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GENDER DIFFERENCES IN EMERGENCY SHIPBOARD DAMAGE-CONTROL TASK PERFORMANCE: HUMAN FACTORS SOLUTIONS

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TECHNICAL REVIEW AND APPROVAL

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The experiments reported herein were conducted according to the principles set forth in the current edition of the "Guide for the Care and Use of Laboratory Animals," Institute of Laboratory Animal Resources, National Research Council.

This technical report has been reviewed by the NMRI scientific and public affairs staff and is approved for publication. It is releasable to the National Technical Information Service where it will be available to the general public, including foreign nations.

THOMAS J. CONTRERAS
CAPT, MSC, USN
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13. ABSTRACT (*Maximum 200 words*)

As an alternative to developing exclusionary performance-based selection standards, the approach of this study was to modify the demands of shipboard damage-control tasks by using mechanical aids. Tasks selected included a mannequin drag (maximum distance in 30 s) and a CO_2 bottle extinguisher carry (measured in seconds). A tether device and a shoulder strap were developed to improve performance on the respective tasks. Subjects were 24 women and 23 men stationed onboard the USS Emory S. Land (AS-39). Results indicated that average mannequin drag distance was 8.1 m for women and 25.2 m for men. Although no difference in performance was observed between the two drag techniques, use of the tether significantly reduced overall ratings of perceived exertion (RPE) for both sexes. On average, CO_2 bottle extinguisher carry times for women were 59% slower than for men. Use of the shoulder strap did not significantly affect time to complete the task or overall RPE. However, RPE for the right arm and right hand were reduced significantly during the strap-assisted carry (38% and 48%, respectively). Future work will focus on refining these prototype devices and assessing their utility in similar and sustained damage-control task scenarios.

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I. INTRODUCTION

In the U.S. Navy, current procedures for damage-control evolutions have been designed around the ability of the average male. As a consequence, a significant gender difference in damage-control task performance has been observed. For example, the percent of U.S. Navy men meeting standards on two damage-control evolutions has been reported to range from 96% (P-250 water pump carry) to 100% (stretcher carry). The percent of women meeting standards on the same tasks was 1% and 12%, respectively (1). This gender-based performance difference has been attributed to the fact that women have approximately 60% of the upper torso strength of men (2).

With the advent of women being assigned to U.S. Navy combat vessels, gender differences in emergency tasks performance has become an operational readiness and national security issue. Inability of crewmembers to perform emergency damage-control tasks may be potentially life-threatening. Tragedies, such as the USS Stark (FFG-31) incident, offer vivid testimony to the enormous physical demands placed on ship's personnel during sustained fire-fighting operations.

One solution to this problem would be to develop gender-neutral physical standards to ensure all personnel meet damage-control task requirements. Such physical selection criteria would likely demand great upper torso strength and thus severely restrict the assignment of women to combat ships. Therefore, alternative solutions to this issue need to be investigated.

The following objectives of this investigation were designed to optimize shipboard operational readiness, safety, and worker productivity.

1) Select a set of representative emergency shipboard damage-control tasks

2) Develop ergonomic aids to reduce the physical demands of the tasks

3) Assess physiological, psychophysical, and damage-control task performance of U.S. Navy men and women

4) Compare damage-control task performance of subjects before and after ergonomic intervention.

II. METHODS

Emergency damage-control task identification

We observed current emergency shipboard damage-control procedures and identified physically demanding tasks that would be amenable to ergonomic intervention. Site visits to the Naval Station, Newport, R.I. (Advanced Shipboard Fire Fighting Command and Basic Shipboard Damage-Control Command) and Naval Station, Norfolk,VA (Basic Fire-Fighting Training) were conducted to observe live fire-fighting and damage-control scenarios. Informal interviews were carried out with U.S. Navy damage-control instructors at these training sites.

Information gathered at the training sites was verified during shipboard visits. The research team toured the USS Shenandoah (AD-44) and USS America (CV-66) to observe fire-fighting procedures/equipment and interview the damage-control personnel, and the USS Oliver Hazard Perry to witness a fire-fighting drill. In addition, a site visit was made to the EX USS Shadwell, which is the test and evaluation platform from which damage-control, fire-fighting, and ship survivability investigations and experiments are conducted.

Based upon information obtained from the various training sites and shipboard visits, as well as interview data gleaned from damage-control personnel, the following five tasks were identified for analysis:

1) Extricate injured/unconscious personnel
2) CO_2 bottle extinguisher carry
3) Fire-fighting scenario (three-person team)
4) Kerie exothermic torch carry
5) Fire-fighting techniques (solid stream vs. microburst water delivery)

Tasks 1 and 2 were chosen for initial evaluation because 1) task procedures were amenable to ergonomic intervention, 2) task administration could be conducted onboard ship with minimal impact on the ship's crew, and 3) tasks could be easily and realistically simulated and performance measured accurately. Due to limited time, resources, and facilities tasks 3 to 5 were not selected for further evaluation.

Shipboard testing

Subjects

Subjects participating in the study were 24 female and 23 male volunteers from the ship's company of the USS Emory S. Land, (AS-39) ported at the Naval Station, Norfolk, VA. Subjects were recruited through the assistance of the ship's Damage-Control Administrator during a three-week period prior to the actual testing. During an advance trip to the ship to plan logistics, the investigators held a briefing to recruit volunteers, familiarize the volunteers with the planned study, and distribute Informed Consent forms. In order to provide a representative sample of shipboard personnel, no restrictions were placed on the rank, experience, or physical sizes of the volunteers. Subjects were grouped into eight teams of six subjects for purposes of improving the logistics of testing. The teams served as a means of encouraging maximal performance.

Two emergency shipboard tasks were presented to the subjects. The first task (Task 1) simulated extrication of an unconscious fire fighter (Mannequin drag). The second task (Task 2) was a CO_2 bottle extinguisher carry. Each task was performed under two conditions, standard and experimental, and each subject performed both conditions of each task. Thus, each subject served as his/her own control. Half of the subjects began with Task 1; half with Task 2. The presentation of conditions within task and within team was randomized.

The subjects reported to the testing sites on three different days. On the first visit, the subjects received an overview of the study and were given detailed instructions on how to measure both overall perceived exertion (RPE) and perceived exertion for the different body parts. Also during this visit, anthropometric and strength measures were made. During the other two visits, the subjects performed the two emergency shipboard tasks. Two conditions of each task were administered per day.

<u>Anthropometric measurements</u>

Anthropometric measurements were conducted using the technique outlined in OPNAVINST 6110.1D (3). Standing height to the nearest 0.25 in. and body weight to the nearest 0.25 lb was measured with a calibrated Physicians's scale (Eye Level Beam Scale, Detecto, Webb City, MO). Body circumferences were measured with a plastic tape at the neck, natural waist, and hip for women, and at the neck and waist for men. The neck measurement was taken at a point just below the larynx and perpendicular to the long axis of the neck. This measurement was rounded up to the nearest 0.5 in. The natural waist measurement for women was taken at the point of minimal abdominal circumference, while the waist measurement for men was taken at the level of the umbilicus. Both waist measurements were rounded down to the nearest 0.5 in. The hip measurement (women only) was taken at the greatest protrusion of the gluteal muscles and level to the deck.

