Finally, correlates of back injury among a recruit sample will be explored to determine potentially important risk factors that may be amenable to intervention.

Method

Participants and Procedures

A total of 3,431 male recruits from Recruit Training Command (RTC), Great Lakes, participated in the present study. No female recruits were included in the study because no women train at RTC, Great Lakes, and this was the only training command available for participation at the time of the study. Age of the recruits ranged from 17-35, with an average age of 19.3 years. Approximately 93% of the sample had enlisted for the regular Navy and seven percent had enlisted in the reserves. About 78% had completed high school or obtained a high school equivalence; an additional 21% had taken educational coursework beyond high school.

The Healthy Back intervention was administered to recruits during July, 1991. Assembled in groups averaging 300 individuals, 1,772 recruits attended the Healthy Back Program presented by a Navy physical therapist (PT). Immediately after the presentation, the intervention recruits were administered a brief questionnaire assessing demographic and general health characteristics; smoking history; cumulative, past-year, and recent back problems; back knowledge; and a nutrition knowledge scale to be used as a comparison knowledge measure (see below for a more detailed description). The following month, a similar-sized control group (n=1,658) completed identical questionnaires, but received no Healthy Back intervention.

U.S. Navy Healthy Back Program

The Healthy Back Program is a slide presentation with an accompanying script/handbook provided for the PTs' use. The script contains specific explanations and points-of-emphasis for each of approximately 75 slides. The content of the Healthy Back presentation includes a brief introduction addressing the scope of back problems and the importance of health and physical readiness in the Navy, including health of the low back. Slides and script address a number of areas: (a) postural curves of the body sitting and standing, (b) anatomy of the spine including the role of vertebrae, ligaments, discs, and muscles, and (c) exercises and behaviors to protect the back from injury. In addition, the correct lifting technique (i.e., "locking in" the normal curve of the back before lifting) is demonstrated in detail

by a professional weight lifter in a series of slides. The PT may also demonstrate correct and incorrect lifting, and may add information to the presentation deemed suitable for specific Navy audiences.

Questionnaire Measures

Demographic and general health items, history of back problems, back knowledge, and nutrition knowledge were assessed with a brief questionnaire administered to control recruits and to intervention recruits immediately following the Healthy Back presentation. The questionnaire measures are described in more detail below.

Demographic and health-related variables. Recruits provided information about their age, education level, regular Navy versus reserve status, height, and weight. Several health-related variables thought to be correlates of back injury also were included. Recruits rated their current Health Status and Fitness Status on a 5-point scale ranging from Poor (1) to Excellent (5). Pounds Overweight was measured on a scale ranging from Not Overweight (0) to 16-20 Pounds Overweight (4). Two items assessed the average Frequency of Cigarette Use and Frequency of Smokeless Tobacco Use during the 12 months prior to recruit training using a scale with the following response options: Never in the 12 months prior to recruit training (1), Once or twice in the prior 12 months (2), 3-6 days in the prior 12 months (3), 7-11 days in the prior 12 months (4), About one a month (5), 2-3 days a month (6), 1-2 days a month (7), 3-4 days a week (8), 5-6 days a week (9), and About every day (10). Two additional items asked about the average Daily Quantity of Cigarettes Smoked and the average Daily Quantity of Dips/Chews the recruit had on days that he used tobacco.

Previous and recent back-problem measures. Lifetime History of back problems was assessed by five items, shown in Appendix A. All five items were answered on a scale with values ranging from 0 to 10+. A mean of these five items was computed to serve as an overall measure of Lifetime History of back problems. The internal consistency (coefficient alpha) for this scale was .81. In addition, recruits provided information about causes of any previous low back problems and indicated types of treatment that had been prescribed.

Past-year history of back problems was assessed by eight items. These eight items were used to form two subscales. Past-year Frequency and Severity and Past-year Functional Impairment. The two subscales, shown in Appendix A, were computed as the means of four items each; internal consistencies for the two subscales were .81 and .71, respectively. Items asking about the number of low back problems, the number of doctor visits, the number of days symptoms lasted, and the number of work/school days missed were measured on a scale ranging from 0 to 10+. Three items addressing the extent of pain and limitations of daily activities used response options ranging from NA/None (0) to A

lot (4). One item asking about the severity of back pain was measured on a scale ranging from NA/Not at all Severe (0) to Extremely Severe (4).

