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Core Fatigue and Low Back Pain

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Abstract

The objective of this study was to determine the relationship between core fatigue and low back pain. Nine college students with low back pain (M=2, F=7, ages 18-25) participated in the study by completing 4 different core exercises. Participants completed prone bridge test, left side plank, right-side plank and finally the Sorensen test exercises for as long as possible without form compensation or unbearable pain. After completion of each exercise, participants ranked their low back pain using the Visual Analog Scale (VAS). Mean age, height, and weight were recorded, and low back disability of the participants were assessed. The correlation between the pain rating and hold time per exercise was calculated. The correlation between VAS rating and right-side plank hold time had the greatest positive correlation at 0.094. The correlation between VAS rating and plank hold time had a negative correlation at -0.593. The researcher found no correlation between a greater VAS pain rating and a shorter hold time. The null hypothesis is accepted; no significant correlation was found at $R = +/- 1$. Further research should be conducted with a larger sample size.

Introduction

Low back pain is the most common cause of job-related disabilities and a contributor to missed workdays.¹ Low back pain is also considered to be one of the most common reasons that competitive athletes miss playing time.² The lower back consists of five vertebrae that support much of the weight from the upper body.³ In between the space of the vertebrae are intervertebral discs that absorb the force as the body moves to protect the bones. If too much pressure is exerted on these discs it could cause pain in the lower back.¹ Core stability has been shown to increase efficiency in body mechanics, which allows for minimal impact on the joints.² A lack of trunk control has been found to be a contributing factor to nonspecific low back pain.² The prone bridging test has been theorized to be a functional test for core muscle endurance.⁴ Exercises that do not require twisting, flexion or extension of the spine are considered to be valid exercises in strengthening the core musculature.⁴ Evaluation of the relationship between low back pain and lack of core musculature may be helpful in rehabilitation program decision making for people with LBP.



Figure 1
Left side plank



Figure 2
Right side plank

Figure 3
Prone bridge test



Figure 4
Sorensen Test



Methods

Setting

- Small DI Midwestern University laboratory
- Spring 2020

Participants

- 9 students of the university with low back pain (M=2 F=7).

Procedures

- Low back pain questionnaire completed by participant
- Five-minute dynamic warm-up on treadmill.
- Prone bridge, left side plank, right side plank and Sorensen test were performed until failure and video recorded.
- Hold time for each exercise was recorded.
- Low back pain during exercises was rated using Visual Analog Scale.
- Data was uploaded onto the computer.
- Pearson correlation coefficient used to analyze data.