<u>Muscular strength testing</u>

Maximum voluntary isometric lifting strength at elbow and knee height was measured with a dynamometer (Back, Leg, and Chest Model 68815, J.A. Preston Corp, New York). The subjects gripped a metal bar with padded handgrips attached by a chain to provide the link between the subject and the dynamometer. The initial posture required the subject to stand with his/her feet on either side of the dynamometer, approximately shoulder-width apart, and grasp the bar with both hands, in a supine position (i.e., palms up). The subject was instructed to lift the bar vertically, with maximum force and without jerking, for a period of 3-4 s. After a 2-minute rest period the subject was retested.

Each strength score was recorded and the mean of the two trials at each height served as the subject's final score for each posture. If the score on the second trial was not within 10% of the first trial, a third trial was performed. In this latter case, the strength score was determined from the mean of the two trials showing the closest agreement.

Maximum voluntary isometric hand-grip strength was measured using a Jamar Hand Dynamometer (J.A. Preston Corp., Jackson, MI). The grip of the dynamometer was adjusted to the subject's comfort. On the command "GO" the subject squeezed the handle vigorously, exerting maximal force. Both hands was measured alternately, with two trials per hand. The maximum score for each hand were recorded as the subject's final score to the nearest 1.0 kg (9.8 Newtons (N)).

Task 1: Mannequin drag

Procedure

Subjects were instrumented with a Uniq Heart Watch (Model 8799, Computer Instruments Corporation, Hempstead, New York) for telemetric measurement of heart rate, and then dressed in a Fire-Fighting Ensemble (FFE) including boots, coveralls, gloves, and Oxygen Breathing Apparatus (OBA) (without the oxygen-producing canister or the face mask). Fire helmets and gloves were not worn. The "unconscious fire fighter" was a 74.8 kg mannequin fully suited in a 15.9 kg FFE (total body mass 90.7 kg). Upon command, they had 30 s to drag the mannequin as far as possible along a worn, "non skid" weather deck. Immediately upon completing the task, each subject was required to give an overall RPE, as well as provide separate RPE scores for different body regions (see below).

Each subject performed Task 1 under two conditions: (1) a simple "lift and drag" where the subject crouched, lifted the mannequin by grabbing underneath the arms, and moved the mannequin by walking backwards (shoulder drag) and (2) a "tether drag" where the subject looped a tether under the arms of the mannequin, placed another loop over his/her shoulder, and moved the mannequin by walking and facing either forward or backward. At least 30 min elapsed before subsequent testing on a given individual.

Prior to the subject's performing a task condition, an investigator demonstrated the procedure and instructed each subject to perform a familiarization "run-through." These practice trials did not require the subject to drag the mannequin more than 2-5 ft, if at all, keeping the physical demands of the familiarization period to a minimum.

Measurements

The forces required to drag the mannequin were measured using a Chatillon push-pull dynamometer (Model DMG 250, Chatillon Medical Products, Greensboro, NC). The dynamometer was attached to the mannequin via the tether. Peak forces were recorded while directing the angle of pull horizontally along the level deck surface, as well as at 45° to the horizontal. A minimum of four measurements at each angle of pull and at different locations on the deck surface were performed.

The main performance criterion recorded for this task was the distance the subjects were able to drag the mannequin in 30 s. During performance, the subject's heart rate was recorded at 5-second intervals using Uniq Heart Watch monitors. A baseline heart rate measure was recorded before the subject began the task condition. Upon completion, the heart rate values were reviewed and the maximal value was recorded for analysis. Subjects were required to give an overall RPE score, as well as provide RPE scores for different body parts. The 10-point category-ratio scale described by Borg (4) was used for assessing RPE. As an aid in rating the different body regions, subjects were provided with a body diagram illustrating these regions. The body diagram was similar to that used by Corlett and Bishop (5) and was divided into the following areas: neck, shoulders, upper back, mid-back, lower back, upper arms, lower arms, hands, buttocks, upper legs, and lower legs. Separate ratings were given for left and right sides of the upper and lower limbs.

Task 2: CO_2 bottle extinguisher carry

<u>Procedure</u>

Subjects reported to the test area dressed in working coveralls and steel-toed footwear. They were instrumented for telemetric heart rate measures as described above. Baseline heart rate was measured just before the task was begun. On command, subjects lifted a standard shipboard CO_2 fire extinguisher (23.5 kg) from the deck and carried it as quickly as possible through a designated course. The course took them up an inclined ladder (56° from the horizontal), across the deck, up another inclined ladder (54° from the horizontal), through a hatch at the top of the second ladder, and across an open deck to a turn-around point. They then proceeded back along the same route returning to the start. The round-trip distance traversed was 40 m, including a combined vertical height of 5.3 m. Subjects were not allowed to miss steps in ascending or descending the inclined ladders, nor were they allowed to run when crossing the decks. They were encouraged to walk as rapidly as possible on the decks.

Subjects performed Task 2 under two conditions: (1) a simple "lift and carry" (standard carry) where they crouched, lifted the extinguisher, and carried it unaided through the prescribed route and (2) a "strap-assisted carry" where they crouched, affixed the strap to the extinguisher with a carabiner clip, placed the strap over their head (diagonal across the torso), and then stood to begin the prescribed route. An investigator demonstrated the two task conditions and each subject was walked through the test course before commencing the task.

<u>Measurements</u>

Task performance measures included the overall time to lift the extinguisher and complete the route. Within 10 s of completing each task condition, both right and left grip were measured (one trial on each hand). Subjects were then debriefed and asked to give a description of the manner in which the bottle was carried (e.g., left/right hand, cradled in arms, or sling carry), as well as give an overall RPE and an RPE for the different body parts. RPE for the lower body were not taken. Stored heart rates (5-second intervals) were reviewed to determine peak heart rate.

III. RESULTS

Shipboard testing

Anthropometric and strength characteristics of the female and male subject population are shown in Tables 1 and 2, respectively. Although the male and female groups were similar in age, the males were significantly taller, heavier, and had more lean body mass than the females. The percentage of body fat for the females was twice that of the males ($p < 0.05$). Isometric lifting strength of women (sum of elbow and knee strength) was 56% that of men.

Cumulative frequency histograms of isometric lifting strength at elbow and knee height are illustrated in Figures 1 and 2. Twenty-five percent of women exhibited scores that overlapped the scores of the weakest men (lowest 26% of men) for lifting strength at elbow height. The strength scores of the upper 22% of women overlapped the performance of the weakest men (lowest 13%) for lifting strength at knee height.

TABLE 1. Anthropometric and strength characteristics of the female subjects (n=24)

	Min	Max	Mean	SD
Age [yrs]	18	42	25.7	5.8
Body Mass [kg]	45	101	70.9	13.8
Height [cm]	152	185	163.2	7.7
Body fat [%]	14	45	30.8	8.0
Lean Body Mass [kg]	38	59	48.1	5.4
Right Grip Strength [N]	284	481	359	49
Left Grip Strength [N]	255	422	322	43
Knee Strength [N]	471	1089	765	170
Elbow Strength [N]	147	392	239	54

TABLE 2. Anthropometric and strength characteristics of the male subjects (n=23)

	Min	Max	Mean	SD
Age [yrs]	19	35	24.3	4.6
Body Mass [kg]	62	99	79.5*	10.8
Height [cm]	165	185	175.6*	5.1
Body fat [%]	7	36	15.0*	5.5
Lean Body Mass [kg]	56	82	67.2*	7.0
Right Grip Strength [N]	402	628	531*	61
Left Grip Strength [N]	334	608	516*	66
Knee Strength [N]	873	1844	1375*	243
Elbow Strength [N]	265	598	430*	77

* Significantly different from female mean ($p < 0.05$; 2-tailed t-test).

