Long, Hot Summer: A Preliminary Investigation of Seasonal Variations in the Physical Fitness Performance Of Law Enforcement Recruits in Southern California
Bloodgood, Ashley M.; Moreno, Matthew R.; Dulla, Joseph; Heredia, Caitlin; Heredia, Javier; Dawes, Jay J.; Orr, Rob Marc; Lockie, Robert G.

Published: 01/10/2018

Document Version:
Peer reviewed version

Link to publication in Bond University research repository.

Recommended citation(APA):

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

For more information, or if you believe that this document breaches copyright, please contact the Bond University research repository coordinator.
METHODS

Retrospective analysis was conducted on data from four classes during different environmental seasons. The physical conditions for each season are displayed in Table 1. Ambient temperatures and humidity percentages were obtained via meteorological records [4].

The sample included 375 recruits from one LEA:
- Fall (n = 73, females = 11, age = 27.8 ± 7.7 years; height = 172.9 ± 8.4 cm; Body Mass = 79.1 ± 13.9 kg; WInT = 83.2 ± 1.4 kg).
- Winter (n = 75, females = 27; age = 26.8 ± 6.4 years; height = 170.5 ± 10.1 cm; Body Mass = 80.8 ± 14.8 kg).

The VPAT+ occurred in the week prior to the start of academy and consisted of: push-ups and sit-ups completed in 60 s; seated medicine ball throw with a 2 kg ball (MBT; vi); arm ergometer revolutions in 60 s (75 PR; sec); and MSF. To compare the groups, a one-way ANOVA was used with a Bonferroni post hoc test (p < 0.05). There were significant differences found in all conditions, with ergometer results in the academy being the most extreme values found across the seasons could be due to class-to-class fitness variations in recruits. However, WInT was significantly better in the MSF, which is a maximal running test. Warmer temperatures can increase cardiovascular strain, while humidity can decrease sweat evaporation rates. Both factors can result in an increased rate to fatigue and poorer performance on the MSF. Therefore, this study can be greatly influenced by hot environments as a result of increased skin temperature, which decreases cardiac output [4].

Warmer temperatures can increase cardiovascular strain, while humidity can decrease sweat evaporation rates. Both factors can result in an increased rate to fatigue and poorer performance on the MSF. Therefore, this study can be greatly influenced by hot environments as a result of increased skin temperature, which decreases cardiac output [4].

Warmer temperatures can increase cardiovascular strain, while humidity can decrease sweat evaporation rates. Both factors can result in an increased rate to fatigue and poorer performance on the MSF. Therefore, this study can be greatly influenced by hot environments as a result of increased skin temperature, which decreases cardiac output [4].

Warmer temperatures can increase cardiovascular strain, while humidity can decrease sweat evaporation rates. Both factors can result in an increased rate to fatigue and poorer performance on the MSF. Therefore, this study can be greatly influenced by hot environments as a result of increased skin temperature, which decreases cardiac output [4].

CONCLUSIONS

- Warmer ambient temperatures, coupled with high relative humidity, could have negatively affected recruitment performance. This was indicated by Maughan et al. (4), who found that a reduced rate of heat loss at higher levels of humidity, coupled with warmer temperatures, progressively impaired exercise capacity.
- It should be noted that variability in VPAT+ performance across the seasons could be due to class-to-class fitness variations in recruits (3). However, WInT was still significantly better in the MSF, which is a maximal running test. Aerobic activities have been shown to be greatly influenced by hot environments as a result of increased skin temperature, which decreases cardiac output [4].
- Warmer temperatures can increase cardiovascular strain, while humidity can decrease sweat evaporation rates. Both factors can result in an increased rate to fatigue and poorer performance on the MSF. Therefore, this study can be greatly influenced by hot environments as a result of increased skin temperature, which decreases cardiac output [4].
- A recruit’s performance in fitness assessments could impact possible employment. Ambient weather conditions could have a significant influence on how a recruit performs during fitness assessments, potentially playing a role in the hiring process (2).
- LEA staff may need to consider ambient temperature and humidity during tests such as the VPAT+ due to possible adverse effects on recruit performance, and this is particularly true for maximal running tests.

RESULTS

- Significant differences were found between the seasons in specific VPAT+ tests, and the descriptive data is displayed in Table 2. For the push-ups, WInT and SUM performed 16% and 19% significantly better than SPR. In the MSF, SUM performed 18% significantly better than WInT. Regarding the arm ergometry test, SUM and SPR performed 8% better than WInT, while SUMMER performed 11% better than WInT. WInT performed significantly better than SUM, SPR, and SUMMER in the MSF, completing 18%, 27%, and 16% more shuttles. No significant differences were found in sit-ups, vi, and the 75PR.

specific factors were found between the seasons in specific VPAT+ tests, and the descriptive data is displayed in Table 2. For the push-ups, WInT and SUM performed 16% and 19% significantly better than SPR. In the MSF, SUM performed 18% significantly better than WInT. Regarding the arm ergometry test, SUM and SPR performed 8% better than WInT, while SUMMER performed 11% better than WInT. WInT performed significantly better than SUM, SPR, and SUMMER in the MSF, completing 18%, 27%, and 16% more shuttles. No significant differences were found in sit-ups, vi, and the 75PR.

Table 1. Descriptive data (mean ± SD) between seasons and VPAT+:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Fall</th>
<th>WInT</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>22-28°C</td>
<td>22-26°C</td>
<td>22-29°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>30-30%</td>
<td>8-17%</td>
<td>23-25%</td>
</tr>
<tr>
<td>VPAT+</td>
<td>12-22%</td>
<td>12-22%</td>
<td>12-22%</td>
</tr>
</tbody>
</table>

Table 2. Descriptive data (mean ± SD) between seasons and VPAT+:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Fall</th>
<th>WInT</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push-ups</td>
<td>41.23 ± 16.02</td>
<td>45.16 ± 13.41*</td>
<td>38.54 ± 15.38</td>
</tr>
<tr>
<td>Sit-ups</td>
<td>35.06 ± 8.62</td>
<td>35.79 ± 10.17</td>
<td>36.66 ± 12.94</td>
</tr>
<tr>
<td>WInT</td>
<td>5.71 ± 3.34</td>
<td>6.16 ± 3.11</td>
<td>6.15 ± 4.64</td>
</tr>
<tr>
<td>SPR</td>
<td>51.49 ± 12.89</td>
<td>54.20 ± 12.30</td>
<td>53.33 ± 14.75</td>
</tr>
<tr>
<td>Air Erg. (watts)</td>
<td>27.12 ± 11.38</td>
<td>27.37 ± 12.17</td>
<td>27.10 ± 12.04</td>
</tr>
<tr>
<td>75 PR (sec)</td>
<td>17.32 ± 2.67</td>
<td>16.97 ± 1.95</td>
<td>17.01 ± 1.15</td>
</tr>
<tr>
<td>MSF (shuttles)</td>
<td>17.32 ± 2.67</td>
<td>16.97 ± 1.95</td>
<td>17.01 ± 1.15</td>
</tr>
</tbody>
</table>

*Significantly (p < 0.05) different than WInT.
†Significantly (p < 0.05) different than SPR.
‡Significantly (p < 0.05) different than fall.
§Significantly (p < 0.05) different than WInT and SPR.

- Significant (p < 0.05) different than fall.