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BEHAVIORS AND POSTURES IN RESPONSE TO THREAT OF BLUNT IMPACT

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14. ABSTRACT

Blunt impact tools are currently used in the field under conflict situations and continue to be proposed and refined for field use. The purposes of these analyses were to characterize behaviors and postures induced by the threat of paintball impact and to derive information about the probability of impacts resulting from those behaviors and postures. The probabilities of impacts at certain locations on the body and avoidance methods at different distances from the paintball markers were also of interest. Subjects engaged in several runs through the course with single or clustered point blunt impacts occurring in every zone. Cameras were positioned throughout the test bed to capture behavioral responses to the threat of paintball impacts. The resulting videos were synchronized and coded for behaviors, postures, trigger pulls, impacts, and impact locations using the Noldus Observer 11.5 application.

The results demonstrated that methods of behavioral coding can be applied to understand responses to non-lethal weapon's fire. A large variety of postures and behaviors were observed even in the highly controlled laboratory conditions. The majority of the hits were to the chest, arms, and surprisingly to the head (possibly because subjects would try to duck down to evade fire). The most frequent behavior was to move out of the line of fire and get behind objects. Behaviors did not seem to vary with distance. Further research is necessary to more fully explore what behaviors and postures are performed in response to the threat of blunt impact. These data are necessary for developing high-fidelity models that can predict risk of significant injury in targets of blunt impact weapons.

15. SUBJECT TERMS

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(continued)

INTRODUCTION

Non-lethal blunt impact tools are currently used in the field under conflict situations and continue to be proposed and refined for field use. The present experiment examined how a person physically reacts, in both their behavior and their postures, when targeted and/or hit with a blunt impact. The present study furthers the analyses first published in the Defense Technical Information Center (DTIC) technical report, “Blunt Impact as a Deterrent under Nominally Low Approach Motivation Conditions” (ref. 1). The present study examines the postural and physical behavioral reactions of the subjects to the threat of blunt impact and subsequent location of the round impact. The work is a first look at behavioral and postural responses to the threat of blunt impact. Descriptive statistics are provided in this report in preparation for more focused efforts in the future.

SUBJECTS

Subjects were 20 males between the ages of 18 and 52 and were recruited from the general public. Every subject went through an informed consent process. Subjects were recruited from the general population through advertisements posted at shopping areas, colleges, and other public locations. Upon arrival, subjects went through a detailed consent process, including self-exclusions for several health problems that may be exacerbated by exercise or by blunt impact injuries. Subjects wore jeans or sweatpants, a groin protector, and a thin t-shirt provided by the experimenters, in addition to a face and neck protector. After consenting and administration of initial questionnaires, subjects practiced the approach and shooting task. Participants were assigned to one of the two trial sequences and commenced with the first approach trial. After each approach, the subject returned to the intake area and was visually examined to document the location of and to characterize the damage from all paintball hits. Each subject was reminded of the threat sequence that he would face and was then given the option to return for the next approach trial. When subjects had completed all the approach trials that they chose to complete, they were paid a flat participation fee corresponding to $20/hr for the period that it would typically take subjects to complete all seven approach trials. Those who quit early did not receive less compensation.

EXPERIMENT

A participant’s task in the experimental design was to traverse a distance between a start location and a shooting location. Upon reaching a shooting location, the participant was instructed to hit each of three targets before proceeding to the next shooting location. A subject had to traverse the approach distance for four such shooting locations (zones) on an approach trial. Points were awarded for traversing the space between locations and accurately hitting targets providing motivation for continuing the task (i.e., approaching the threat).

Subjects traversed the distance between shooting locations with some probability of being hit by a paintball delivered from different devices. No paintballs would be encountered in Threat Level 0. Paintballs were delivered from a single ATS-AT4 (fig. 1) marker by a highly experienced shooter under Threat Level 1. Finally, paintballs (fig. 2) were delivered from the multi-gun flexible array aimed by the same experienced shooter under Threat Level 2. Subjects were aware of the threat contingency on each trial. Aim point was the subject’s chest. The present examination analyzed data from only the two threat conditions.

Figure 1
ATS – AT4 paintball marker

Figure 2
Spyder E99 paintball marker

Subjects repeated the approach game up to seven times under different threat conditions. Three approach trials offered no threat to the subject (Threat Level 0), two approach trials offered the single-gun blunt impact threat (Threat Level 1), and two approach trials offered the three-gun-turret blunt impact threat (Threat Level 2). The order of presentation of the two nonzero threat levels was counterbalanced across subjects, with subjects randomly assigned to one of the two sequences listed. Video and other data collected under Threat Levels 1 and 2 were used to assess behavioral and postural responses to the threat of blunt impact and location of impacts.

The experiment was conducted in a long narrow approach arena (figs. 3 and 4), in which a subject approached toward the nominal goal, but the goal end held a bench from which paintballs were aimed at the approaching subject. The subject's and shooter's paintball markers are shown in figures 3 and 4, and marksman information is given in figures 5 and 6.

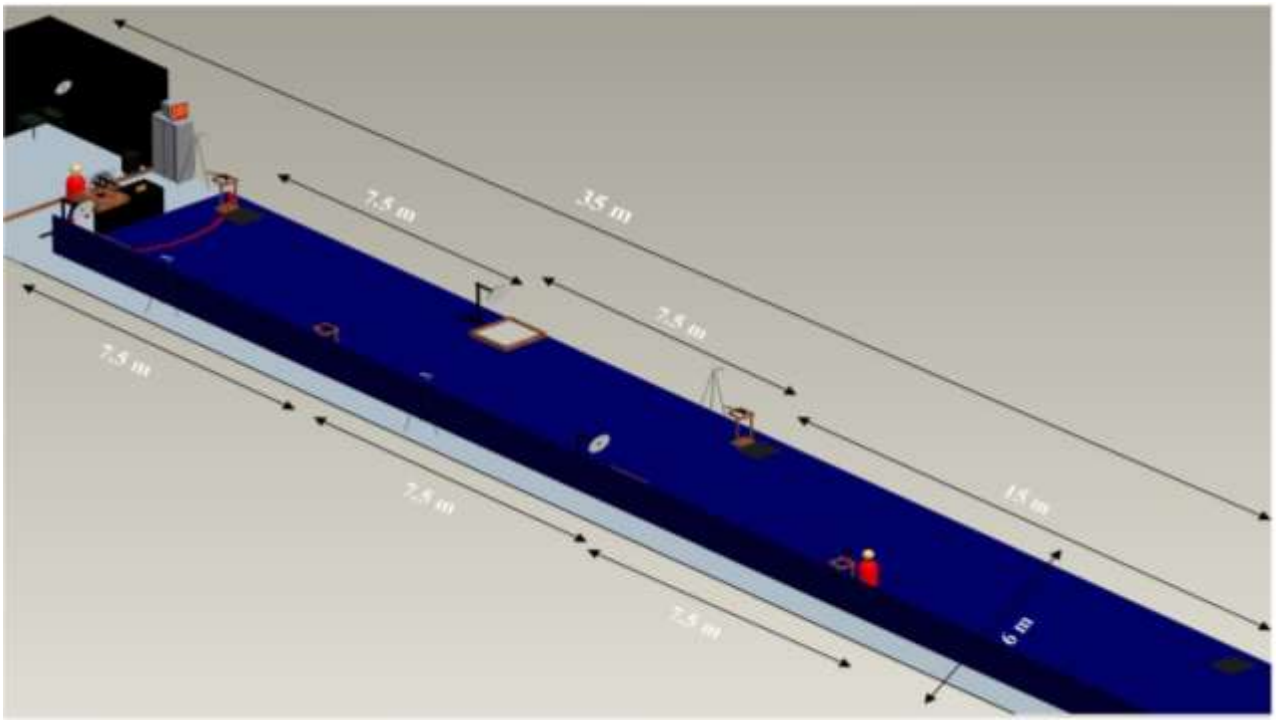

Figure 3
Test bed layout

Figure 4
Experimental approach arena with shooting stations, targets, and marksman's station (threat source) at the far end

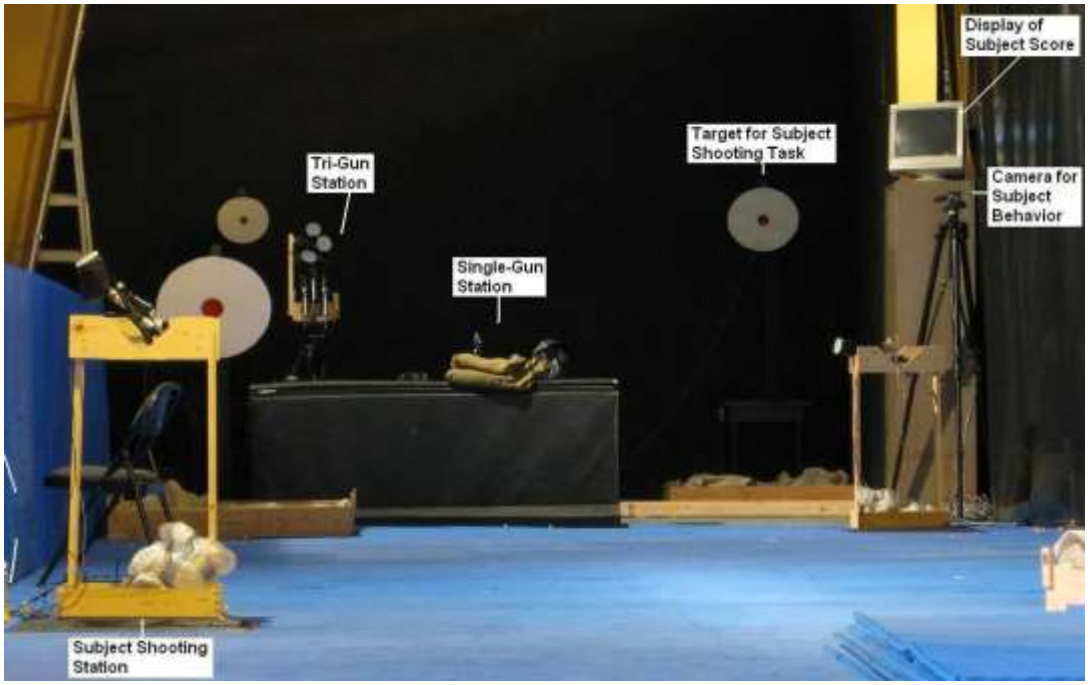

Figure 5
Close-up photograph of threat source (marksman's station) and final two shooting stations