Mannequin drag task

The minimum horizontal force required to drag the mannequin over the "non-skid" surface was 438 N (SD = 19 N). The coefficient of static friction between the "non-skid" floor and the mannequin (dressed in the fire fighters' ensemble) was calculated to be approximately 0.49. When the mannequin was dragged with a force directed at 45° from the horizontal the minimum force required to initiate movement was 552 N (SD = 14 N).

Table 3 shows the distance (m) the mannequin was dragged in 30 s by the men and women using the shoulder and tether drag techniques. Significant gender differences in performance were observed for both techniques ($F_{1,43}$= 89.5; $p < 0.0001$), with the males dragging the mannequin an average total of 25.2 m versus 8.1 m for the females. Figure 3 shows subjects performing the mannequin drag task using the shoulder drag and tether drag techniques.

Although there was no significant difference in performance between the two drag techniques ($F_{1,43}$= 2.1; $p > 0.05$), a significant interaction between gender and drag technique was found ($F_{1,43}$= 4.3; $p < 0.05$). There was a slight tendency for the tether drag technique to improve female drag distance, but decrease male performance relative to the shoulder drag technique. However, post hoc analysis using Tukey's HSD test revealed that these tendencies were not statistically significant.

TABLE 3. Mannequin drag and CO_2 bottle carry task perfomance of male and female subjects.

	Min	Max	Mean	SD
Mannequin Drag Distance (m)*†				
Shoulder Drag				
Males (n=22)	12.6	38.7	26.7	8.3
Females (n=23)	1.0	17.6	7.8	4.7
Tethered Drag				
Males (n=22)	8.1	36.0	23.7	8.1
Females (n=23)	1.6	18.3	8.3	5.1
CO_2 Bottle Carry Time (s)*				
Standard Carry				
Males (n=23)	30	63	39.9	8.5
Females (n=22)	40	153	65.7	24.5
Strap-assisted Carry				
Males (n=23)	31	63	43	7.5
Females (n=22)	42	156	65.8	21.6

* Significant gender difference in performance ($p < 0.0001$).
† Significant interaction between gender and drag technique ($p < 0.05$).

A cumulative frequency histogram showing the overlap in mannequin drag performance (shoulder drag technique) is found in Figure 4. The scores of approximately 17% of the women overlapped with the lowest performing men (18%).

Ratings of perceived exertion for the different body parts for the shoulder and tether drag are illustrated in Figure 5. The highest RPE for the shoulder drag were reported at the hands

(7.2), and lower back (6.0) regions. The RPE for these body locations as well as for the lower arms were reduced significantly (between 47% and 67%; $p < 0.0001$) using the tether drag technique. Ratings for perceived exertion for the other body parts were similar for the shoulder drag and tether drag techniques ($p > 0.05$).

Use of the tether significantly reduced the overall RPE (shoulder drag technique = 6.5 vs. 4.75 for tether drag; $F_{1,42} = 31.1$; $p < 0.0001$). Despite the lower RPE with the tether drag, peak HRs were similar with the two techniques (shoulder drag technique = 91% of age predicted maximum heart rate (HR_{max}) vs. 88% for tether drag; $F_{1,41} = 3.7$; $p = 0.06$). The women tended to display lower peak HRs than the men (86% vs 93% of HR_{max}; $F_{1,41} = 92.6$; $p < 0.05$), as well as lower overall RPE scores (4.9 vs. 6.3; $F_{1,42} = 7.2$; $p < 0.05$).

CO_2 bottle carry task

Figure 6 shows several subjects performing the CO_2 bottle carry tasks both with and without the aid of a strap. Table 3 shows the time (s) required for the men and women to complete the CO_2 bottle carry task using the standard and strap-assisted carry. A significant gender difference in performance on this task was observed. The average female time was 59% slower than the average male time (41 s vs. 65 s; $F_{1,43} = 24.1$; $p < 0.0001$). Using the strap did not alter significantly the time to complete the task (standard carry = 53 s vs. 54 s for strap-assisted carry; $F_{1,43} = 0.2$; $p > 0.05$).

A cumulative frequency histogram illustrating the distribution of CO_2 bottle carry times (standard carry) for men and women is found in Figure 7. Most subjects were able to complete the task within 75 s either with or without the assistance of the strap. Approximately 64% of women exhibited times that overlapped with the worst performing men (i.e., slowest 52% of men).

Mean RPE for the different body parts for the standard and strap-assisted carry are illustrated in Figure 8. For the standard carry, the right arm (upper and lower) and right hand received the highest RPE (range 3 to 3.6). The RPE for these body locations were reduced significantly (between 38% and 43%; $p < 0.0001$) using the strap. However, use of the strap significantly increased the RPE for the neck region from 1.1 (very slight) to 2.6 (between slight and moderate) ($p < 0.0001$).

Use of the strap did not affect overall RPE (standard carry = 4.5 vs 3.9 for strap-assisted carry; $F_{1,43} = 4.0$; $p = 0.052$), or peak HR (standard carry = 88% vs 90% HR_{max} for strap-assisted carry; $F_{1,42} = 2.0$; $p > 0.05$). However, there was a 9% decrease in right-handed grip strength immediately following completion of the standard carry task ($p < 0.001$). Grip strength following completion of the strap-assisted carry was not significantly different from the pre-task measurements.

IV. DISCUSSION

The primary finding of this investigation was a significant gender difference in emergency damage-control task performance. On average, the task performance of women was 32% (mannequin drag) and 41% (CO_2 bottle extinguisher carry) that of men.

Significant gender differences in anthropometrics and strength appear to account for the lower physical capacity of the women. The average percentage body fat of women was about twice that of men. Conversely, the average man was nearly twice as strong (sum of knee and elbow lift strength) and possessed a significantly greater amount of lean muscle mass than the average woman.

Surprisingly, both interventions proved unsuccessful in improving the task performance of either gender. In the case of the mannequin drag task, performance was unchanged despite a reduction in overall RPE. It is possible that the timed performance may have been compromised by the amount of time required to place the tether under the arms of the mannequin and under the oxygen breathing apparatus. It is estimated that this component of the task took approximately 5 to 10 s, depending on the adeptness of the subject. It appears that the loss of time attaching the tether counteracted any benefit of using it during the drag phase of this task.

The tether device was designed to reduce the stress placed on the hands and lower back during the mannequin drag. This objective was accomplished by the reductions in RPE illustrated in Figure 5. Considering the reduction in RPE, the intervention may have proven effective in improving performance if the duration of the task had been longer. Future research should focus on the design of a tether that allows for quicker attachment to the mannequin and should evaluate its effectiveness for both single and multiple rescue scenarios.

A plausible explanation for the failure of the CO_2 bottle extinguisher shoulder strap to enhance performance is more perplexing. The shoulder strap was designed to reduce the arm and grip strength needed to carry an 23.5-kilogram CO_2 bottle extinguisher up and down an inclined ladder. Results indicated that there was no change in overall RPE for this task (a significant reduction in right arm and right hand RPE was observed, however this was offset by an increase in RPE in the neck region). Time needed to place the shoulder strap over the head and on the shoulder may have offset any benefits of using the device for this timed task.

It may also be possible that factors other than arm and grip strength (i.e., leg strength, leg speed, balance, agility, etc.) are more important in influencing performance of this short duration task.