In addition to past-year back pain information, recruits answered a single item asking about the degree to which they had been bothered by back Pain during Recruit Training. Response options for this item ranged from NA/None (0) to A Lot (4).

Knowledge Measures. Back Knowledge was measured with ten true/false statements suggested for use in the Healthy Back script/handbook. Shown in Appendix B, the back knowledge test did not comprehensively cover all of the information covered in the Healthy Back Program, but rather addressed several main objectives. Each recruit's Back Knowledge score was computed as a percent of items correct: (Number of Correct Items/10) x 100.

Thirteen Nutrition Knowledge true/false items, presented in Appendix C, were interspersed within the back knowledge items for the purpose of providing comparison knowledge items in a different health area. In this way, the effect of the Healthy Back Program could more accurately be assessed, in that the control items provide the opportunity to compare knowledge related to the intervention with knowledge in a health area not specifically addressed by the intervention. The nutrition items used in the present study were taken from a previous Navy nutrition knowledge test developed by Trent (1990) that was based on the Navy Nutrition and Weight Control Guide (Weber, 1989). The 13 items tested knowledge of weight reduction principles and caloric specifics, and were chosen because they showed good variability in difficulty level (Trent, 1990). As in the computation of the Back Knowledge score, a Nutrition Knowledge score was computed as the percent of correct items.

Statistical Analyses

Several statistical procedures were used to accomplish the purposes of the present study. To examine the effect of the Healthy Back Program on back knowledge, t tests for independent groups were used to assess intervention-versus-control group differences. Nutrition knowledge differences were analyzed similarly. Descriptive analyses of back injuries among incoming recruits were performed, and t tests were conducted to assess potential inequivalences between the intervention and control group on demographic, health-related, and back injury measures. Finally, correlational analyses were used to assess potential risk factors for back injury among recruits.

A problem arises when performing tests of association and group differences with large samples. If enough cases are used, even the slightest difference or association may be found to be statistically significant (Hays, 1963). In the present study, tests resulting in a highly significant difference between groups (i.e., $p < .001$) were followed by additional analyses that tested for the magnitude of the group effect. More specifically, group effect size was assessed by determining the proportion of variance in

a particular measure accounted for by differences between the two groups of subjects (Hays, 1963). A group effect size accounting for at least 1% of the variance in the target variable was set as the criterion for considering a finding to be of sufficient practical significance. In the correlational analyses, an r^2 of at least 1% was required before considering the association significant.

Results

Knowledge Effect

Figure 1 presents Back Knowledge and Nutrition Knowledge mean scores for the two groups. Results of a t test for independent groups indicated a significant difference between the intervention and control groups for Back Knowledge, with the intervention group having a significantly higher Back Knowledge score ($t(3,430) = 36.32$, $p < .001$). Inspection of one particularly important single item testing knowledge of correct body and back placement during lifting (item #10), showed that 86% of the intervention group answered the item correctly compared to 42% of the control group ($t(3,350) = 29.65$, $p < .001$).

A significant group effect was also found for Nutrition Knowledge ($t(3,430) = 3.60$, $p < .001$). However, tests for the magnitude of the group effects showed that group membership accounted for 28% of the variance in Back Knowledge, but explained less than one percent (0.2%) of the variance in Nutrition Knowledge.

Description of Previous and Recent Back Problems among Recruits

Table 1 presents frequency distributions, means, and standard deviations for all back-problem items and related scales. Although recruits answered items addressing the frequency or number of back-related events on a scale ranging from 0 to 10+, response options were collapsed into five categories (0, 1-2, 3-4, 5-6, 7+) for ease of presentation alongside other items with five response options. Analysis indicated that approximately 41% of the recruit sample had experienced at least one back problem in their lifetime; about 27% reported at least one back problem within the past year. During recruit training, 11% reported "some" to "a lot" of back pain.

As shown in Table 2, the leading causes of previous back problems among recruits were lifting, sports, and bending. The most commonly prescribed forms of treatment for previous back problems included the application of heat, bed rest, and exercise/strengthening regimens (Table 3).