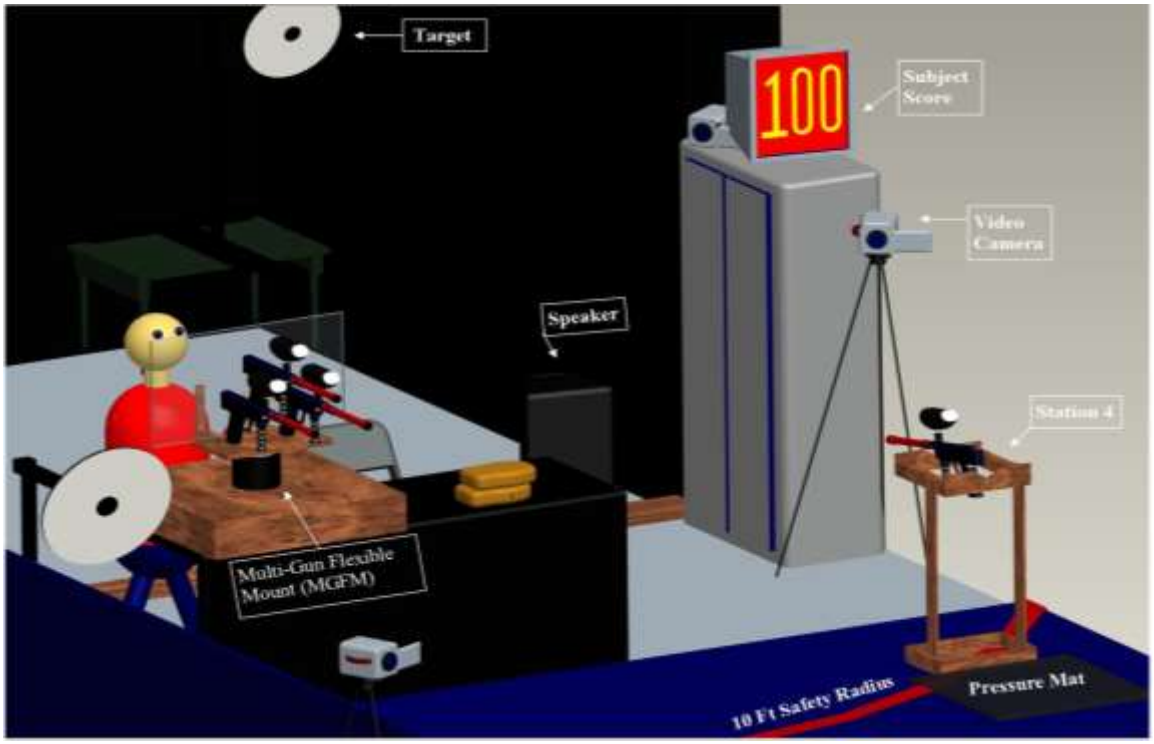

Figure 6
Shooter's multi-gun paintball marker array

METHODS, ASSUMPTIONS, AND PROCEDURES

In the primary study, a baseline run through the course was conducted to collect data for each shooting location (zone) within the test bed without the blunt impact stimulus. Subjects then conducted several runs through the course with single or clustered-point blunt impacts occurring in every zone. Between each run, researchers inspected impact locations and subjects were asked in which zone each hit occurred. Researchers attempted to verify hit locations to the extent possible.

The purposes of these additional analyses were to characterize the behaviors and postures induced by the threat of paintball impact and to derive information about the probability of impacts resulting from those behaviors and postures shown at different distances from the markers.

Two data sources were used. The first were the paper records of impact locations found by visual inspection following each of the trials where the markers targeted subjects. The second were sets of videos that were coded for postures and behaviors, trigger pulls, impacts, and locations of impacts. Both sets of data contain impact locations; however, the paper records do not list a posture, time, or distance at which the impacts occurred. In addition, hits that did not result in detectable injuries upon skin inspection may not have been recorded in the paper records, because the primary research question of the study focused on pain and injury effects on motivation.

Paper Records

Paper records were used to calculate the overall total numbers and percentages of impacts on regions of the body, according to the following diagram shown in figure 7.

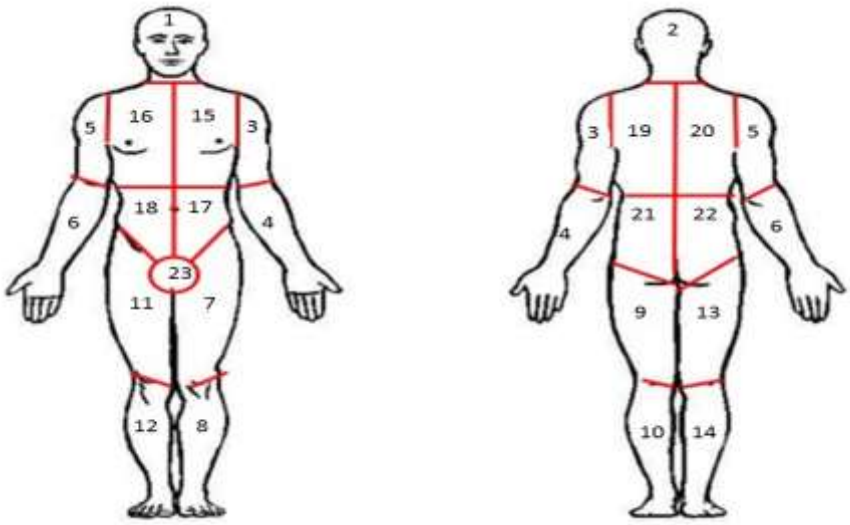

Figure 7
Areas of the body for recording impact location

Video Records

Cameras were positioned throughout the test bed to capture behavioral responses to the threat of paintball impacts. The resulting videos were synchronized and coded for behaviors, postures, trigger pulls, impacts, and impact locations using the Noldus Observer 11.5 application. Two research assistants independently coded half the data and then coders exchanged results to verify the work. Figures 8 through 16 show examples of the behavioral codes used. One subject did

not have sufficient video data recorded, and six terminated participation early. Data from three subjects were lost from the distance of 7.5 to 15 m due to unknown computer coding error.

Figure 8
Subject ducking down and moving behind object

Figure 9
Subject ducking down with head rotated and self-hugging

Figure 10
Subject ducking down with locomotion and moving out of line of fire

Figure 11
Subject ducking with raised arms blocking face

Figure 12
Subject face and neck rotation with raised arms blocking face

Figure 13
Subject raised arms and palms out

Figure 14
Subject self-hugging arms raised blocking face with trunk rotated

Figure 15
Subject turning whole body and self-hugging (image 1)

Figure 16
Subject turning whole body and self-hugging (image 2)

The output from the behavioral coding was used to generate files containing a timeline of each of the trials listing start times, end times, and durations of behaviors and postures as well as event times for trigger pulls, impacts, and impact locations. This minimally processed timeline data were submitted to the Joint Intermediate Forces Command Office (formerly known as the Joint Non-Lethal Weapons Directorate) for their further analyses.

Similarly, to the data processing using paper records, the totals and percentages of impact locations were derived. However, video data allow researchers to identify the distances between the subject and the weapon at which the impacts occurred. Data are presented separately for each of the distances (22.5 to 30 m, 15 to 25.5 m, 7.5 to 15 m, and 0 to 7.5 m).

Hit locations given behaviors or postures were also derived. Finally, to understand individual variabilities of behaviors under threat, a matrix that lists each subject and the amount of time spent in each posture or behavior was generated.

RESULTS

Paper Recording Results

Probability of Hit in Each of the 23 Areas of the Body across All Trials

Figure 17 shows the percentage of time each of the 23 areas of the body were hit.

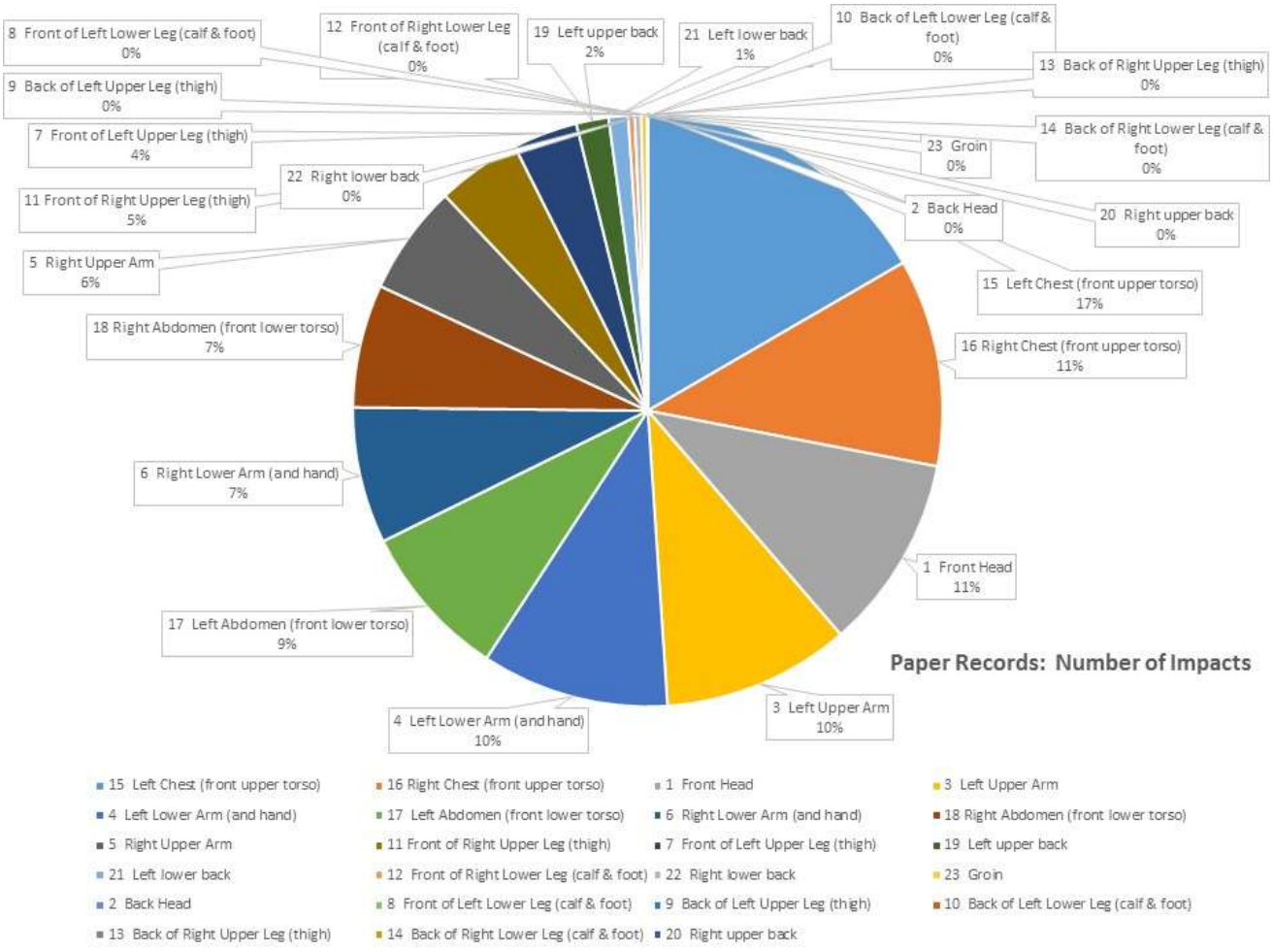

Figure 17
Probability of hit in each of the 23 areas of the body across all trials

Probability of Hit in Each of the 23 Areas of the Body across All Trials, Given a Hit

Figure 18 shows where that impact is likely to be, given there is an impact.