One positive outcome of the strap-assisted carry was that it helped to maintain grip strength. The fact that the shoulder strap enabled subjects to carry the CO_2 bottle extinguisher without the use of their hands could have accounted for this finding. This may be of significance when grip strength is limiting factor in performance (e.g., carrying the extinguisher for extended periods of time or ascending/descending vertical ladders). Future research should investigate these scenarios.

Finally, it should be noted that while men, on average, were larger, stronger, and performed better on the tasks than the women, there was some overlap (percentage of women who performed better than men) in performance between genders. This finding suggests that physically demanding damage-control performance is not simply a gender-related issue but may be a size- and strength-related issue as well.

V. CONCLUSION

In summary, this investigation addressed the important operational readiness issue of women's emergency task performance onboard ship. It sought to apply human factors science to augment damage-control task performance, rather than construct exclusionary standards that could potentially restrict the assignment of women to combat ships. On-site visits to training facilities and U.S. Navy vessels, as well as interviews with subject matter experts identified five emergency damage-control tasks with high physical demands. Prototype ergonomic interventions were designed and evaluated for two of these tasks. Results of shipboard testing of Navy men and women revealed inherent physiological gender differences that significantly influence performance of these tasks. While the interventions proved largely unsuccessful in improving task performance, results of this investigation provided valuable insight regarding future design modifications. Additional research is needed to improve the design of these prototype devices and to assess their utility in similar and sustained damage-control task scenarios.

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APPENDIX A

FIGURES

Fig. 1. Cumulative frequency histogram of isometric lifting strength at elbow height

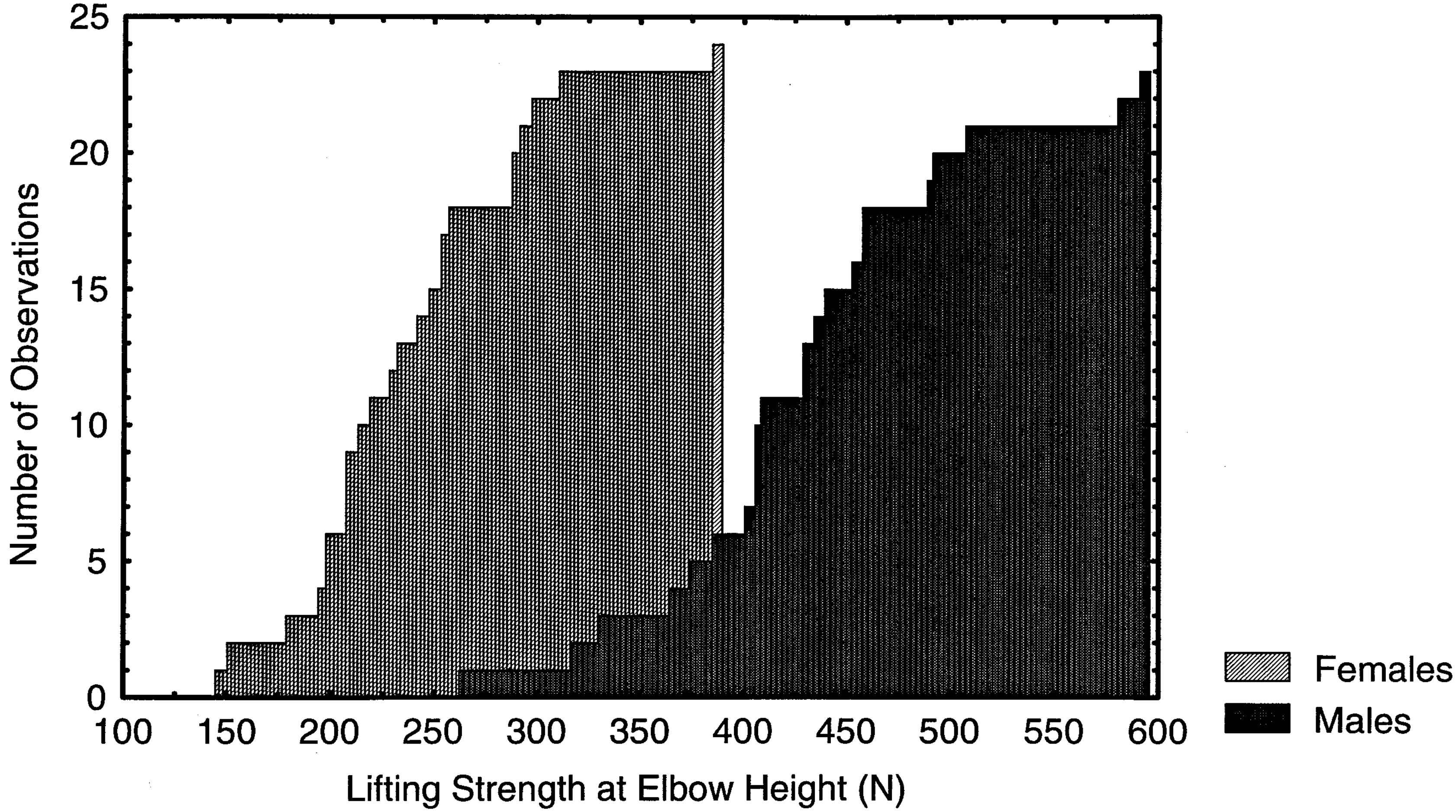


Fig. 2. Cumulative frequency histogram of isometric lifting strength at knee height