Figure 1. Knowledge Scores by Group

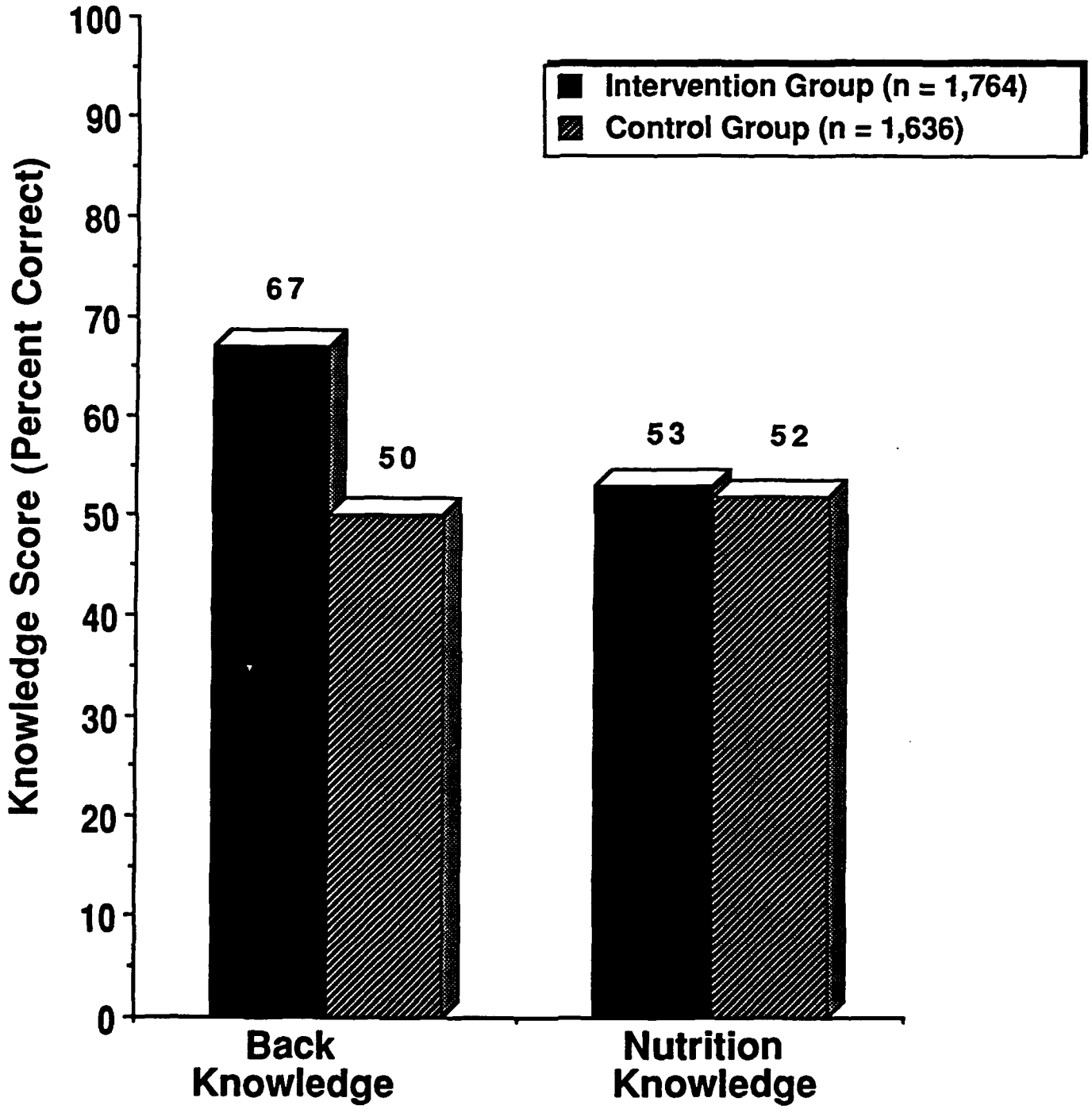

Table 1

Frequency Distributions and Means for Back-Problem Items and Scales

Items/Scales	% Responding					Mean	SD
	0 or NA	1-2	3-4	5-6	7+ times		
Lifetime History:							
In your lifetime, how many times have you had a low back problem?	59	21	10	4	6	1.35	2.36
Over the years, how many times have you visited a doctor about back pain?	84	12	2	1	1	0.42	1.40
How many days did your low back symptoms usually last?	61	19	10	4	6	1.37	2.39
How many of your back problems were related to work done on the job?	75	16	5	2	2	0.65	1.58
How many of your back problems were related to nonwork incidents?	70	19	5	2	4	0.81	1.81
Lifetime History Scale	-	-	-	-	-	0.92	1.47
Past-year Frequency & Severity:							
During the past year, how many times have you had a low back problem?	73	19	4	2	2	0.70	1.68
During the past year, when you had a back problem, how many days did symptoms usually last?	73	14	7	2	4	0.85	1.91
	0 NA/ None	1 A little	2 Some	3 Quite a bit	4 A lot		
During the past year, how much low back pain did you have?	62	21	12	4	1	0.62	0.92

Table 1 (continued)

	0 NA/ Not	1 Some-what	2 Mod. severe	3 Consid. severe	4 Extrem. severe		
During the past year, how severe was your low back pain?	82	11	5	2	0	0.27	0.64
Past-year Frequency & Severity Scale	-	-	-	-	-	0.61	1.11
Past-year Functional Impairment:							
	0 or NA	1-2	3-4	5-6	7+		
During the past year, how many times have you visited a doctor about low back pain?	92	7	1	0	0	0.18	0.84
During the past year, how many work/school days did you miss because of low back problems?	94	3	2	1	1	0.21	1.04
	0 NA/ None	1 A little	2 Some	3 Quite a bit	4 A lot		
During the past year, to what degree have you been unable to go about daily activities?	86	9	4	1	1	0.22	0.62
During the past year, to what extent has job/school suffered?	91	6	2	1	0	0.13	0.46
Past-year Functional Impairment Scale	-	-	-	-	-	0.19	0.57
Pain during Recruit Training:							
During recruit training, to what degree have you been bothered by low back pain?	69	20	7	3	1	0.47	0.82

Note. Percents for frequency distributions may not total 100% due to rounding. Ns for items and scales ranged from 3,391 to 3,416.

Table 2

Causes of Previous Back Problems Reported by Recruits

Cause	% Indicating Yes
Lifting	21.4
Sports	20.1
Bending	10.1