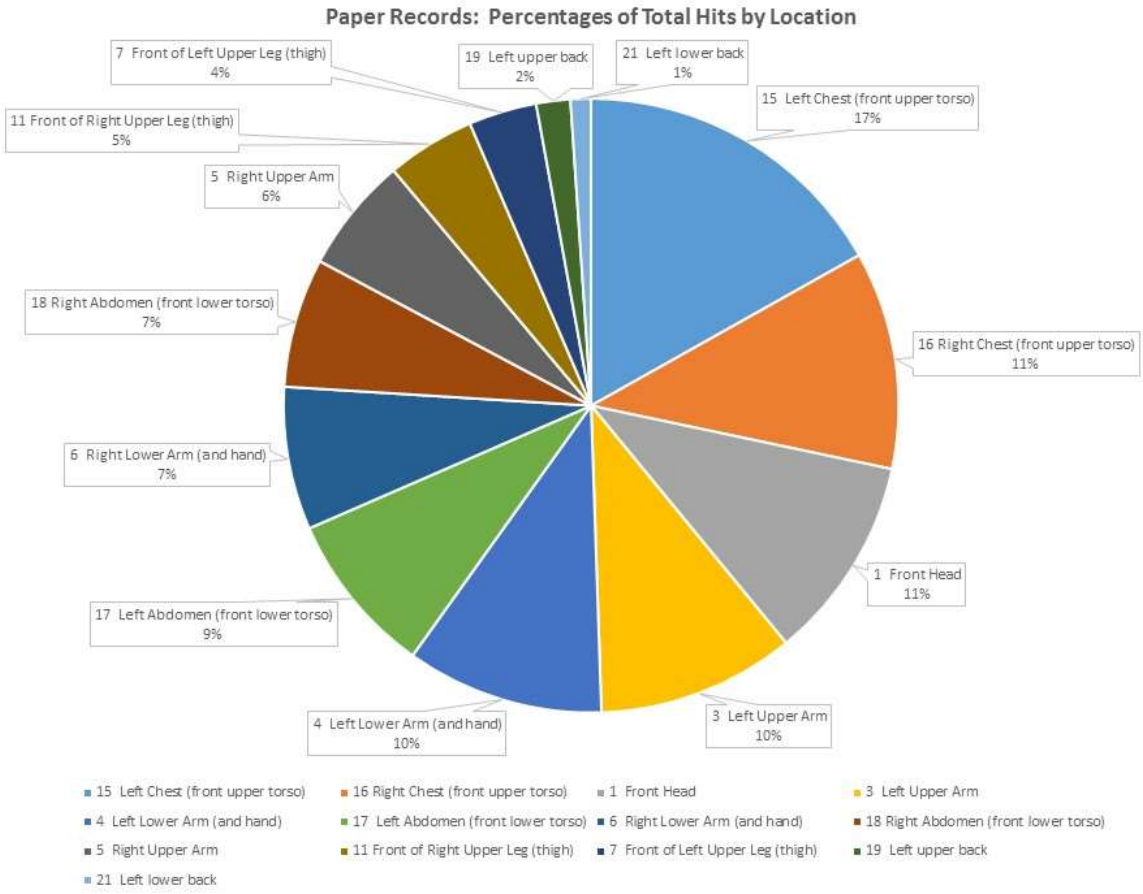

Figure 18
Probability of hit in each of the 23 areas of the body across all trials, given a hit

Individual Variation in Number of Hits and Hit Locations

The following matrix (table 1) shows for each subject (Subject a through Subject u) the number of impacts to each of the areas of the body and the total number of impacts. Note that some subjects terminated participation early (i.e., Subjects g, k, m, r, s, t, and u).

Table 1
Number of impacts to each of the areas of the body

Subject	1 Front Head	2 Back Head	3 Left Upper Arm	4 Left Lower Arm (and hand)	5 Right Upper Arm	6 Right Lower Arm (and hand)	7 Front of Left Upper Leg (thigh)	8 Front of Left Lower Leg (calf & foot)	9 Back of Left Upper Leg (thigh)	10 Back of Left Lower Leg (calf & foot)	11 Front of Right Upper Leg (thigh)	12 Front of Right Lower Leg (calf & foot)	13 Back of Right Upper Leg (thigh)	14 Back of Right Lower Leg (calf & foot)	15 Left Chest (front upper torso)	16 Right Chest (front upper torso)	17 Left Abdomen (front lower torso)	18 Right Abdomen (front lower torso)	19 Left upper back	20 Right upper back	21 Left lower back	22 Right lower back	23 Groin	# Hits Subject Received
a	1	0	0	2	3	2	0	0	0	0	0	0	0	0	4	3	2	0	0	0	0	0	0	**17**
b	2	0	1	2	0	0	0	0	0	0	2	0	0	0	5	0	1	0	1	0	0	0	0	**14**
c	3	0	1	1	1	0	0	0	0	0	0	0	0	0	4	2	1	0	0	0	0	0	0	**13**
d	1	0	1	5	1	2	0	0	0	0	5	1	0	0	0	2	1	1	0	0	0	0	0	**20**
e	2	0	2	2	0	2	0	0	0	0	0	0	0	0	6	5	0	1	1	0	0	0	0	**21**
f	3	0	1	1	2	1	0	0	0	0	1	0	0	0	1	2	1	0	0	0	1	0	1	**15**
g	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	**6**
h	4	0	0	1	0	1	1	0	0	0	0	0	0	0	2	1	1	4	0	0	0	0	0	**15**
i	0	0	3	2	0	2	1	0	0	0	0	0	0	0	6	0	2	0	0	0	0	0	0	**16**
j	0	0	3	1	2	3	1	0	0	0	1	0	0	0	2	1	0	0	0	0	0	0	0	**14**
k	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
l	1	0	4	1	1	2	1	0	0	0	0	0	0	0	2	2	2	0	1	0	0	0	0	**17**
m	0	0	0	2	0	1	1	0	0	0	2	0	0	0	1	1	0	2	0	0	0	0	0	**10**
n	2	0	4	1	2	0	2	0	0	0	1	0	0	0	2	4	1	0	1	0	0	1	0	**21**
o	0	0	3	1	0	2	0	0	0	0	1	0	0	0	1	4	3	3	0	0	0	0	0	**18**
p	5	0	2	0	1	2	0	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	**15**
q	0	0	1	1	3	0	0	0	0	0	0	0	0	0	1	1	3	2	0	0	0	0	0	**12**
r	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
s	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	1	2	0	0	0	0	0	**9**
t	1	0	0	3	0	0	0	0	0	0	0	0	0	0	2	1	2	1	1	0	0	0	0	**11**
u	3	0	2	2	1	1	3	0	0	0	0	0	0	0	2	0	1	0	0	0	2	0	0	**17**

Video Recording Results

Probability of Impacts

Table 2 presents the probability of impacts at each distance under fire from the single marker and the multiple marker array separately. The probability was calculated by summing all trigger pulls that resulted in an impact across all trials and dividing by the sum of all recorded trigger pulls across all the trials. As one might predict, the closer the subject is to the marker, the more likely the subject will be hit by the blunt impact.

Table 2
Probability of impacts at each distance under fire

Distance to marker (m)	Single marker	Multiple markers
22.5 to 30	0.14	0.17
15 to 22.5	0.37	0.34
7.5 to 15	0.60	0.54
0 to 7.5	0.81	0.89

Behavior and Postures at Each Distance

Figures 19 to 22 present the behaviors and postures and their percentages of times reported (no. of time behavior recorded/no. of total no. of times all behaviors reported) at each of the distances across all subjects and trials.