Results

Table 1

Results of participants' hold time and pain rating

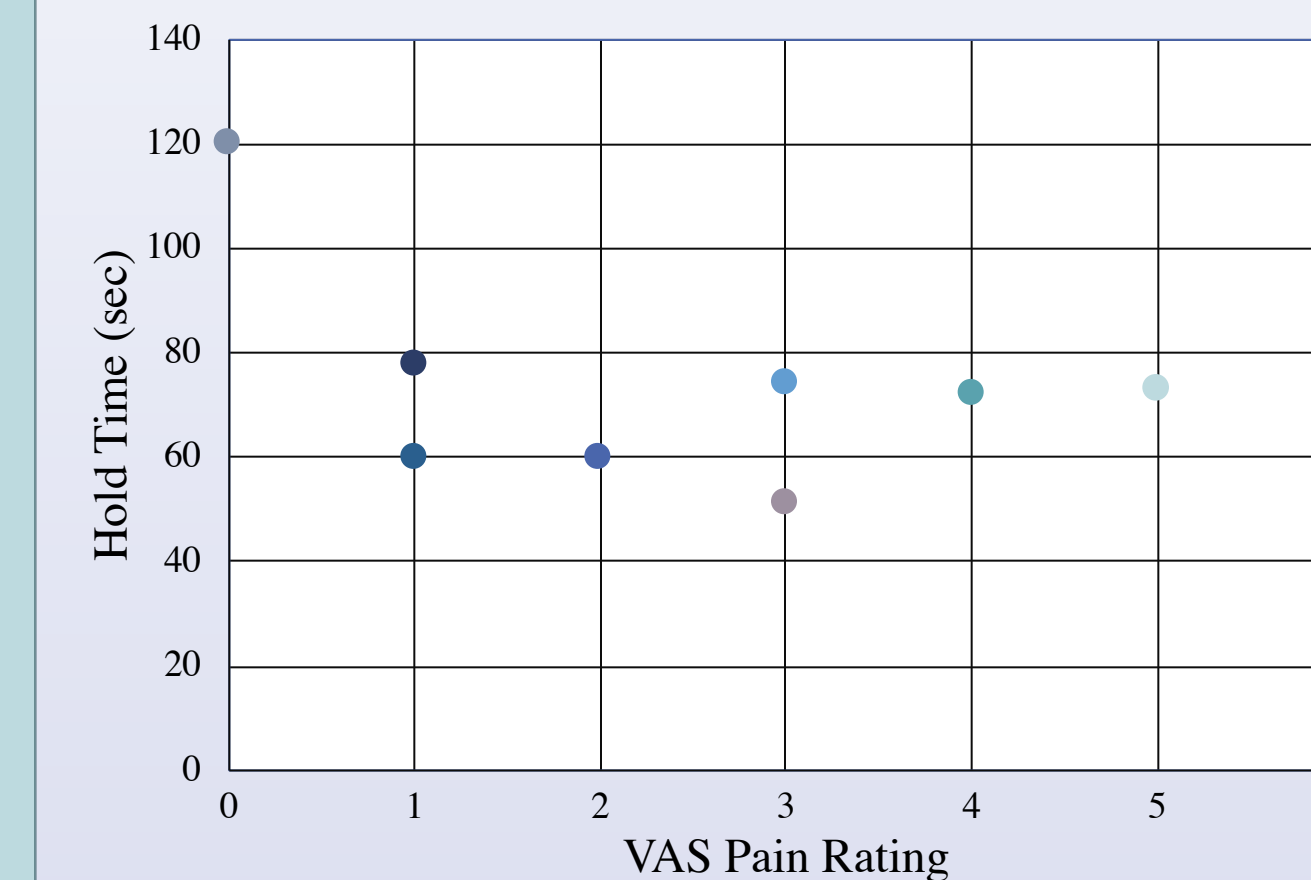
Participant	Plank		Left Side Plank		Right Side Plank		Sorensen Test	
	VAS	Time (s)	VAS	Time (s)	VAS	Time (s)	VAS	Time (s)
1	2	60.04	3	57.99	3	43.42	4	42.92
2	3	74.00	2	54.95	2	39.88	4	60.07
3	0	120.00	2	45.96	2	51.92	2	60.07
4	0	120.00	4	40.31	5	42.48	7	60.05
5	4	72.00	3	49.94	3	60.07	6	59.08
6	3	51.03	4	29.49	4	29.81	4	60.46
7	1	78.00	2	31.00	2	60.01	4	23.00
8	1	60.03	1	31.63	2	20.40	2	60.05
9	5	73.00	5	41.05	5	57.88	5	52.07
Mean	2.11	78.68	2.89	42.48	3.11	45.10	4.22	53.09