Twisting	8.1
Horse play/clowning around	5.6
Falling	4.4
Other	4.1
Reaching	3.7
Auto accident	3.7
No obvious cause	2.9
Gradual onset	1.4
Motorcycle accident	1.3
Coughing/sneezing	1.0

Table 3

Types of Treatment Prescribed for Previous Back Problems

Treatment	% Indicating Yes
Heat	10.8
Bedrest	9.6
Exercise/Strengthening	7.3
Medication	6.4
Massage/Hydro-electrotherapy	5.6
Cold	3.6
Other	2.9
Educational Material	0.5
Traction	0.2
Back School	0.1
Surgery	0.0

Comparison of Intervention and Control Groups on Back Measures

Means for the four back-problem scales in both intervention and control groups are presented in Table 4. Inspection of group averages indicated that the two groups differed, with the intervention group scoring somewhat higher on the back-problem scales. However, it should be noted that the group membership effect sizes were small (all less than or equal to 2% of the variance). Tests for mean differences on demographic and health-related variables (shown in Table 5), indicated that there were significant group effects only for age and education level. To investigate the possibility that age and education rather than group might be accounting for the relatively small back-problem differences, regression procedures were used to test the association of the three back-injury variables with group membership after controlling for age and educational level. However, results indicated that, even after controlling for age and education, group membership remained significantly, although weakly, related to the three back problem measures (i.e., Lifetime History, R^2 change=1.4%; Past-year Frequency and Severity, R^2 change=1.5%; and Pain during Recruit Training, R^2 change=1.9%).

Correlates of Back Problems among Recruits

Table 6 presents zero-order correlations of the four back-problem measures with demographic and health-related variables. Associations between back problems and education, age, regular-versus-reserve status, tobacco use, height, and weight were weak, with most coefficients close to 0.0. Only current Health and Fitness Status showed a significant association with both past and more recent back problems. Directions of these associations indicated that better self-reported health and fitness levels were related to fewer back problems ever, in the past year, and during recruit training.