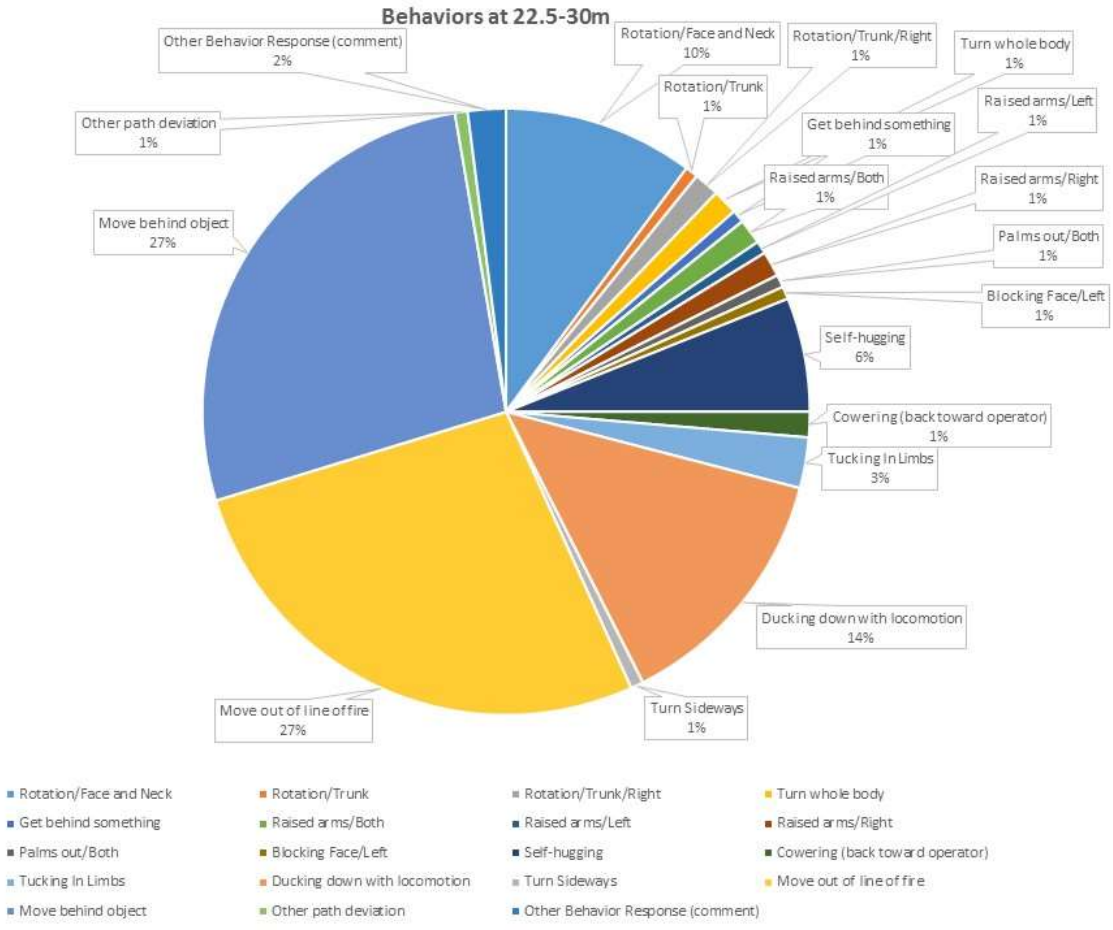

Figure 19
Behaviors and postures at 22.5 to 30 m from marker

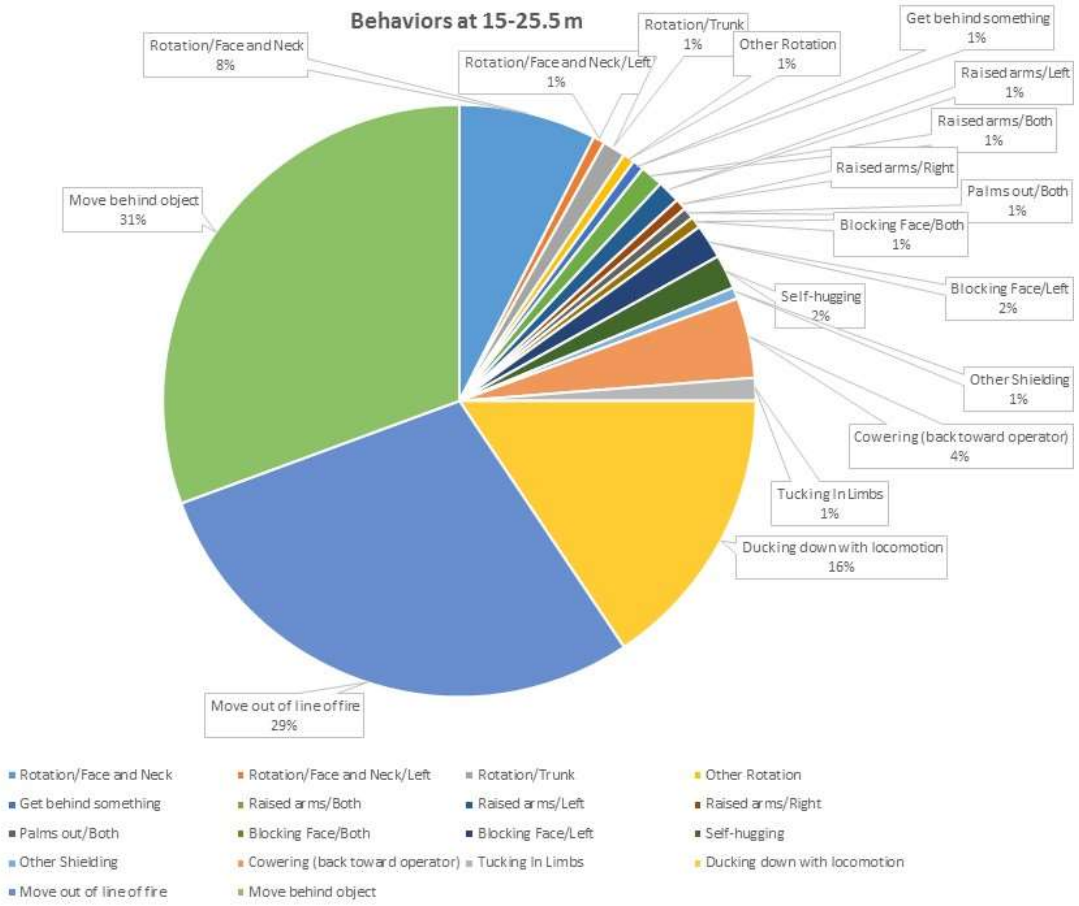

Figure 20
Behaviors and postures at 15 to 25.5 m from marker

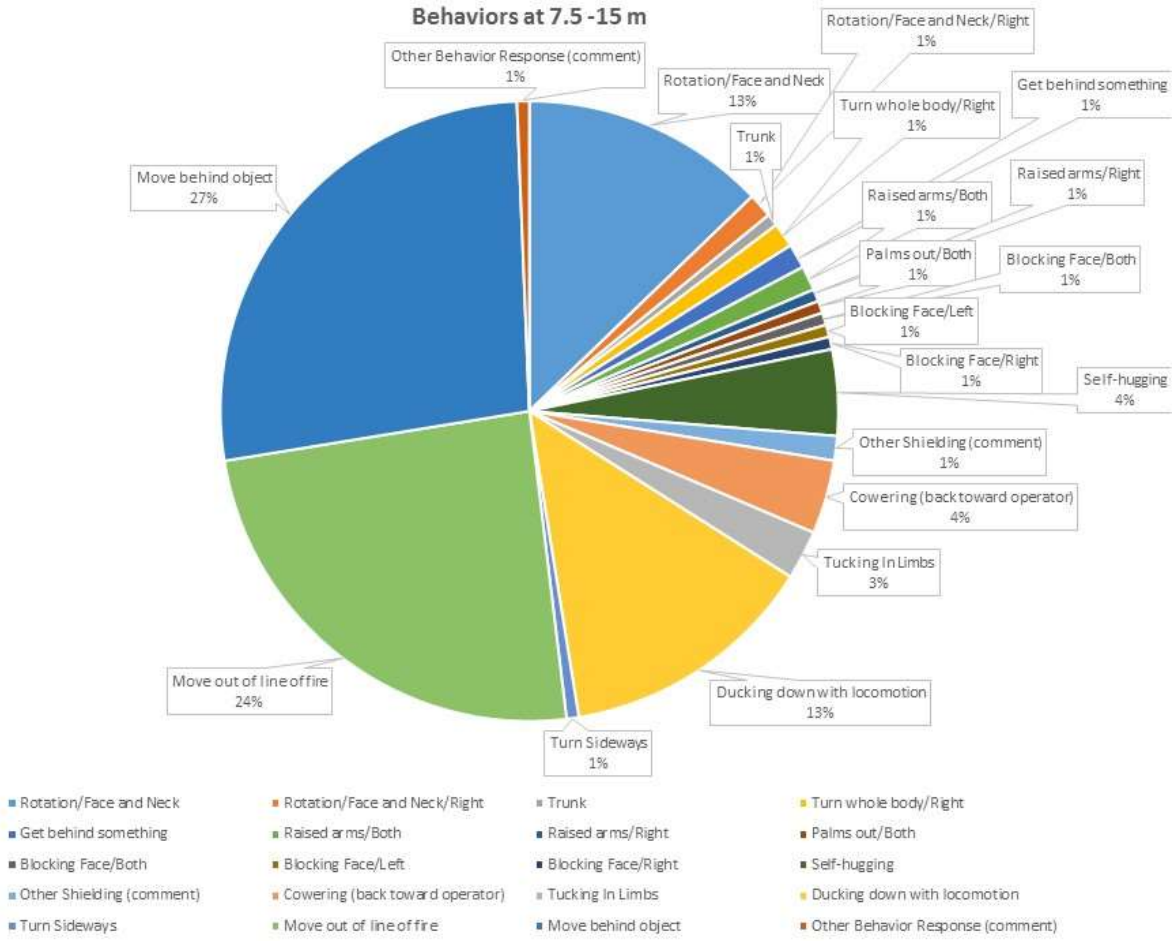

Figure 21
Behaviors and postures at 7.5 to 15 m from marker

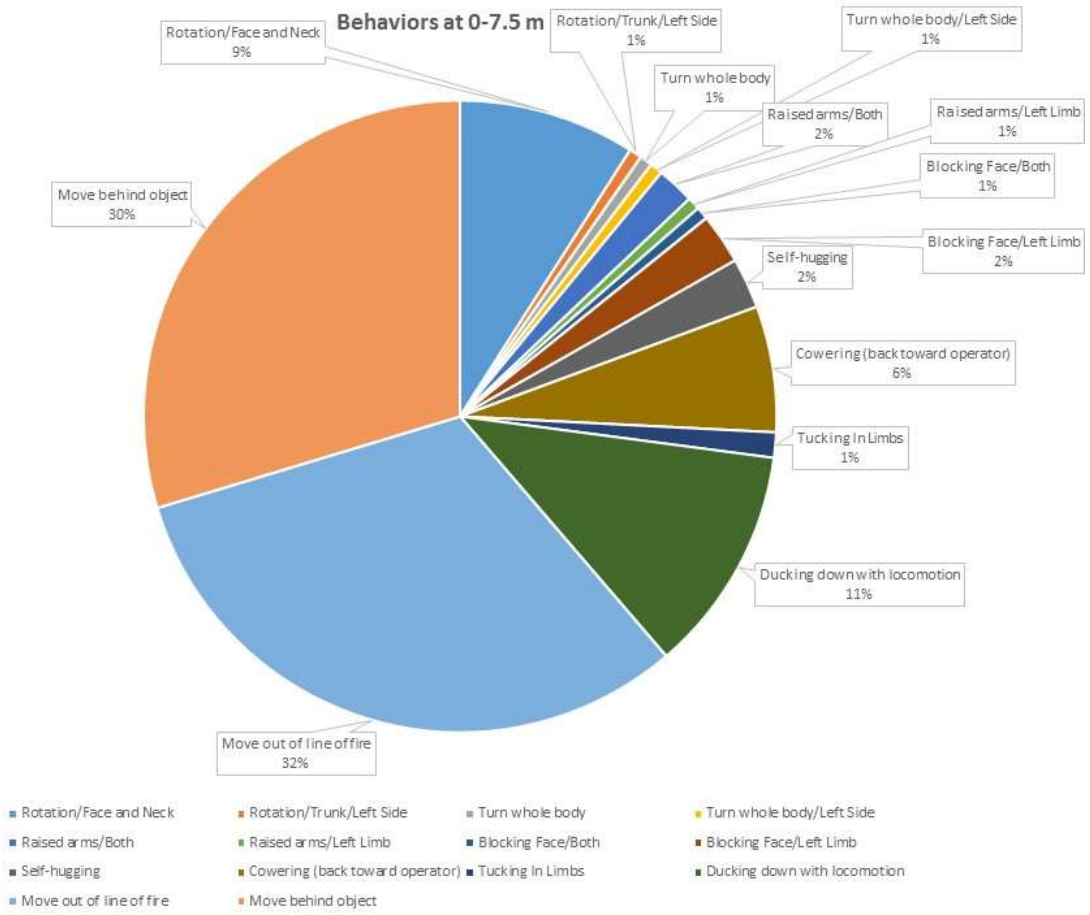

Figure 22
Behaviors and postures at 0 to 7.5 m from marker

Impact Locations at Each Distance

Figures 23 through 26 present the impact locations and their percentages of times reported (no. of time location recorded/no. of total no. of times all locations reported) at each of the distances across all subjects and trials.

