Relationships Between Physical Activity, Pain, Fatigue, Mood, and Functional Disability in Adolescents with Juvenile Fibromyalgia

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Introduction

- Juvenile Fibromyalgia (JFM) is a chronic musculoskeletal pain condition in adolescents. JFM is frequently associated with symptoms such as: sleep disturbances, IBS, fatigue, headaches, anxiety, and depression.¹
- Previous research studies indicate high levels of sedentary activity despite the American Pain Society’s physical activity recommendations (below) and proven sustained benefit in pain reduction with increased PA.²,³ This could possibly be explained by pain and fatigue, which causes many to be triply affected: socially, physically, and psychologically thus making adherence to physical activity recommendations a challenge.¹
- Current treatment guidelines (below) include CBT, which improves pain coping and functioning but doesn’t significantly change self-reported pain ratings or increase physical activity.¹,⁴
- Ultimately, understanding patterns of movement and physical activity are becoming increasingly important in chronic juvenile pain conditions for the development and assessment of effective treatment options.

Methods

- Participants (n=91) wore a hip-mounted Actigraphy monitor for one week, as part of the baseline period of a larger clinical trial, prior to randomization.
- The best 5 days of data were used, where the monitor was not removed for >3 continuous hours.
- The counts were recorded in 15 s epochs and filters for non-physiological and non-physical activity counts were recorded in 15 s epochs and filters for 2x a week.
- Participants also completed self-report measures: Functional Disability Index (FDI), Child Depression Inventory 2 (CDI), PROMIS Fatigue, and Pain Rating Form.
- The correlations between activity and outcome measures were done using SPSS Version 27.
- Participants age ranged from 12-17 with a mean of 15.35 (SD=1.45) years
- Participant Sex at Birth: 93.4% Female, 6.6% Male
- Participant Race: 86.8% Caucasian, 3.3% African-American, 2.2% Native American/Alaskan Native, 2.2% Asian, 1.1% Native Hawaiian/Other Pacific Islander, 4.4% More than one race

Results

Types of Activity Measured

- Light activities are like playing video games or cooking.
- Moderate activities are like walking slowly, light chores, playing catch.
- Vigorous activities are speed walking, jogging, cycling.
- Very Vigorous activities are like sprinting or a task which one cannot do for more than 10 minutes.

Pain Rating Form

- The ACTIV8, moderate to vigorous activity
- Sedentary activities are sleeping, sitting, resting.

Table 1: Mean total time (min) spent in various P.A. levels over 5 days

<table>
<thead>
<tr>
<th>Activity</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Activity</td>
<td>333.52</td>
<td>103.04</td>
</tr>
<tr>
<td>Moderate Activity</td>
<td>452.70</td>
<td>167.32</td>
</tr>
<tr>
<td>Vigorous Activity</td>
<td>17.00</td>
<td>18.32</td>
</tr>
<tr>
<td>Very Vigorous Activity</td>
<td>1.71</td>
<td>4.91</td>
</tr>
<tr>
<td>MVP study</td>
<td>471.40</td>
<td>175.20</td>
</tr>
<tr>
<td>Sedentary Behavior</td>
<td>3,989.52</td>
<td>264.36</td>
</tr>
</tbody>
</table>

Table 2: Self-Report Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Rating Score</td>
<td>5.85</td>
<td>1.26</td>
</tr>
<tr>
<td>CDI 2 Total Score</td>
<td>19.06</td>
<td>7.47</td>
</tr>
<tr>
<td>Functional Disability</td>
<td>25.79</td>
<td>8.52</td>
</tr>
<tr>
<td>Fatigue T-score</td>
<td>50.63</td>
<td>9.56</td>
</tr>
</tbody>
</table>

Table 3: Daily Time (mins) in Various P.A. Levels

<table>
<thead>
<tr>
<th>Time Spent in Sedentary Behavior Across 5 Days</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>979.9</td>
<td>52.87</td>
</tr>
</tbody>
</table>

Table 4: Pearson Correlation Between Key Study Variables

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mean Daily MVPA Minutes</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2. Mean Daily Sedentary Minutes</td>
<td>-0.97**</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>3. Pain Rating Score</td>
<td>0.01</td>
<td>-0.1</td>
<td>0.16</td>
<td>0.34**</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>4. CDI 2 Total Score</td>
<td>-0.13</td>
<td>0.16</td>
<td>0.34**</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5. Fatigue T-score</td>
<td>-0.08</td>
<td>0.1</td>
<td>0.28**</td>
<td>0.65**</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6. Functional Disability</td>
<td>-0.28**</td>
<td>0.28**</td>
<td>0.48**</td>
<td>0.59**</td>
<td>0.45**</td>
<td>--</td>
</tr>
</tbody>
</table>

Association between Mood and Fatigue

![Graph](image1.png)

Association Between Time in MVP and Functional Disability

![Graph](image2.png)

Conclusion

These results are interesting given the effectiveness of anti-depressants in reducing pain and/or fatigue. Pain ratings remains unclear but is showing promise.⁴,⁶ A mean of 19.06 indicates very elevated depressive symptoms.

Average Pain Rating

0.28**

Depressive Symptoms

0.59**

Fatigue

0.45**

Functional Disability

0.28**

Physical Activity Levels

A significant pos. correlation w/ sedentary activity and FDI scores is expected, because functional disability is the perceived difficulty performing daily tasks, light or moderate activities. This indicates patients are reporting accurate self-representations.

Although participants report high functional disability, on average, they appear to meet the recommended daily moderate activity levels.²

- A possible limitation of the software is it calculates total MVP study rather than sustained bouts of MVPA.

Regardless, monitoring shows adolescents with JFM are engaging in high levels of sedentary activity throughout the week. This finding brings up concerns about physical deconditioning and its effect on pain management, which may increase functional disability.⁴

This stresses the importance of guiding patients through a feasible and realistic physical activity plan which includes strength training, pain coping, improves functional disability, and promotes long term adherence.

Acknowledgements

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References