Table 4

Descriptive Statistics for Intervention and Control Groups on Four Back-problem Measures

	Mean (SD)				
Back-Problem Measures	Overall Sample	Intervention Group	Control Group	t	Group Effect Size
Lifetime History	0.92 (1.47)	1.09 (1.58)	0.74 (1.32)	7.07*	1.5%
Past-year Frequency and Severity	0.61 (1.11)	0.73 (1.19)	0.48 (1.00)	6.82*	1.3%
Past-year Functional Impairment	0.19 (0.57)	0.22 (0.63)	0.15 (0.51)	3.95*	0.4%
Pain during Recruit Training	0.47 (0.82)	0.58 (0.88)	0.35 (0.73)	8.30*	2.0%

*$p < .001$

Table 5

Descriptive Statistics on Demographic and Health-related Variables

Variable	Mean (SD) Overall Sample	Intervention Group	Control Group	t	Group Effect Size
Education Level+	2.21 (0.42)	2.27 (0.46)	2.13 (0.35)	10.19*	3.1%
Age	19.30 (2.39)	19.70 (2.72)	18.90 (1.88)	10.53*	2.9%
Regular/Reserves++	1.07 (0.29)	1.08 (0.30)	1.07 (0.28)	ns	---
Height (in.)	70.20 (3.09)	70.20 (3.05)	70.10 (3.12)	ns	---
Weight (lbs.)	160.50 (22.1)	161.60 (21.8)	159.50 (22.3)	ns	---
Health Status	3.93 (0.81)	3.92 (0.82)	3.94 (0.80)	ns	---
Fitness Status	3.68 (0.86)	3.69 (0.85)	3.68 (0.87)	ns	---
Overweight	0.47 (0.87)	0.51 (0.89)	0.43 (0.83)	ns	---
Freq. Cigarette Use	4.32 (4.05)	4.50 (4.05)	4.11 (4.03)	ns	---
Quant. of Cigarettes	6.58 (11.1)	7.12 (11.6)	5.96 (10.4)	ns	---
Freq. Smokeless Use	2.66 (3.04)	2.82 (3.18)	2.49 (2.87)	ns	---
Quant. of Dips/Chews	1.43 (3.81)	1.54 (3.79)	1.32 (3.82)	ns	---

\+ 1=< High school, 2= High School, 3=> High School
++ 1=Regular Navy, 2=Reserves
* $p < .001$

Table 6

Zero-order Correlations between Back-problem Measures and Demographic and Health-related Variables

	Lifetime History	Past-year Frequency & Severity	Past-year Functional Effect	Pain during Recruit Training
Education Level+	.04	.01	.01	.02
Age	.03	-.02	-.00	-.03
Regular/Reserves++	-.02	-.01	-.02	-.02
Height (in.)	.01	.01	.01	.03
Weight (lbs.)	.05	.01	.01	.03
Health Status	-.18*	-.16*	-.14*	-.18*
Fitness Status	-.14*	-.12*	-.11*	-.14*
Overweight	.07	.03	.01	.03
Freq. Cigarette Use	.06	.05	.04	.04
Quant. of Cigarettes	.05	.05	.05	.06
Freq. Smokeless Use	.06	.03	.04	.02
Quant. of Dips/Chews	.05	.01	-.00	.00

\+ 1 = < High school, 2 = High School, 3 = > High School
++ 1 = Regular Navy, 2 = Reserves
* $p < .001$

Discussion

Low back injury and pain have become a major concern to industry, the health care profession, and the military because of its wide-spread prevalence and socioeconomic and medical impact. As part of a strategy to contain back-related financial and social costs, back education programs geared toward prevention have gained considerable acceptance. The present study investigated the short-term knowledge impact of one such program in the U.S. Navy--the Healthy Back Program.

Results from this study indicated that the brief, relatively inexpensive Healthy Back education intervention had an immediate effect on back knowledge in a young male recruit sample. The finding was fairly substantial, with the intervention group achieving 67% correct on the knowledge test compared to 50% for the control group (group effect size accounted for 28% of the variance in back knowledge). Additional support for the intervention effect comes from the fact that a strong group difference was found on back knowledge, but not on a comparison test assessing nutrition knowledge.