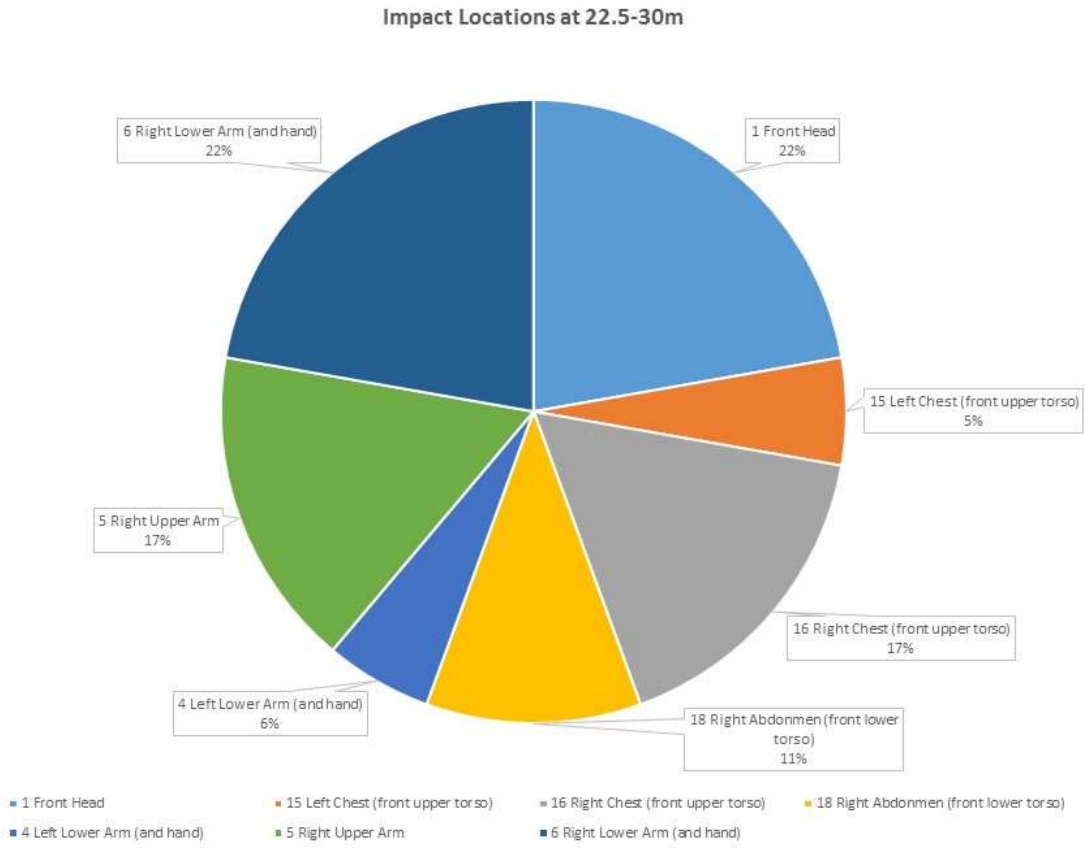

Figure 23
Impact locations at 22.5 to 30 m from marker

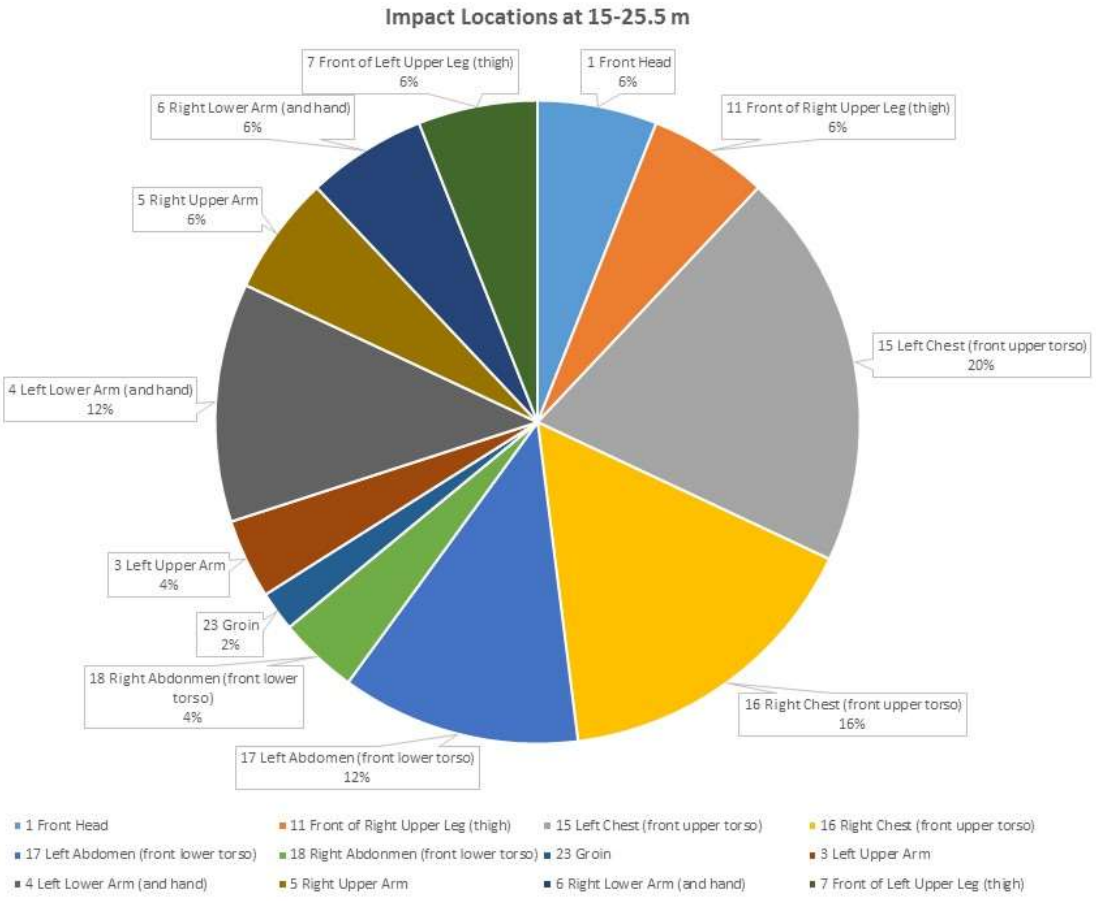

Figure 24
Impact locations at 15 to 25.5 m from marker

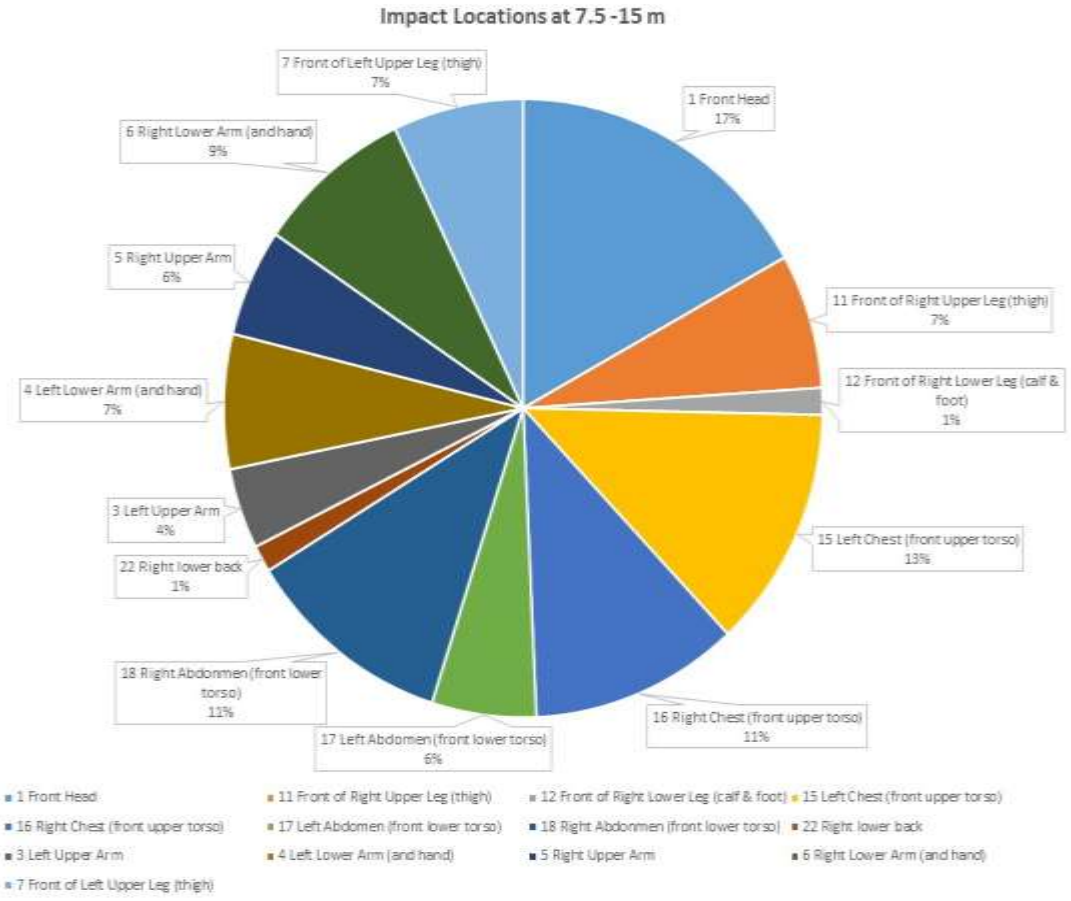

Figure 25
Impact locations at 7.5 to 15 m from marker

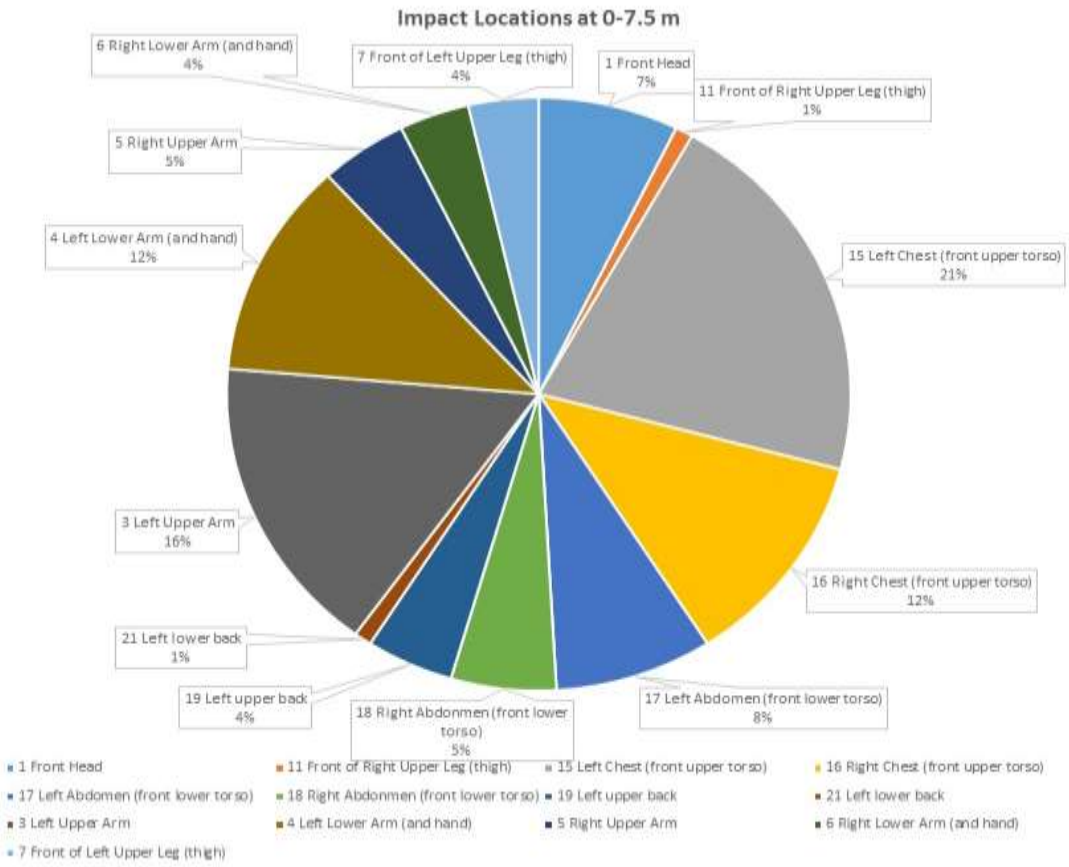

Figure 26
Impact locations at 0 to 7.5 m from marker

Possible Variations in Behaviors and Postures at Different Distances of Engagement

To investigate the possibility of difference in behaviors and postures depending on distance from the marker, total numbers of observed instances of each of the six most frequent behaviors were graphed at each of the four distance bins (fig. 27). Inspection of the graph reveals consistency and similarity across all the distances.

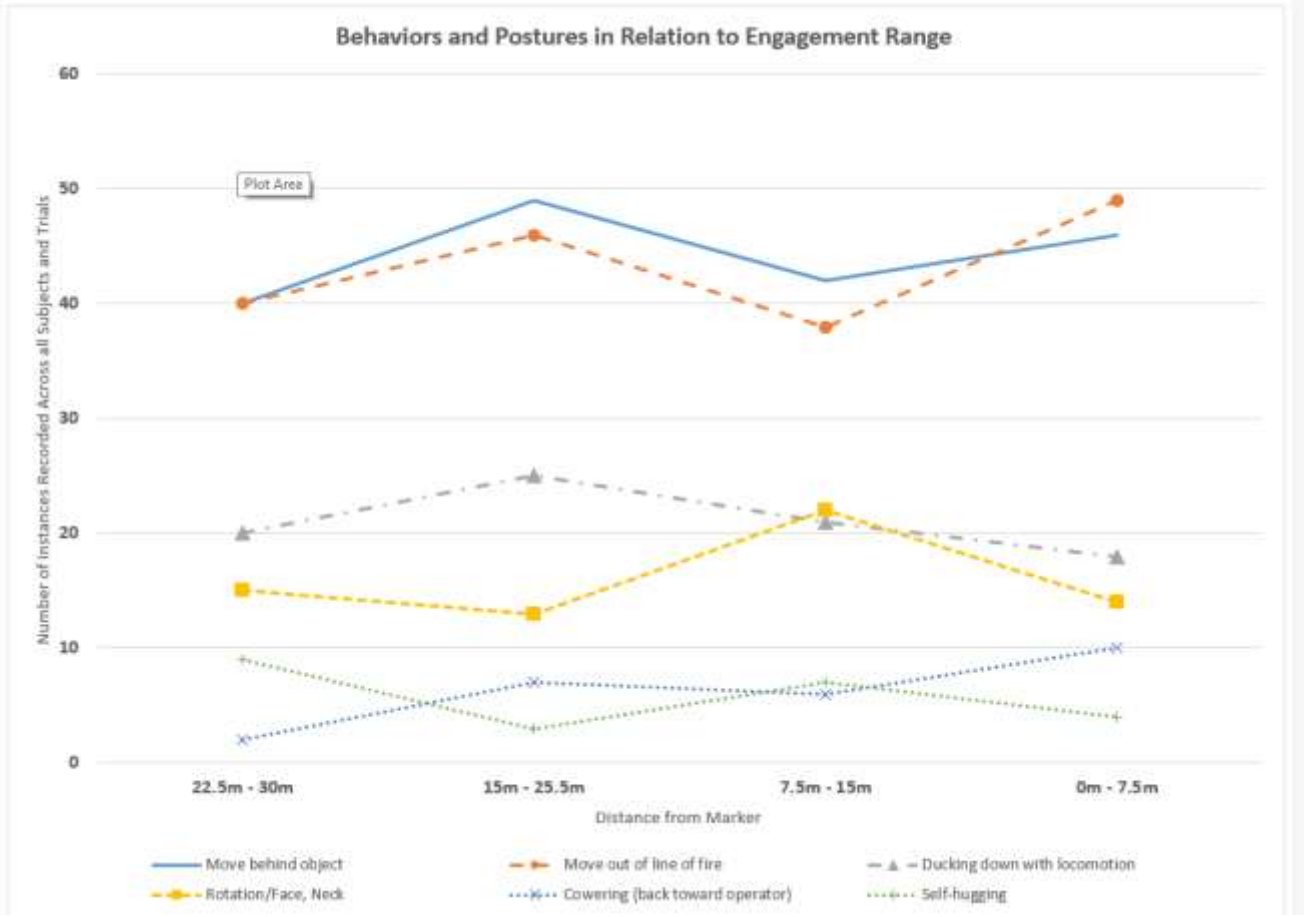

Figure 27
Consistency of behaviors and postures at different distances from the marker

Impact Locations during Each Posture or Behavior

With the exception of those listed at the end of this paragraph, figures 28 through 36 present the impact locations and their percentages of times reported (no. of time location recorded/no. of total no. of times all locations reported) at each of the primary behaviors and postures across all subjects and trials. No hits were recorded during the times these behaviors or postures were performed: (1) Whole body was turned, (2) Other rotation, (3) Get behind something, (4) Other shielding, and (5) Other path deviations.