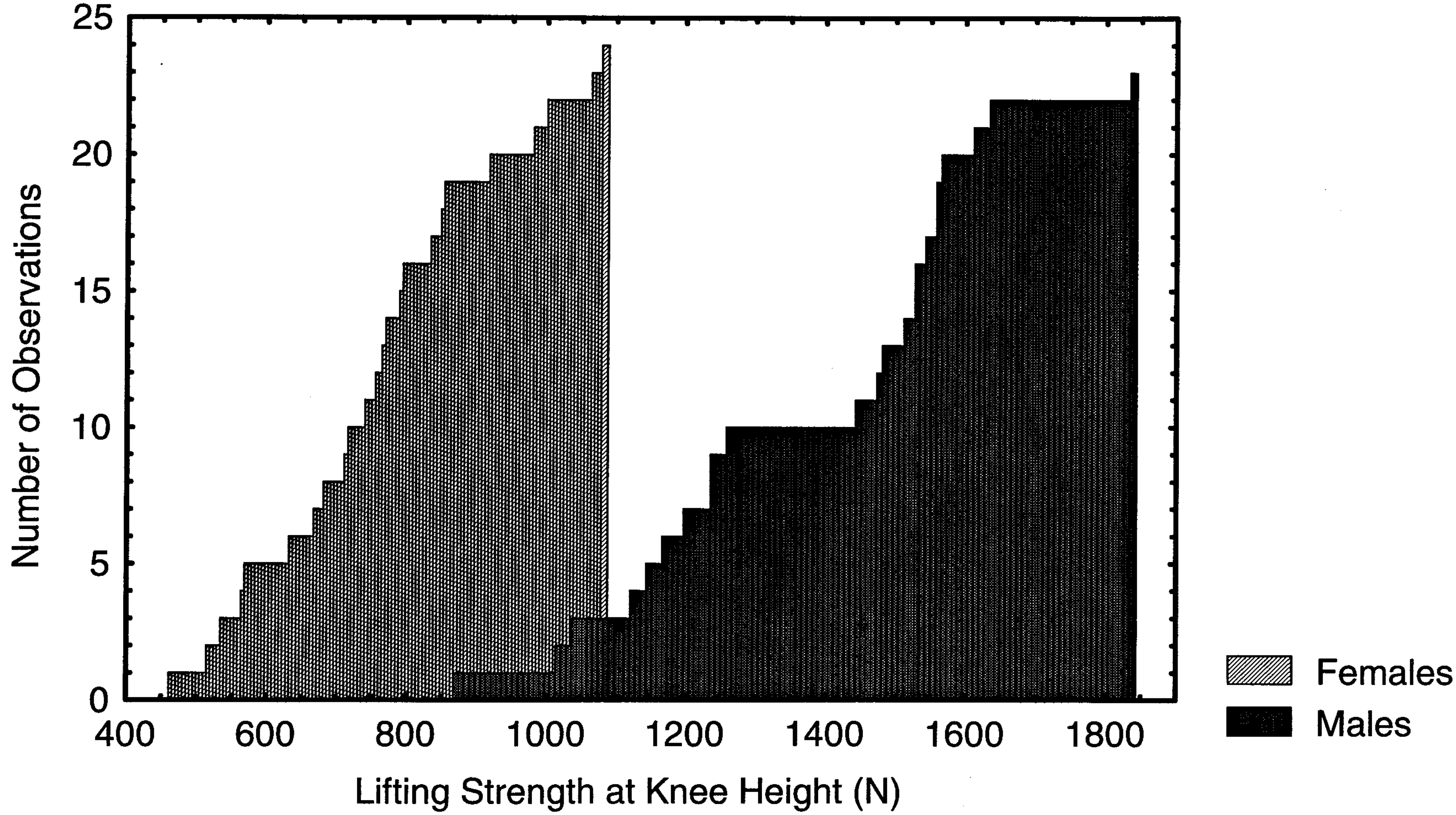
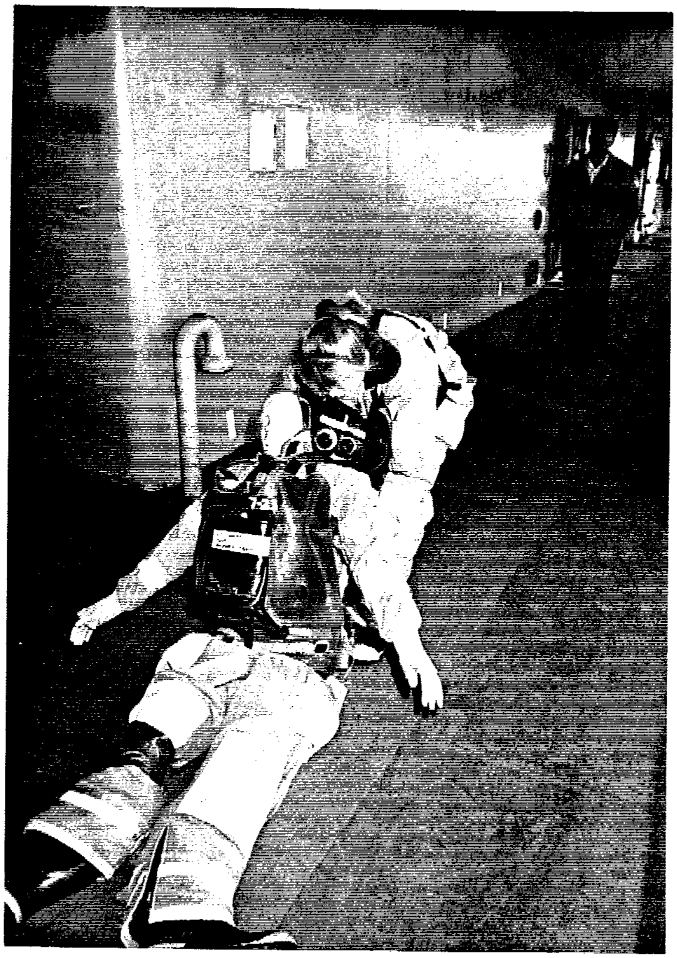
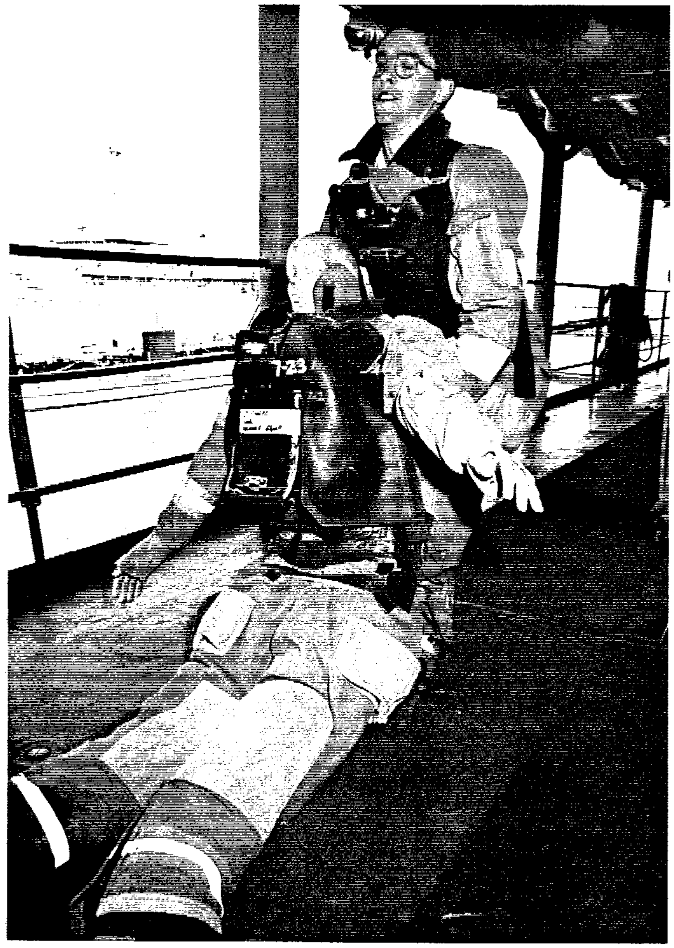


Fig 3. The mannequin drag task simulating extrication of an unconscious fire fighter using the shoulder drag technique (top figures) and with the aid of a tether (lower figures). Note the extreme bent back posture in the upper figures compared with the lower figures.