Another primary purpose of the present study was to describe previous back problems among personnel entering the Navy. Approximately 41% of recruits reported one or more back problems ever, and 27% reported one or more incidents within the last year. These percentages indicate that back problems are not uncommon in this population. Furthermore, these rates are notable in light of the fact that low back problems tend to recur (Kelsey & White, 1980; Biering-Sorensen, 1983).

A descriptive analysis of previous and recruit training-related back injuries revealed a small but statistically significant difference between intervention and control groups that was independent of differences in age and education. This inequivalency between groups could possibly be related to the manner in which subjects were tested. Random assignment and concurrent assessment of groups was not possible; rather, assessments were conducted sequentially (i.e., the Healthy Back intervention was given to recruits who entered training during July; control recruits entered training during August). By chance, July recruits may actually have experienced more back problems in the past, just as, by chance, they were older and slightly more educated. An alternative explanation pertains to the possibility of sensitization due to the intervention itself. After exposure to the Healthy Back program, the intervention group may have been "primed" to respond affirmatively to questions about back problems and pain irrespective of actual back problems. Another possible explanation might be a cognitive-process one in which exposure to the information in the Healthy Back presentation may have facilitated recall of past back problems, resulting in higher reporting among the intervention group. Although a pre-intervention back-injury assessment would have been helpful in controlling possible psychological and cognitive biases in back-injury reporting, time restrictions at RTC Great Lakes precluded an additional data collection period. Furthermore, it was not expected that an educational intervention such as the Healthy Back Program would influence reporting of past back injury.

Considering correlates of back problems in this recruit sample, results suggest that demographic and health-related risk factors reported elsewhere (e.g., smoking, overweight) are not strong correlates of back problems in this relatively homogeneous group (i.e., young males, predominately 18-25 years of age). On the other hand, activity in sports, lifting, and bending were indicated as potential behavioral risk factors according to recruits' self reports. In addition, self-reports of current health and fitness status were inversely associated with back injury.

The finding that lifting, bending, and health/fitness status were related to back problems in young recruits is useful information in light of the fact that these factors are ones which are already targeted in Navy health promotion programs. The Healthy Back Program, because it emphasizes correct lifting and bending techniques, may help recruits avoid initial and recurring back injury episodes. Furthermore, the promotion of health and fitness among servicemembers is the primary focus of the Navy's Health and Physical Readiness Program (HAPR) (OPNAV INST 6110.1D of 18 Jan 90). To the degree that the HAPR Program is effective in improving and maintaining the physical health and fitness of its members, an additional positive impact on back injury also may be achieved.

In addition to increasing knowledge, an educational program such as the Healthy Back Program should ultimately affect behavior and back injury, which is the broader focus of inquiry for this study. Information provided in the present report will be used in a longitudinal evaluation comparing intervention and control groups on self-reported back problems that occur during the first year of Navy service. The present report provides the baseline assessment of back injury among new recruits that will be compared to one-year follow-up data now being collected. Furthermore, the descriptive data on the history of back problems among U.S. Navy recruits should provide important information for medical and health promotion policy makers responsible for improving the health and well-being of Navy personnel.

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Appendix A

Previous and Recent Back-problem Measures

Lifetime History

In your lifetime, how many times have you had a low back problem?

How many of your back problems were related to work done on the job?

How may of your back problems were related to nonwork incidents?

Over the years, how many times have you visited a doctor or other health care prvider about low back problems?

How many days did your low back symptoms usually last.

Past-year Frequency and Severity

During the past year, how many times have you had a low back problem?

During the past year, when you had a back problem, how many days did your low back symptoms usually last?

During the past year, how much low back pain did you have?

During the past year, how severe was your low back pain?

Past-year Functional Impairment

During the past year, how many work or school days did you miss because of low back problems?

During the past year, to what degree have you been unable to go about your daily activities because of low back problems?

During the past year, to what extent has your job or school performance suffered because of low back problems?

During the past year, how many times have you visited a doctor or other health care provider about low back problems?