A few of the postures and behaviors that had too few hits to present in a graph are shown in the following bullets:

- When the trunk was rotated, area 4 left lower arm was hit once.
- When palms are out, 16 right chest (front upper torso) and 5 right upper arm were hit once each.
- When turned sideways, 15 left chest was hit once.

A difficulty with this analysis is that behaviors and postures typically did not occur in isolation, as there appear to be clusters of behaviors and postures that were observed together (figs. 28 to 36).

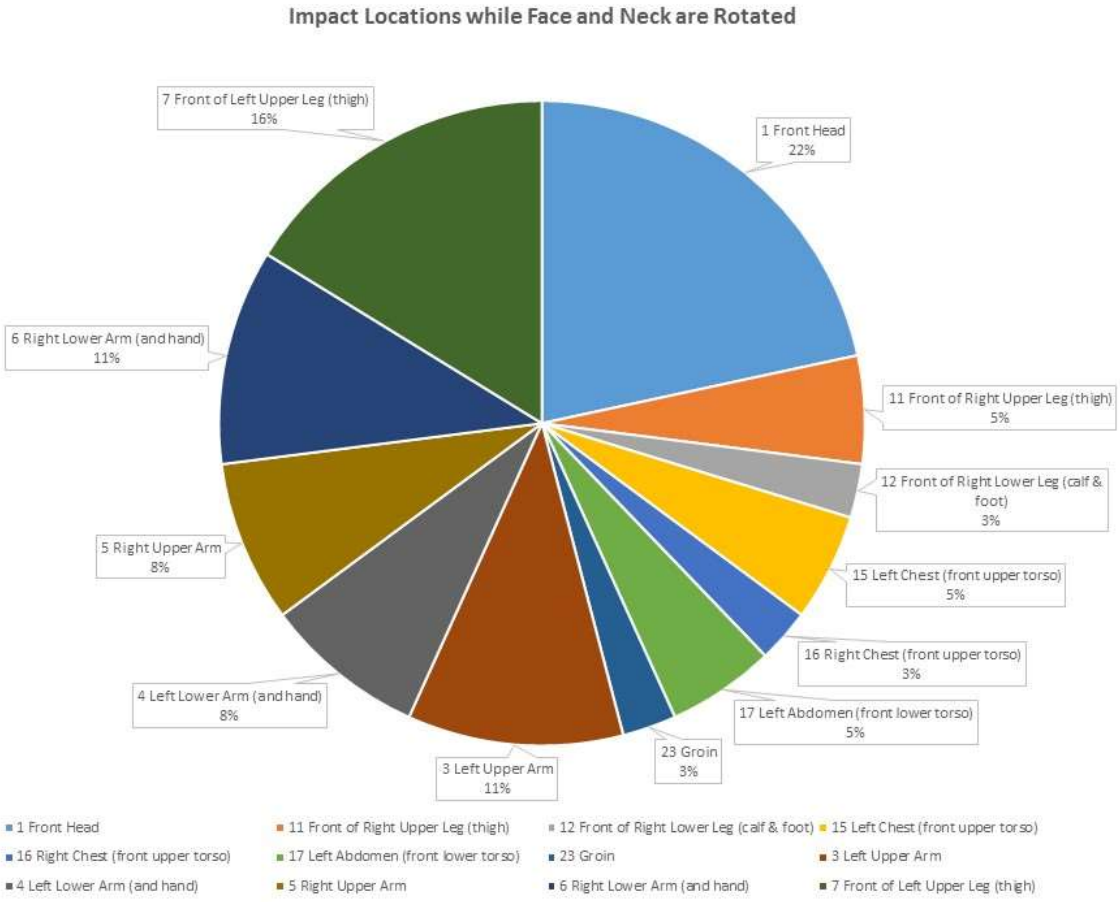

Figure 28
Impact locations while face and neck are rotated

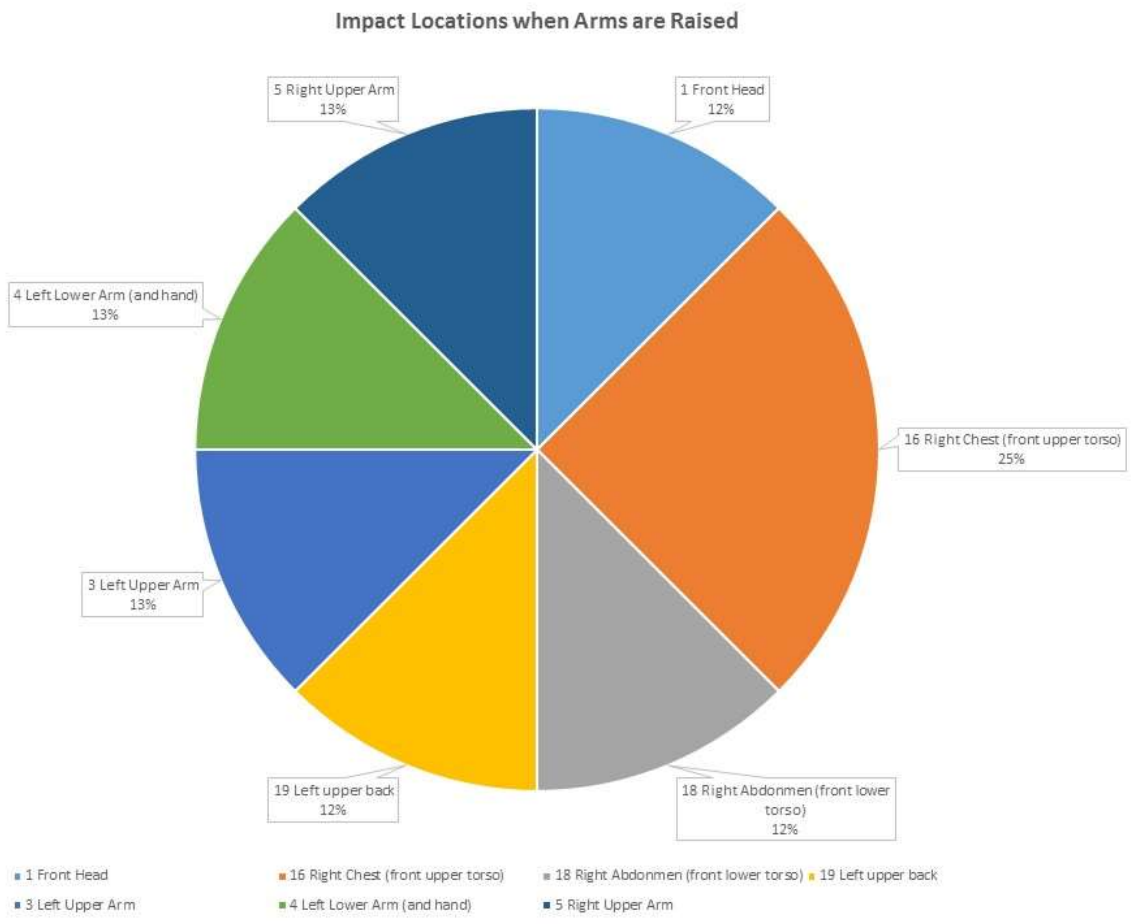

Figure 29
Impact locations when arms are raised

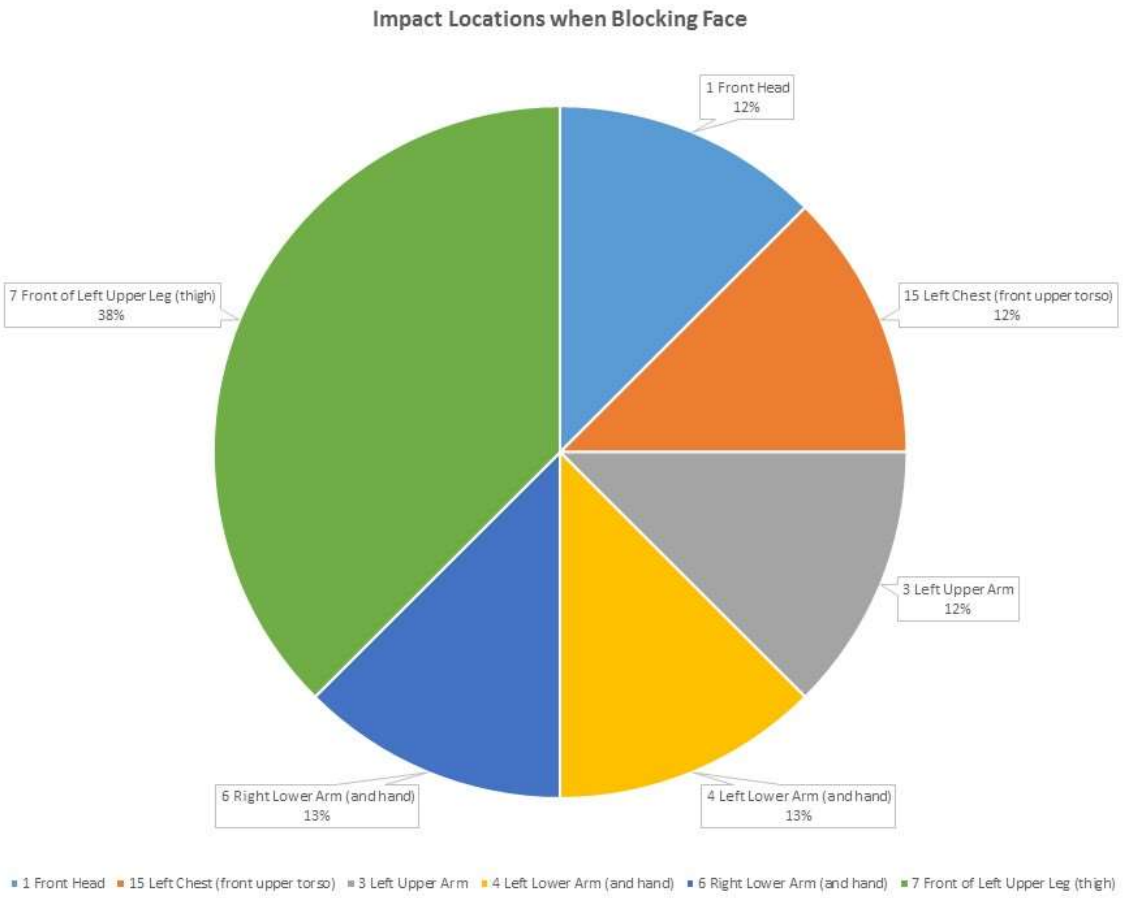

Figure 30
Impact locations when blocking face

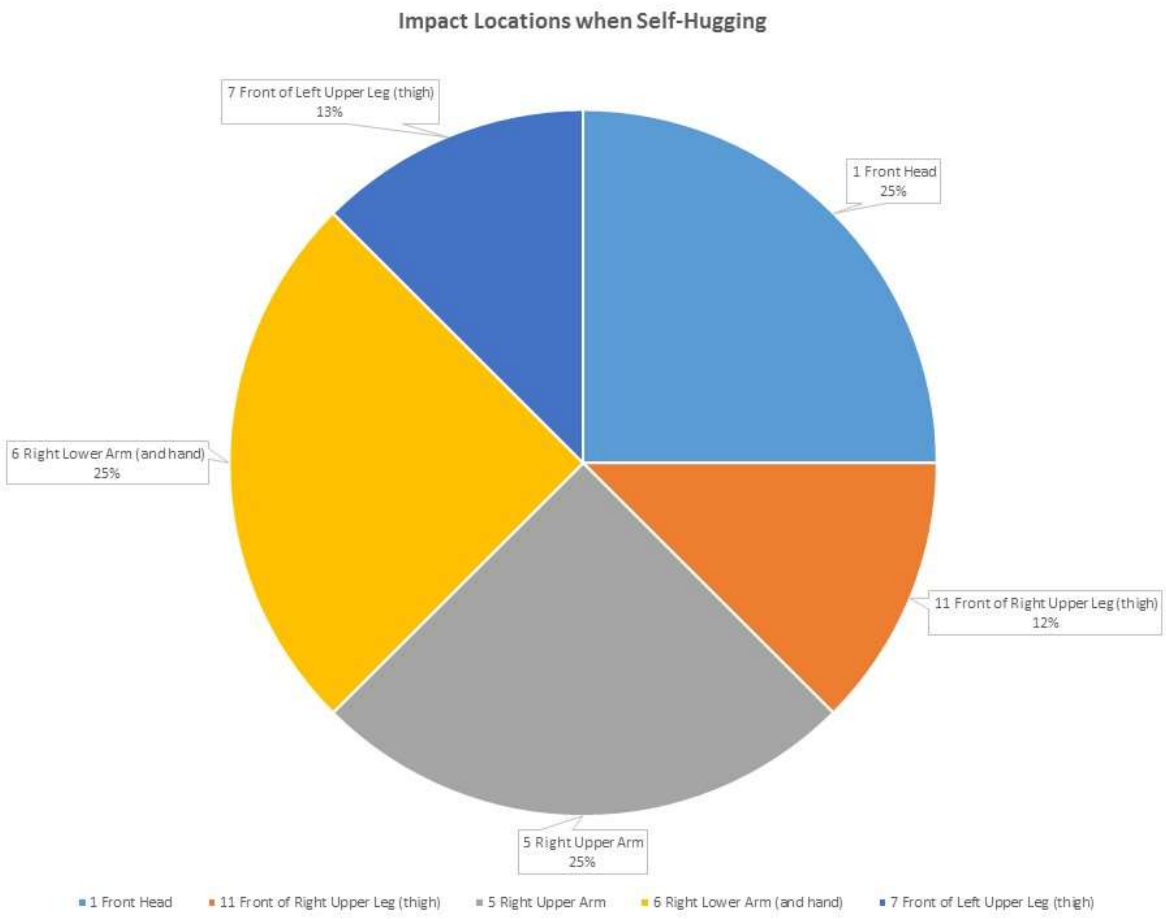

Figure 31
Impact locations when self-hugging

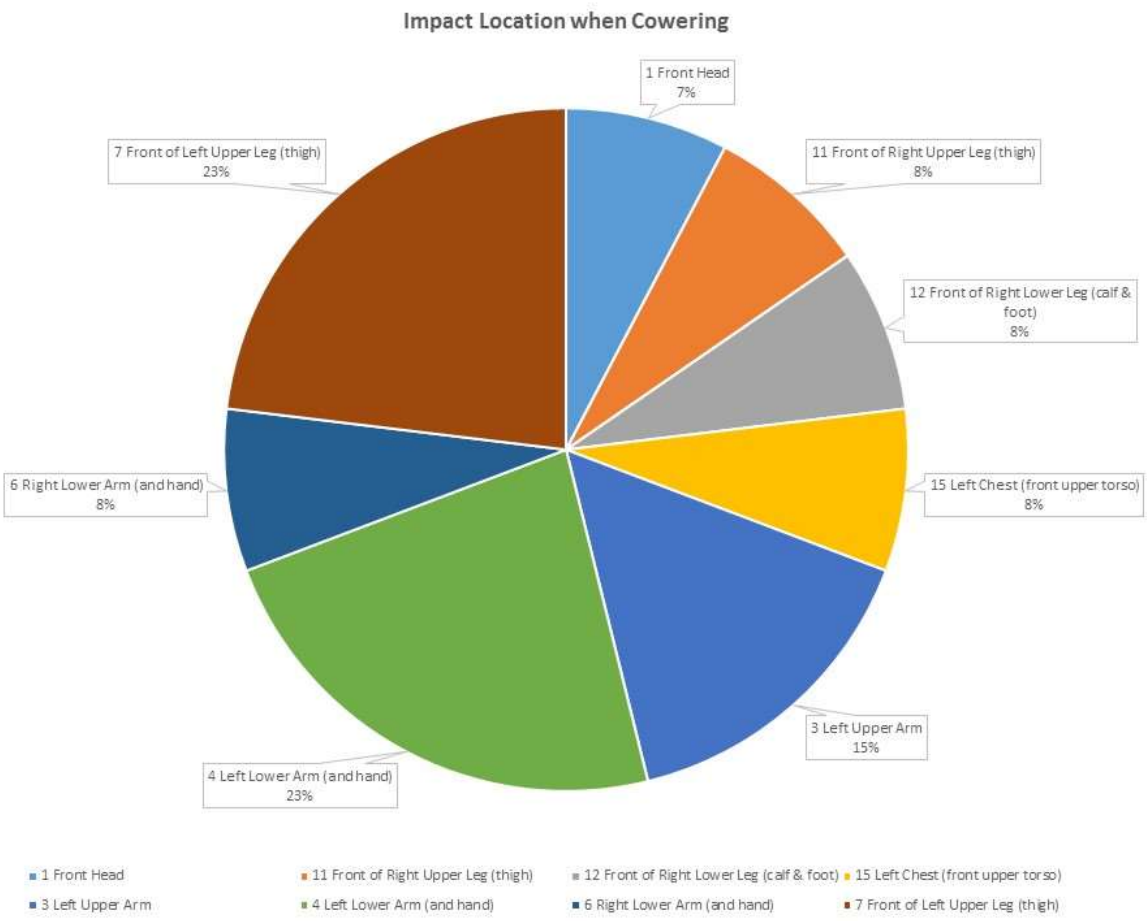

Figure 32
Impact locations when cowering

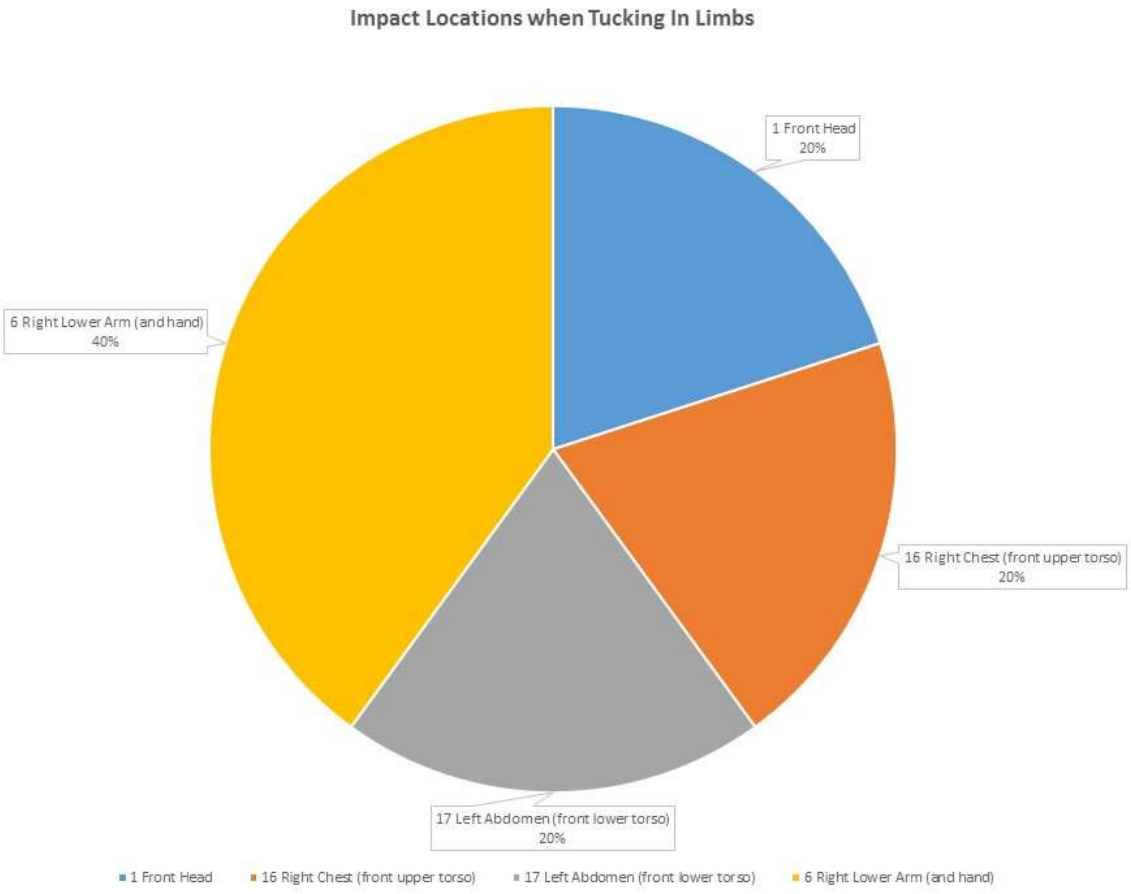

Figure 33
Impact locations when tucking in limbs

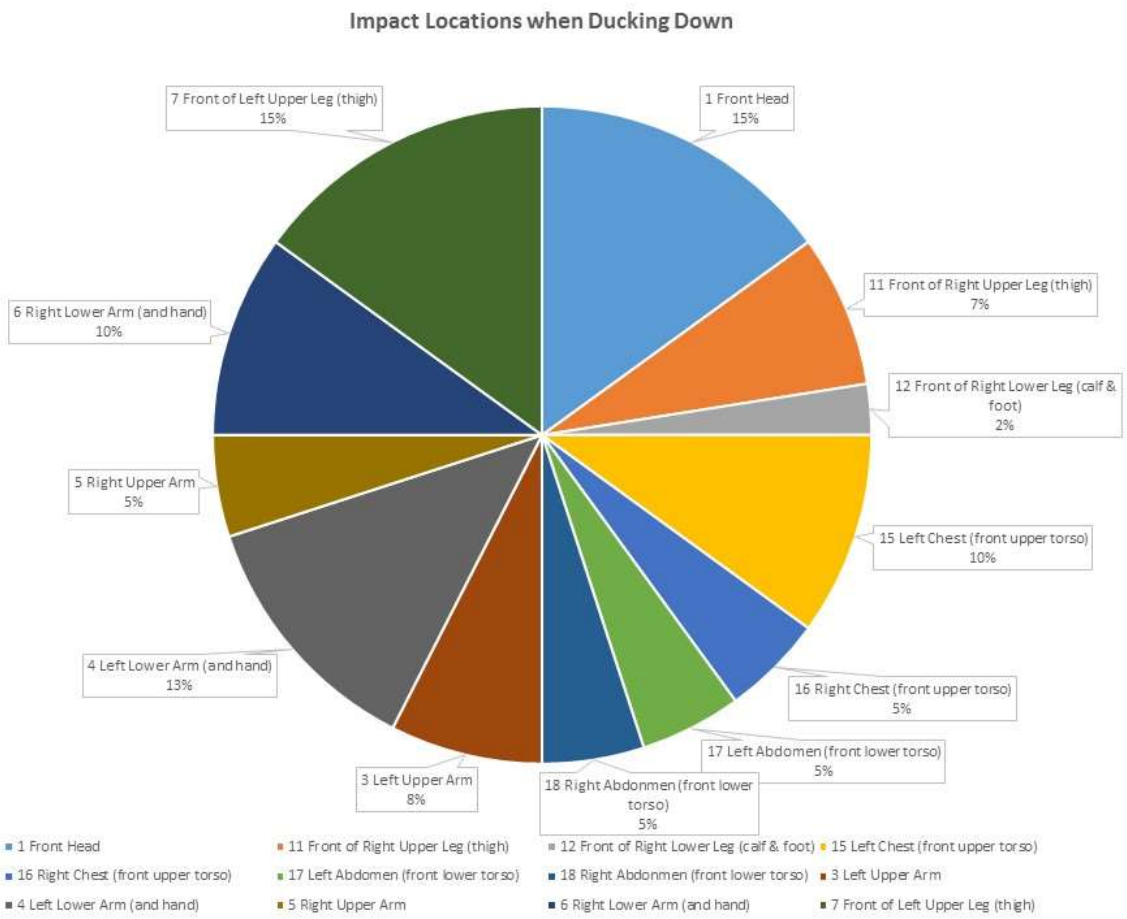

Figure 34
Impact locations when ducking down

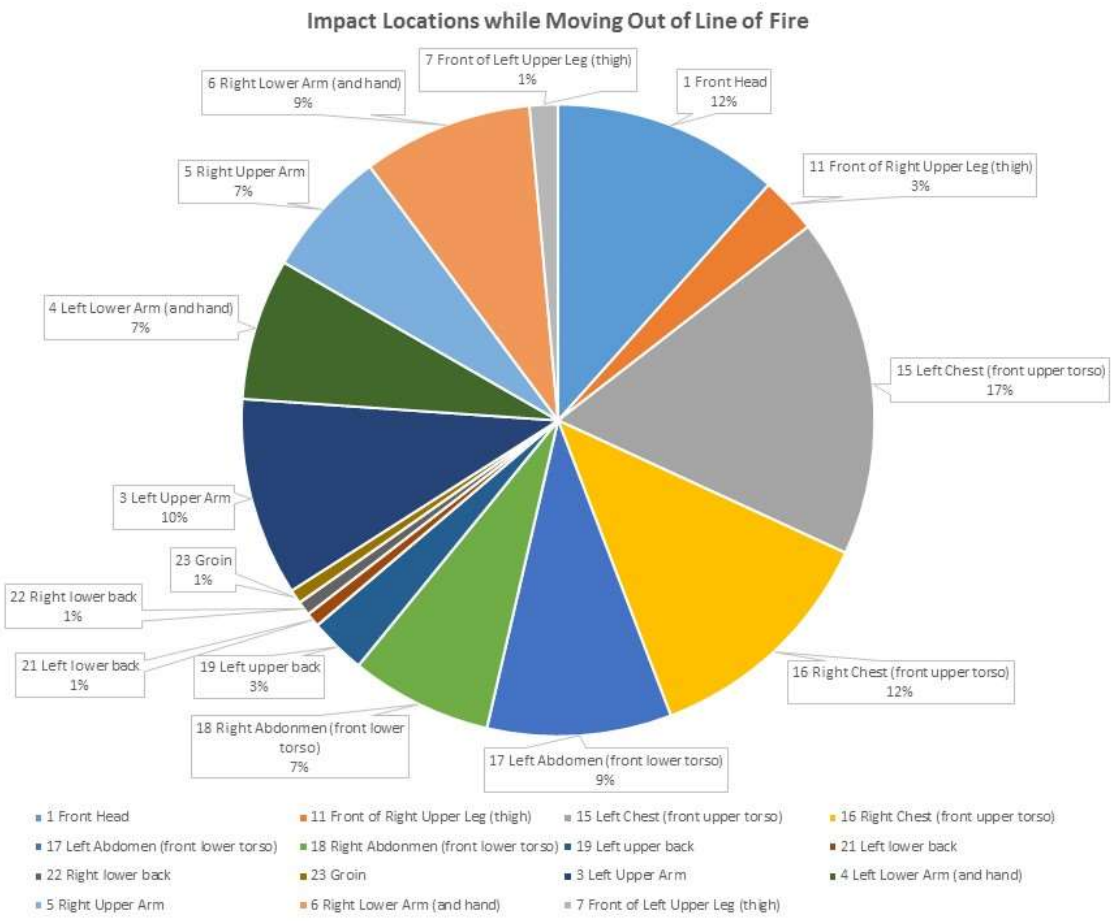

Figure 35
Impact locations when moving out of line of fire

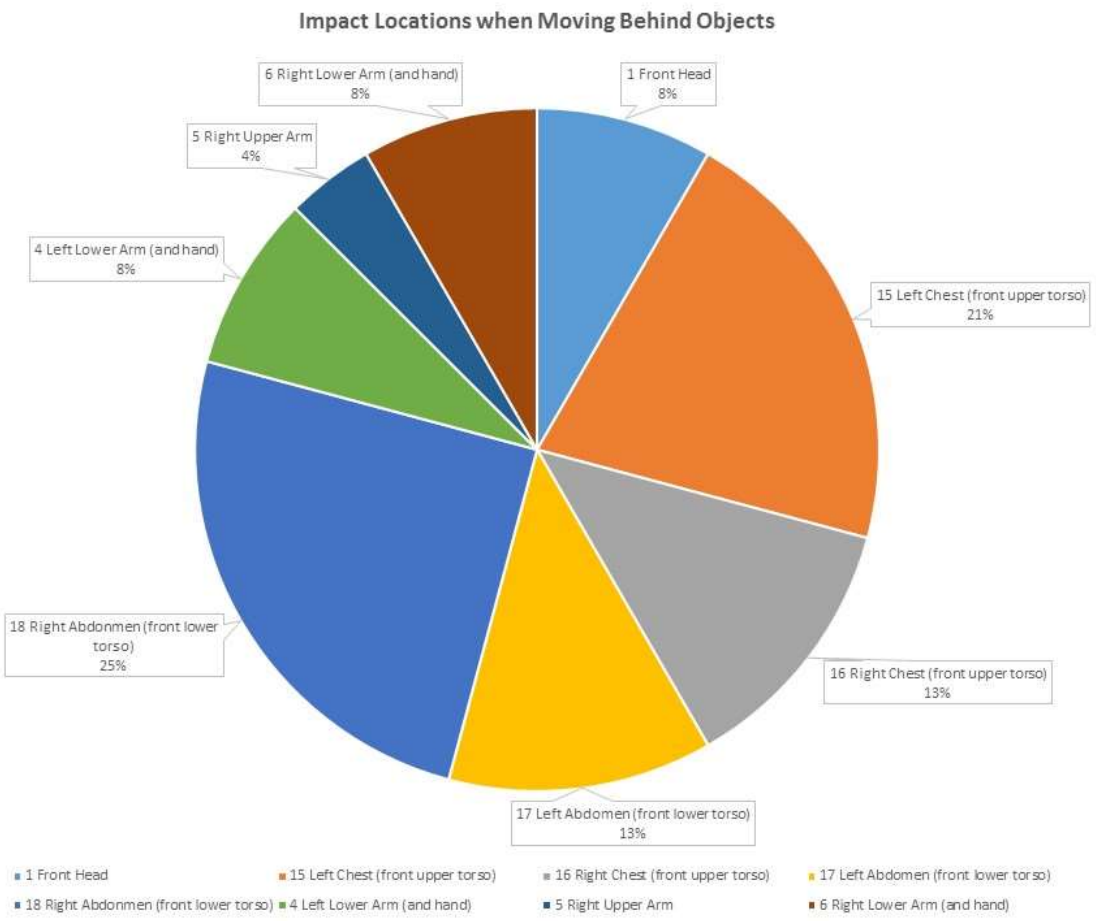

Figure 36
Impact locations when moving behind objects

Individual Differences in Behaviors and Postures

The following matrix (table 3) lists the behaviors and postures and their durations that were recorded for each of the subjects (note that Subject k lacked video data). Note that some subjects terminated participation early (i.e., Subjects g, k, m, r, s, t, and u). The matrix presents varied individual differences in response to the threat of blunt impact; some subjects showed little response while others exhibited a dozen different behavior and postural responses.