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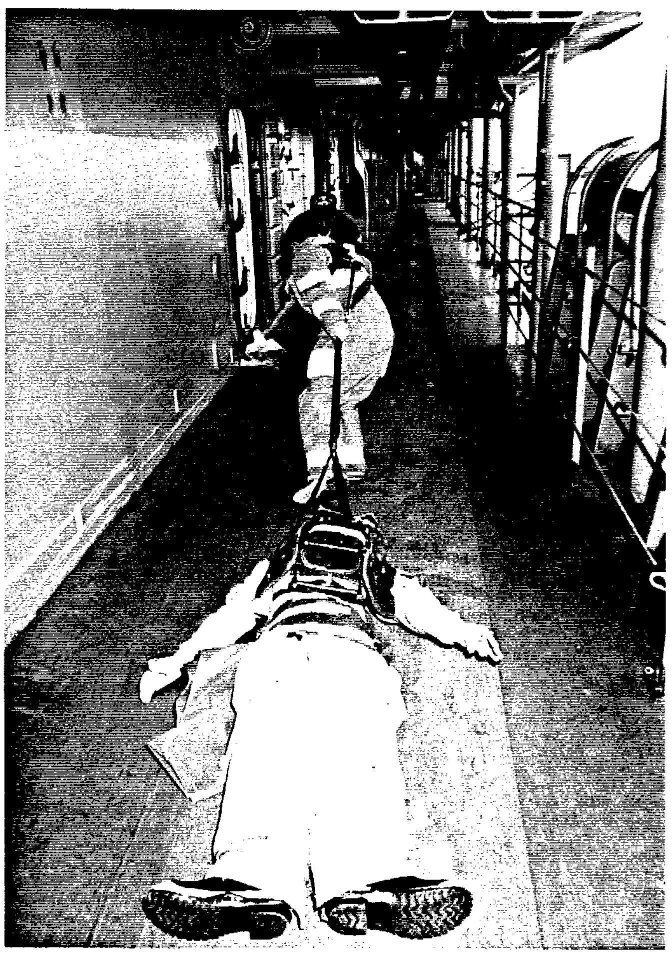


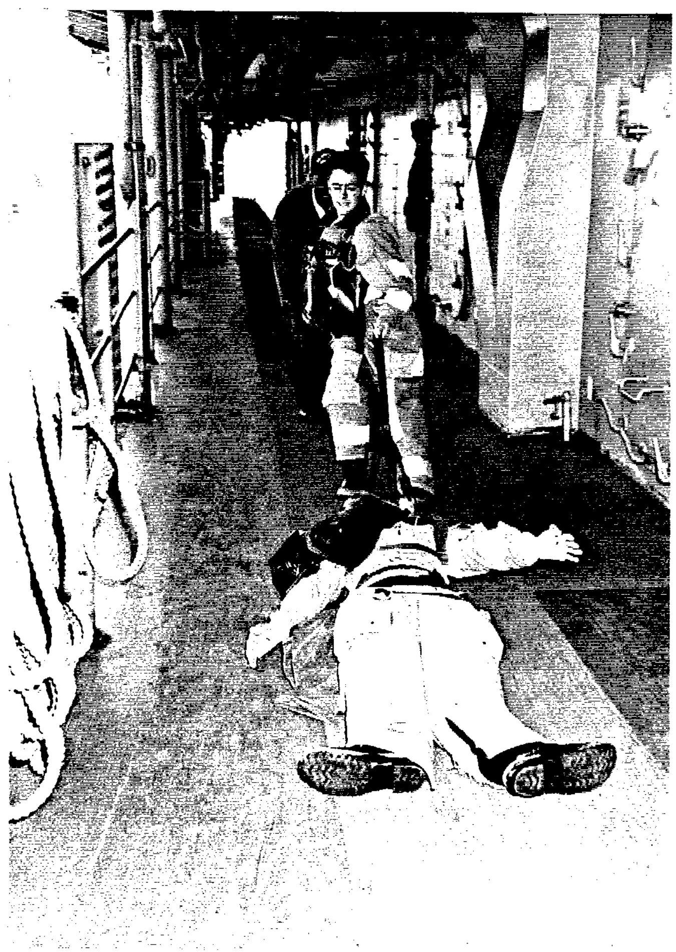


Fig. 4. Cumulative frequency histogram of performance on the manikin drag task (shoulder drag technique)

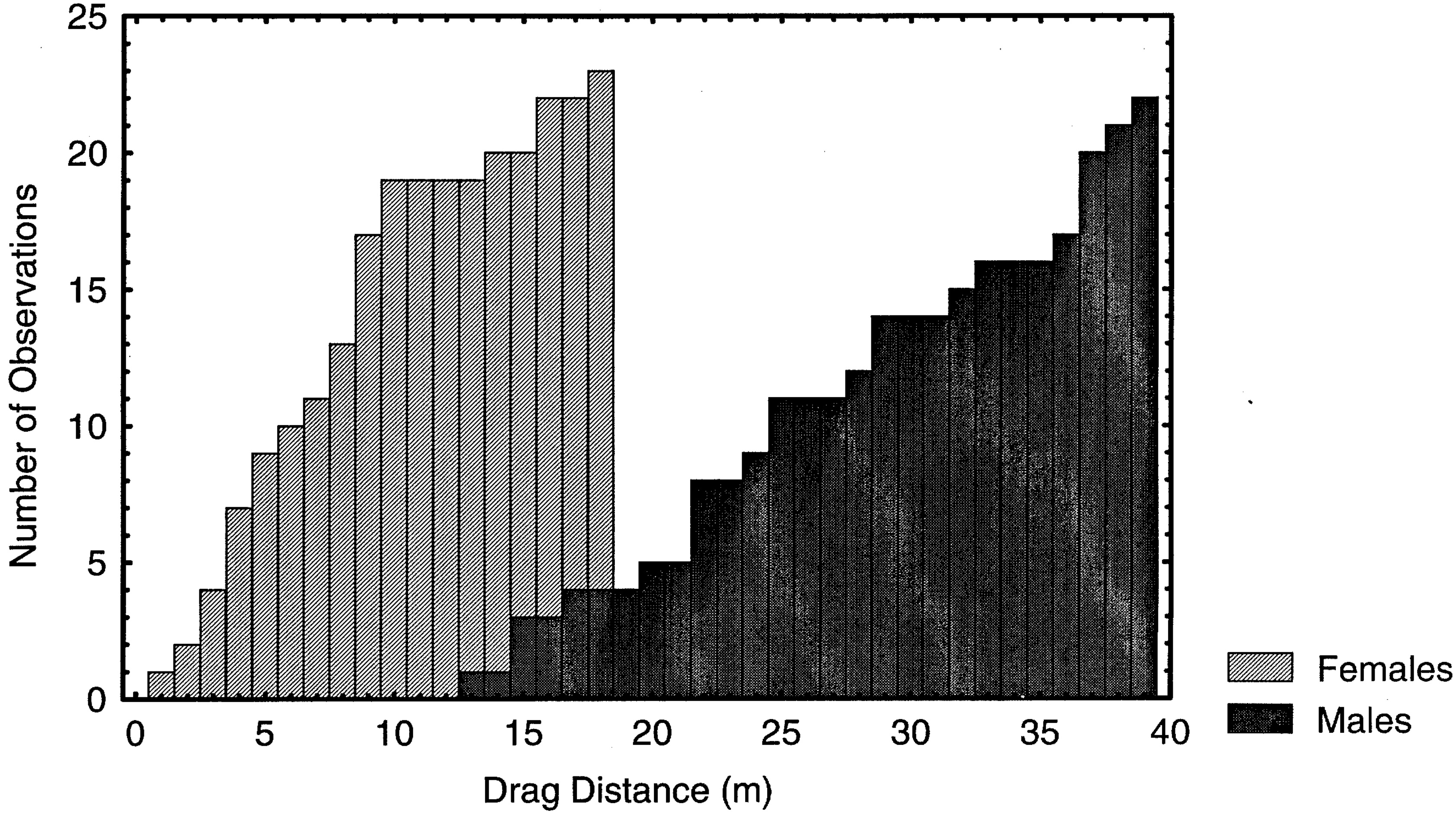


FIG. 5. Mean Ratings of Perceived Exertion for Various Body Parts
(Manikin Shoulder Drag vs. Tether Drag Technique)