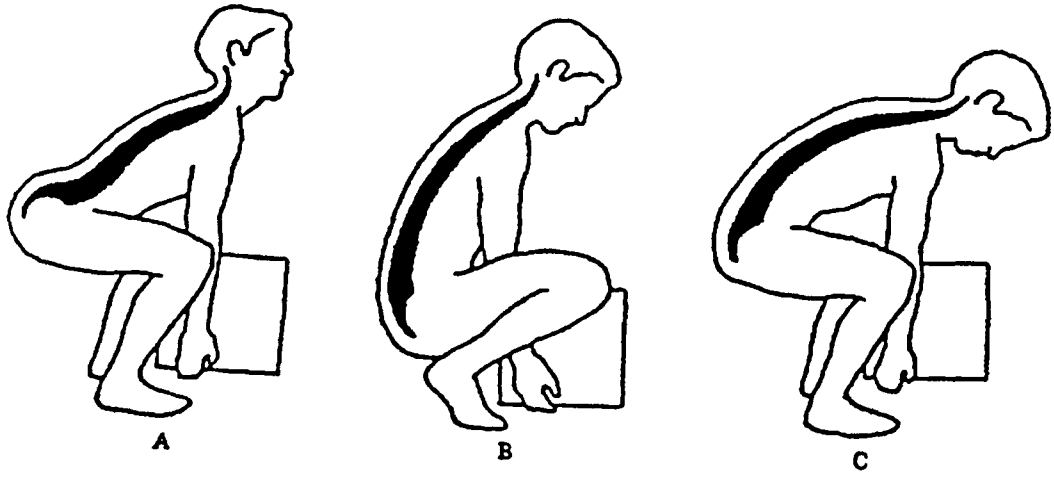
Pain during Recruit Training

During recruit training, to what degree have you been bothered by low back pain?

Appendix B

Back Knowledge Items

	T/F
Once a person has injured his back, he is now 4-5 times more likely to be reinjured.	T
Staying bent over for 20-30 minutes can be hard on the back.	T
While turning with a weight, one should keep his feet still.	F
Sitting is easy on the back.	F
While lifting, the weight should be held away from the body.	F
Bending the knees and keeping the back straight while lifting is the best method of preventing injuries.	F
While lifting, one should use his back.	T
If we use the back muscles when we lift, they will become strained more easily.	F
While lifting an object off the ground, the hips should be held high in the air.	F
Choose the best lifting posture from those pictured below.	A



Appendix C

Nutrition Knowledge Items

	T/F
Ounce for ounce, beer has more calories than wine.	F
It is recommended that no more than 30% of one's daily calories come from carbohydrates.	F
Margarine is lower in calories than butter.	F
Most of the weight in "quick weight loss" diets is water, not fat.	T
Regular exercise actually helps control your appetite.	T
Sugar, not fat, is the main cause of obesity.	F
It is okay to eat bread, rice, and potatoes on a reducing diet.	T
As people grow older, they need the same amount of nutrients but fewer calories.	T
A gram of fat has more than twice as many calories as a gram of carbohydrate (starch).	T
A weight loss of 5 lbs. per week is a reasonable goal for weight reduction.	F
Fish sandwiches at most fast food outlets are higher in calories and fat than the regular hamburgers.	T
A high-protein, low-carbohydrate diet is recommended for losing weight quickly and safely.	F
Mental effort like studying and problem solving requires extra food energy (calories).	F

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13. ABSTRACT *(Maximum 200 words)*

This study presents preliminary findings on the immediate effects of the Navy's Healthy Back Program in changing knowledge about back injury prevention. In addition, a baseline assessment of back problems among incoming recruits is presented and correlates of back pain are examined. Intervention recruits (n = 1,772) received the HealthyBack Program brief, which is a slide presentation that focuses largely on information about back injury and prevention techniques. Immediately following the presentation, intervention subjects completed a short questionnaire assessing history of back problems, demographic and health information, back knowledge, and nutrition knowledge (comparison items). Control subjects (n = 1658) completed identical questionnaires but received no presentation. Intervention recruits had a significantly higher back knowledge score (67% correct) than controls (50% correct); nutrition knowledge differences were minimal (52%-53% correct). About 41% of all recruits had ever experienced a back problem, 27% reported at least one back problem within the past year, and 11% reported back pain during recruit training. Lifting, sports participation, and bending were reported as the leading causes of previous back problems. (Continued on reverse side)

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Although better self-reported health and fitness measures were associated with fewer low back problems, other correlates of back pain reported elsewhere (e.g., smoking, overweight) were not found.