Table 3
Matrix behaviors and postures and durations

Subnum	Rotation of Face and Neck	Rotation of Trunk	Turn Whole Body	Other Rotation	Get Behind Something	Raised Arms	Palms Out	Blocking Face	Self-Hugging	Other Schielding	Cowering	Tuck in Limbs	Ducking Down	Turning Sideways	Move Out of Line of Fire	Move Behind Object	Other Path Deviation	# Behaviors Engaged in
a	2.14							1.47		0.23	0.33	0.17	4.76		40.65	24.15		8
b	1.54					0.80		0.61	0.40		0.37		2.27		18.22	11.46		8
c						0.77									4.11			2
d	9.11	1.42	0.27			3.60	1.87	7.90	1.07		4.00	0.80	10.78		18.76	14.37		12
e	0.40					3.57						0.33	0.57	1.87	8.79	8.23		7
f	11.23		0.37						0.23		1.62	1.51	20.18		30.01	12.97	0.83	9
g																		0
h													8.17		8.52	9.74		3
i	0.24												0.33		28.18	16.15		4
j	6.50		1.64		5.00	0.33			4.80	0.23	1.43	0.80	7.37		37.76	10.13		11
l	6.18	1.19				3.29							9.48		13.33	5.64		6
m			0.70						0.57		4.00		10.60	0.73	30.08	18.92		7
n		0.40								0.33					26.90	13.89		4
o									0.70			0.90	0.67		4.02	6.98		5
p	8.10								8.29						30.75	8.04		4
q		0.17	0.27						0.33		1.03	1.33	6.73		35.94	21.19		8
r				0.98											7.50	8.59		3
s	1.07					0.10		0.43			0.70		2.03		19.29	8.52		7
t															15.60	9.87		2
u	4.41												4.30		19.97	16.49		4
# Sub Who Engaged in Behavior/Posture	11	4	5	1	1	7	1	4	8	3	8	7	14	2	19	18	1	

DISCUSSION

Although this work is a descriptive study, a few observations can be made. The first is that it is possible to apply methods of behavioral coding of responses to non-lethal weapon's fire. In addition, the results revealed a fairly large variety of postures and behavior exhibited even under this highly controlled laboratory condition. The majority of the hits were to the aim point (chest). However, a surprising number of impacts were to the front of the head, possibly