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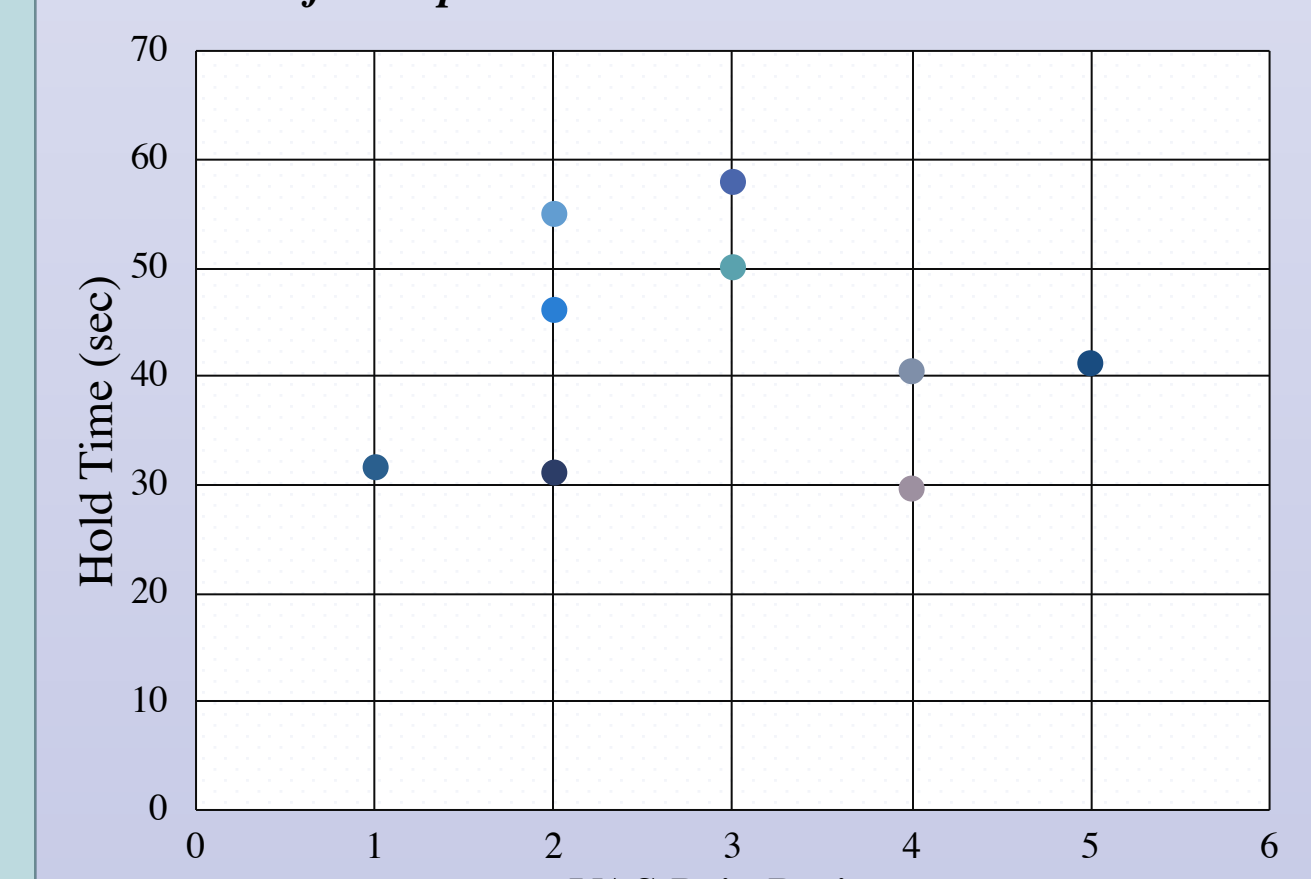
Results cont.

