Static Stretching does not impair sport specific measures of upper-limb force and power in rock climbing

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Static Stretching on Strength and Power

- Static Stretching (SS) has been shown to reduce:
  - maximal voluntary contraction
  - isometric force
  - isokinetic torque
  - one repetition maximum lifts
  - vertical jump height
  - Sprint speed
  - Balance
Methods

- 19 recreational Rock Climbers  (13 male, 6 Female)

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>NS</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>65.22 ± 9.58</td>
<td>68.96 ± 10.05</td>
<td>0.42</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>172.5 ± 6.78</td>
<td>173.75 ± 5.7</td>
<td>0.668</td>
</tr>
<tr>
<td>Arm Span (cm)</td>
<td>172.89 ± 5.9</td>
<td>175.6 ± 7.76</td>
<td>0.408</td>
</tr>
</tbody>
</table>
Methods
Stretching protocol
## Results

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td><strong>DMFF</strong></td>
<td>19.26 ± 5.06</td>
<td>18.12 ± 5.46</td>
<td>20.2 ± 4.09</td>
</tr>
<tr>
<td><strong>DRFP (kg/s)</strong></td>
<td>27.95 ± 9.73</td>
<td>25.05 ± 7.32</td>
<td>30.18 ± 7.32</td>
</tr>
<tr>
<td><strong>NMFF (kg)</strong></td>
<td>18.81 ± 5.8</td>
<td>20.53 ± 8.25</td>
<td>22.98 ± 7.14</td>
</tr>
<tr>
<td><strong>NRFP (kg/s)</strong></td>
<td>26.57 ± 8.34</td>
<td>28.25 ± 9.82</td>
<td>32.49 ± 11.9</td>
</tr>
<tr>
<td><strong>Jump Height (cm)</strong></td>
<td>52.24 ± 17.73</td>
<td>50.74 ± 19.25</td>
<td>55.39 ± 23.64</td>
</tr>
<tr>
<td><strong>Jump Time (s)</strong></td>
<td>0.88 ± 0.25</td>
<td>0.97 ± 0.44</td>
<td>0.81 ± 0.15</td>
</tr>
<tr>
<td><strong>Power (w)</strong></td>
<td>1036.43 ± 267.93</td>
<td>1018.92 ± 281.61</td>
<td>1127.87 ± 308.64</td>
</tr>
</tbody>
</table>

Mean ± standard deviation for the height, weight, Arm span, dominant hand maximal finger flection (DMFF), dominant hand rate of force production (DRFP), non-dominant hand maximal finger flection (NMFF), non-dominant hand rate of force production (nRFP), Jump height, jump time, and power.
Conclusions

• No significant SS induced impairment in any of the variables
  • Limited Stretch shortening cycles
  • Slow contraction speed

• Limitations
  • Large variability between subjects
  • Measurement drift
  • Subject familiarization
Practical Applications

• More research is needed.
  • Stretching and climbing specific power
  • ROM and climbing performance

• Stretching can be included into a warm-up for climbing to increase ROM, without affecting upper-body power
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