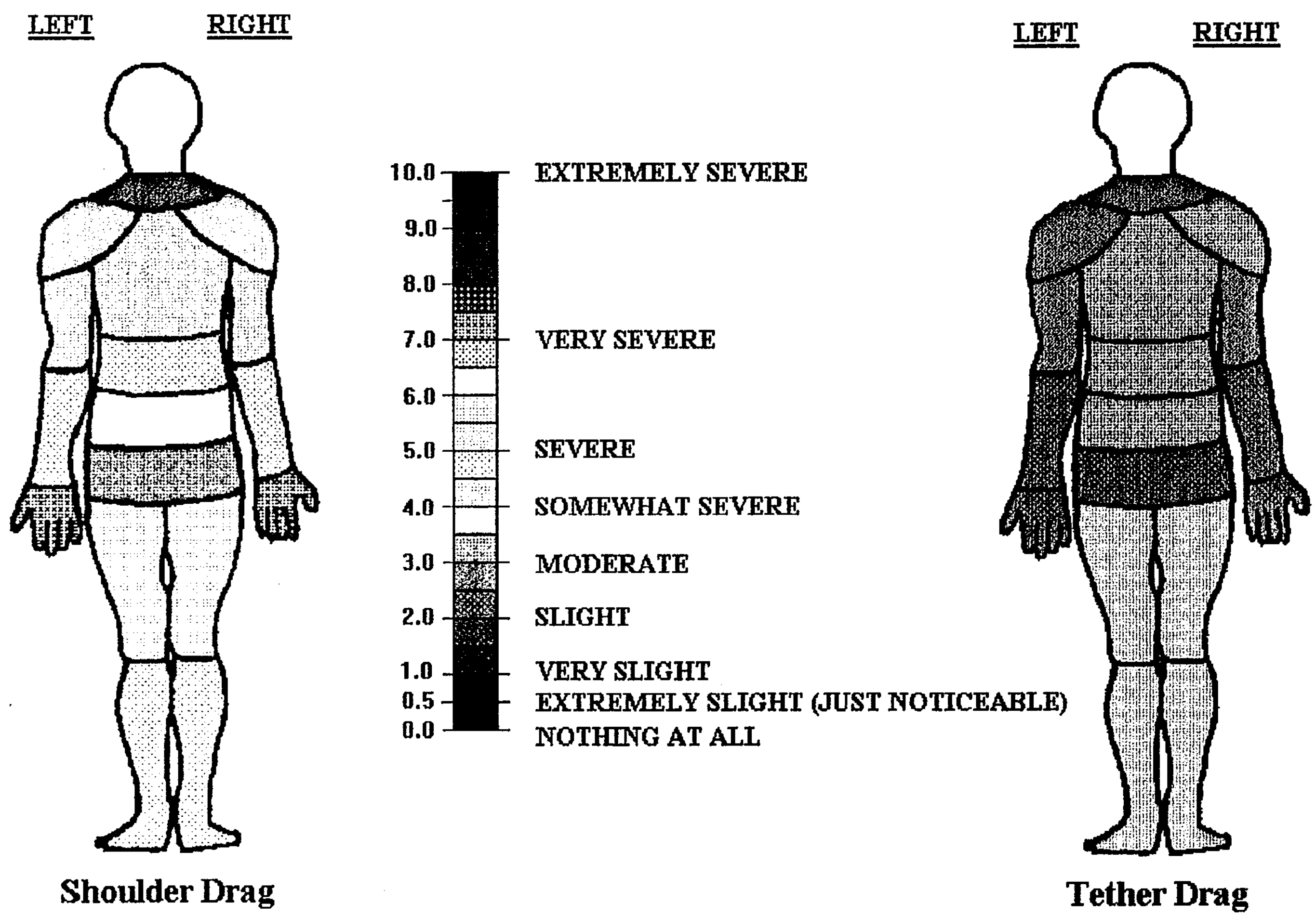
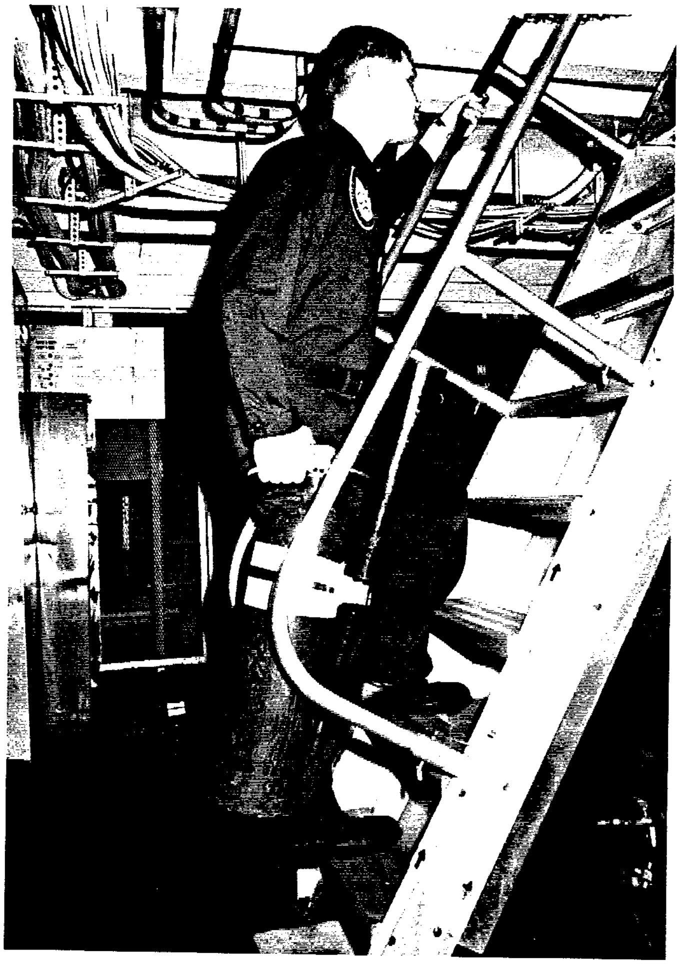
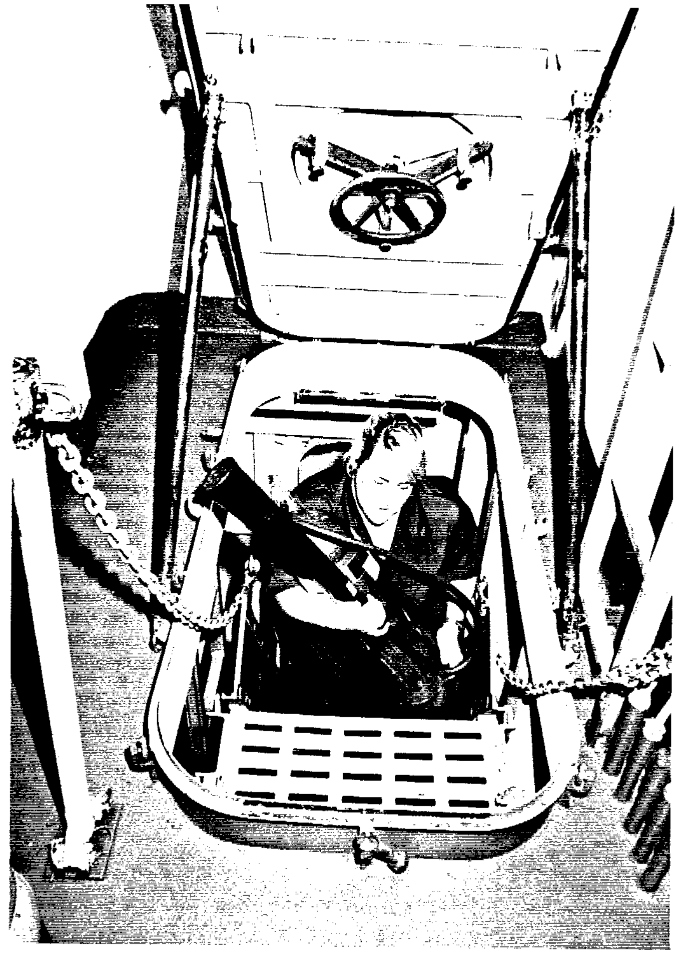