because "ducking down" was a frequent posture adopted in anticipation of blunt impact. Arms also suffered a majority of the impacts, possibly due to attempts to protect the chest and face area. The most frequent behaviors were to move out of the line of fire and to get behind objects, indicating a strategy that is adopted to protect the most body surface area. Moreover, there was consistency in the behaviors and postures adopted, regardless of distance to marker.

CONCLUSIONS

The analyses presented were well within the scope of the original intended experiment; however, because they are “data of convenience,” they are somewhat limited for the topic at hand. Limitations include the relative orientations and distances between the subject and the marker, a subject population which was limited to men, and a single type of engagement. To more fully understand and model the risk of significant injury from blunt impact, a wider range of subject population and scenario is needed. In addition, more sophisticated measures, such as motion capture, would enhance data capture by providing very precise measures of the body and limb positioning and impact locations. Further research is necessary to more fully explore what behaviors and postures are performed in response to the threat of blunt impact. These data are necessary for developing high-fidelity models that can predict risk of significant injury in targets of blunt impact weapons.

REFERENCES

1. Short, K. R, Reid, G., DeMarco, R., Cooke, G., Galonski-Skrocki, L., Hedderich-Nichols, E., Riedener, J., Minor, T. R., and Sheridan, C., “Blunt Impact as a Deterrent Under Nominally Low Approach Motivation Conditions,” Technical Report AREIS-CR-17006, DTIC Accession Number AD1051711, U.S. Army ARDEC, Picatinny Arsenal, NJ, May 2018.

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