Figure 5
Correlation between VAS rating and hold time during plank test



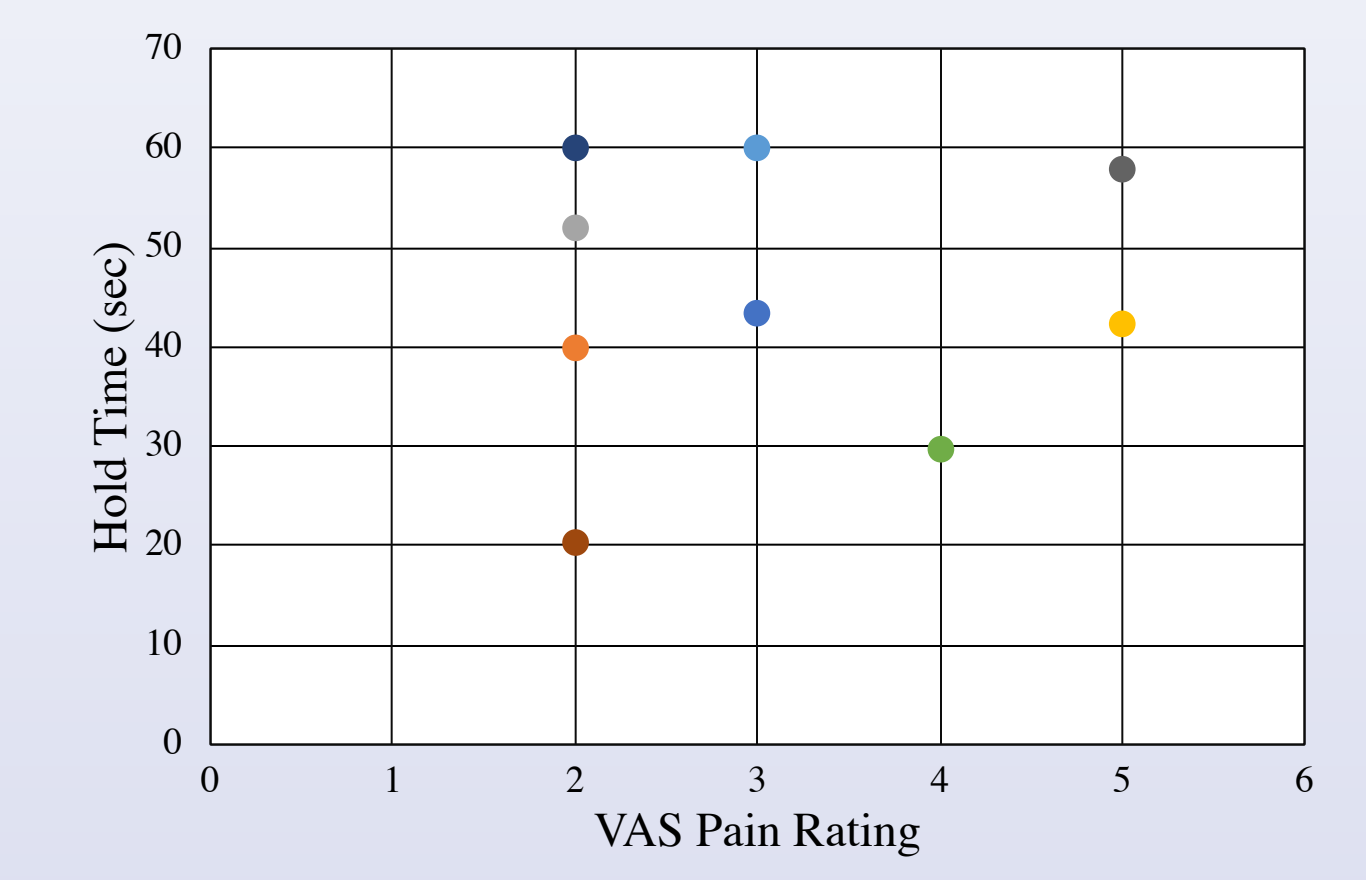
Legend for Figure 5:
 Participant 1 (blue), Participant 2 (orange), Participant 3 (grey)
 Participant 4 (yellow), Participant 5 (light blue), Participant 6 (light grey)
 Participant 7 (dark blue), Participant 8 (red), Participant 9 (dark grey)

Figure 7
Correlation between VAS rating and hold time during the left side plank test