Fig 6. The CO_2 bottle carry task simulating a rapid damage control response to a fire aboard ship. The top figures show subjects carrying the CO_2 fire extinguisher while ascending between decks using the standard carry. Some subjects chose to carry the bottle in one hand (top left) while others adopted a cradle carry (top right). The lower figures show subjects ascending and descending between decks while carrying the CO_2 extinguisher with the aid of a strap. Note the freedom to use the arms for support while carrying the bottle with the aid of the strap versus the standard carry.





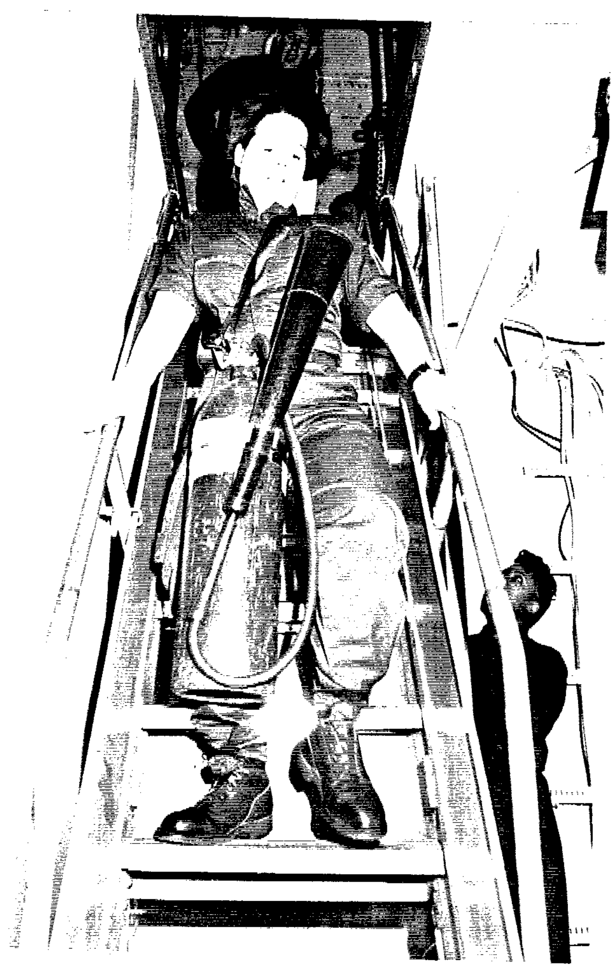


Fig. 7. Cumulative histogram of performance on the CO2 bottle carry task (standard carry)

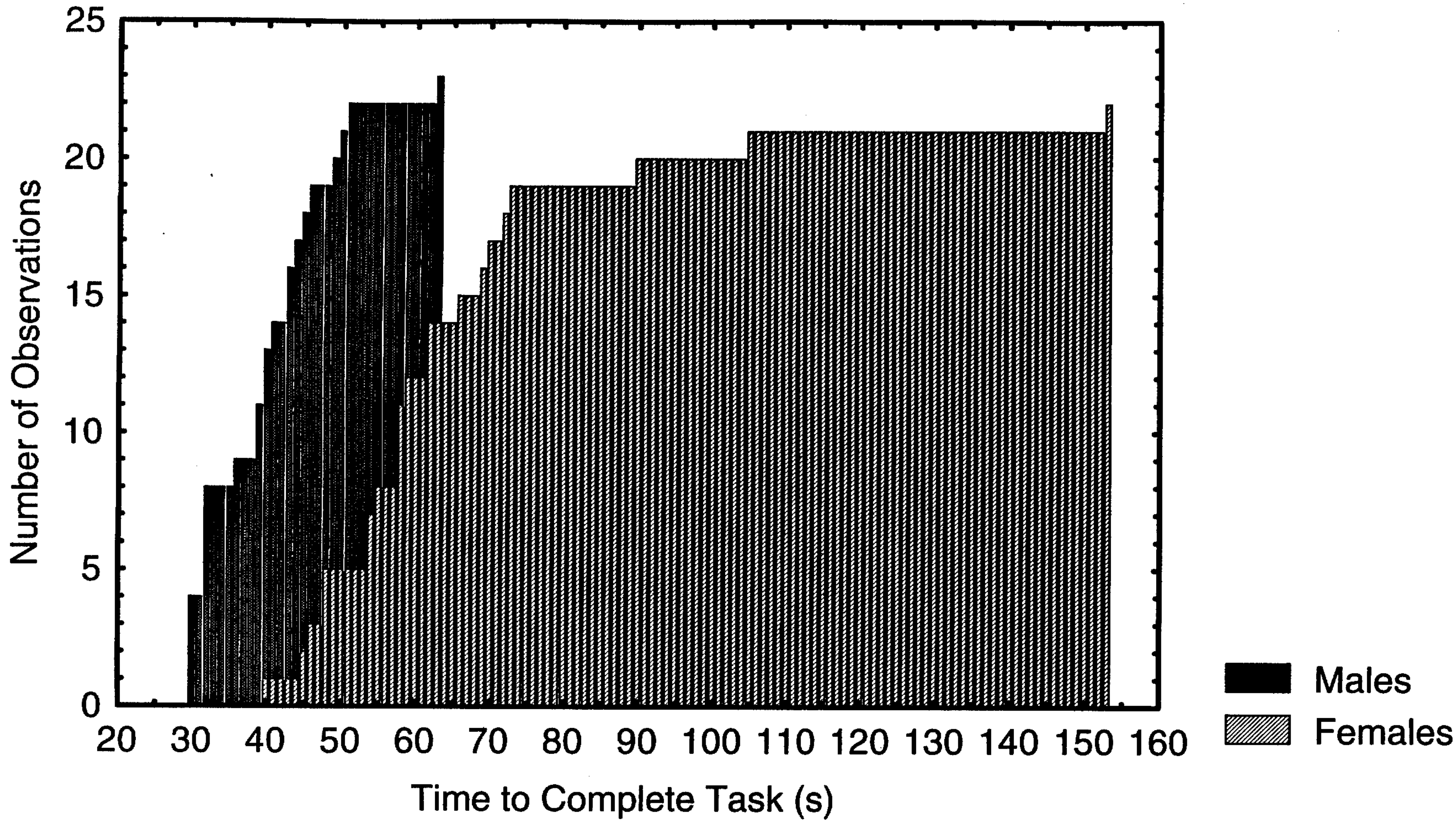


FIG. 8. Mean Ratings of Perceived Exertion for Various Body Parts (CO_2 Bottle Standard Carry vs. Strap Assisted Carry)