

**Braking Reaction-Time Wearing
The Lumbar-Jack[®] Back Support System**

Research Study by:
Richard L. Patten, Ph.D., CHFP, Minneapolis, MN
November 15, 1993

Braking Reaction-Time Wearing The Lumbar-Jack® Back Support System

Research Study by Richard L. Patten, Ph. D., CHFP, Minneapolis, MN

The present study was conducted to determine if wearing the Lumbar-Jack® back support interfered with driver's speed of braking.

The Lumbar-Jack® (LJ) is a modification of the original Nada-Chair® back support with straps that loop around the knees and shoe instep of the driver.

Method

The subjects tested the LJ System in a simulated driving situation which consisted of a parked Plymouth Voyager van with a color TV monitor mounted on the hood in front of the driver's windshield.

After the driver's seat was adjusted for personal preference, the "driver" observed a video of metropolitan streets taken through the front window of a moving auto. The driver was instructed to place his/her foot on the gas pedal to start a trial and to actuate the brake whenever a small red/green stoplight, located alongside the monitor, changed from red to green. The van had an automatic transmission which eliminated the need to operate a clutch.

The stoplight changed to red according to a preset sequence of time intervals, which was the same for each subject.

Each subject received ten reaction-time trials (five with the LJ on and five with the LJ off, or vice versa), according to the following sequence of time intervals (sec.): 34, 41, 9, 60, 12, 27, 14, 15, 54, 11.

Subjects and Groups

The subjects were selected by asking people walking to the Minnesota State Fair entrance if they were interested in participating in a comfort test for a new back support for driving. Those who took part were given a free pass to the fair (worth about \$4.00).

Subject selection was non-systematic, by order of appearance, observing the following criteria: Subjects should represent a wide range of ages and the age and gender make-up of the two groups should be approximately equal.

The twenty-one male and twenty-two female subjects selected ranged in age from 18 to 71 and were assigned to one of two sub-groups whose trials were ordered as follows:

- a. Five trials wearing the LJ followed by five trials without.
- b. Five trials without followed by five trials wearing the LJ.

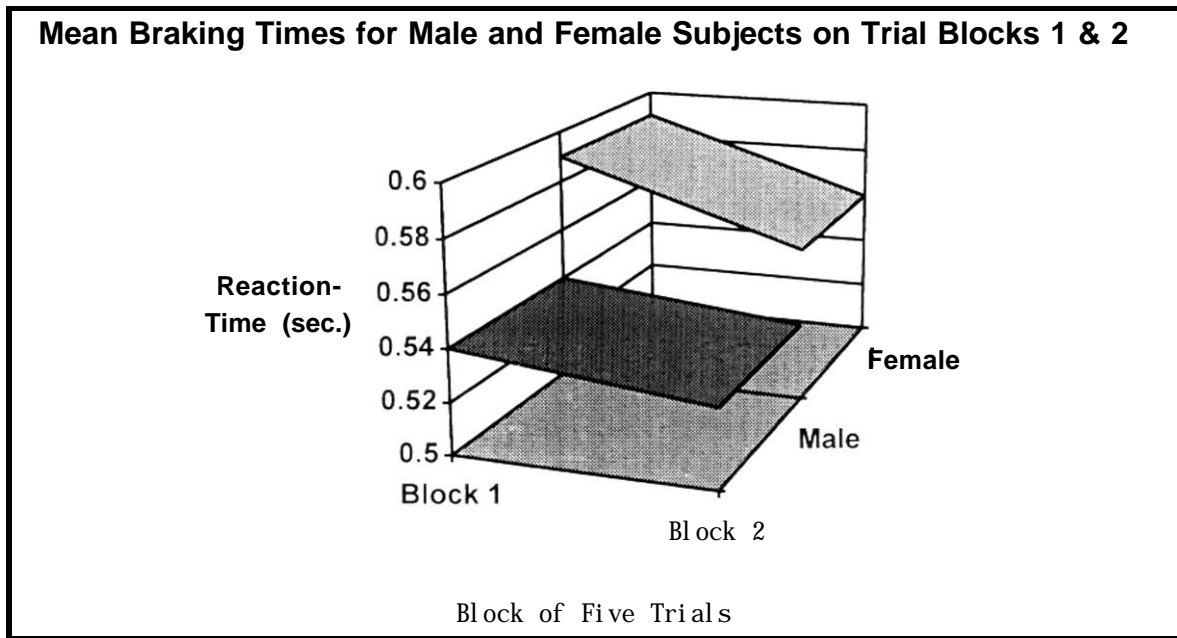
Results

The reaction-times were subjected to analysis of variance. Log transforms of the latency scores produced a pattern of results that were the same as the Latency results. There was no general reaction-time effect of wearing the LJ ($F_{1,39} = .003$). Mean braking time for subjects wearing the LJ was .55 sec. Mean time for subjects not wearing the LJ was .56 sec.

Two second-order interactions were significant:

1. Braking times were faster on the second than on the first block of five trials, regardless of whether or not the LJ was worn ($F_{1,39} = 11.9$, $p < .01$).
2. Females were slower than males on the first block of trials and showed more improvement from the first to the second block of the five trials than was the case with the males ($F_{1,39} = 12.7$, $p < .01$).

Both of these effects can be seen below:



Discussion

The results do not indicate that wearing the LJ adversely affected a driver's reaction-time. There was a learning effect from the first to the second block of trials. Also, females were a bit slower than males, especially during the first few trials. These are plausible effects and do not appear to qualify the important finding that the LJ did not slow braking times under conditions of the present study.

There is one aspect of the LJ system that remains to be examined: In the present study, subjects were instructed in correct wearing of the LJ support. The experimenter showed them how to put it on and made sure it was correctly positioned on the shoes. It remains to be determined whether or not most users will use instructions on the LJ packaging and put the LJ on correctly themselves.

TEST DATA

Each block indicates the average of five time trials with each individual. Shaded areas indicate the trials that were done with the Lumbar-Jack. All times are in seconds.

FEMALES		MALES	
BLOCK 1	BLOCK 2	BLOCK 1	BLOCK 2
.70	.55	.54	.52
.54	.49	.54	.55
.54	.52	.46	.53
.57	.51	.79	.87
.54	.47	.75	.74
.57	.49	.41	.47
.65	.64	.49	.47
.53	.51	.47	.46
.82	.60	.47	.46
.51	.53	.39	.49
.70	.65	.66	.65
.69	.61	.52	.53
.64	.72	.61	.52
.58	.54	.73	.61
.61	.52	.57	.47
.54	.55	.52	.46
.53	.50	.46	.46
.51	.50	.64	.63
.51	.67	.43	.40
.51	.54	.47	.43
.53	.49	.47	.38
.70	.64		
Ave. = .59	Ave. = .56	Ave. = .54	Ave. = .53