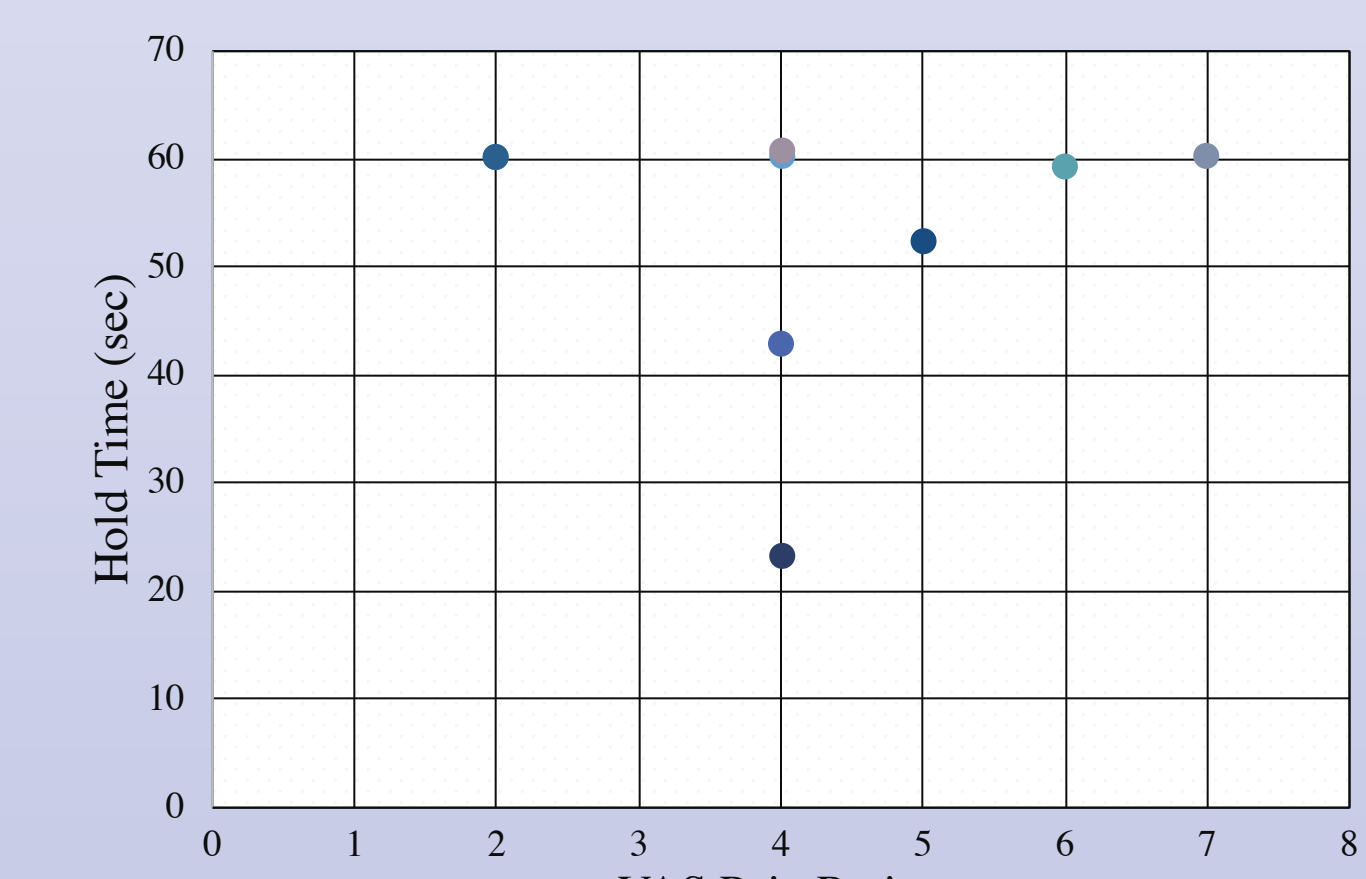
Legend for Figure 7:
 Participant 1 (blue), Participant 2 (orange), Participant 3 (grey)
 Participant 4 (yellow), Participant 5 (light blue), Participant 6 (light grey)
 Participant 7 (dark blue), Participant 8 (red), Participant 9 (dark grey)

Figure 6.
Correlation between VAS rating and hold time) during the right-side plank test



Legend for Figure 6:
 Participant 1 (blue), Participant 2 (orange), Participant 3 (grey)
 Participant 4 (yellow), Participant 5 (light blue), Participant 6 (light grey)
 Participant 7 (dark blue), Participant 8 (red), Participant 9 (dark grey)

Figure 8
Correlation between VAS rating and hold time during the Sorensen Test



Legend for Figure 8:
 Participant 1 (blue), Participant 2 (orange), Participant 3 (grey)
 Participant 4 (yellow), Participant 5 (light blue), Participant 6 (light grey)
 Participant 7 (dark blue), Participant 8 (red), Participant 9 (dark grey)

Table 2

Correlation coefficient of hold time and pain rating

	Prone Bridge	Left Side Plank	Right Side Plank	Sorensen Test
R	0.177	-0.007	-0.094	0.024
n	7*	9	9	9

*Participants 3 and 4 were removed as outliers

No significant correlation was found between a greater low back pain rating and an increased rate of core fatigue.

Conclusions

No significant relationship was found between a greater low back pain rating during an exercise and an increased rate of fatigue in core musculature. However, participants who rated zero pain during the prone bridge test had the smallest rate of fatigue during the prone bridge test. Researcher concluded that participants with low back pain did not show a faster rate of core fatigue. Future research should be conducted with a larger sample size and a less subjective tool to rate participants' low back pain.

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