Table. Effects of Physical Activity on Health and Behavioral Outcomes in School-age Youth

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Sample*</th>
<th>Effect†</th>
<th>Amount‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adiposity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>+</td>
<td>F: 3-5 d/wk</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I: moderate to vigorous</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D: 30-40 min/d</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T: variety of aerobic activities</td>
<td></td>
</tr>
<tr>
<td>Non-overweight</td>
<td>0</td>
<td>NA† but may be similar to overweight</td>
<td></td>
</tr>
<tr>
<td>Cardiovascular health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metabolic syndrome</td>
<td>Overweight</td>
<td>Clusters with obesity, +</td>
<td>NA</td>
</tr>
<tr>
<td>Lipids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>LDL-C</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>HDL-C</td>
<td>+</td>
<td>NA, probably similar to adiposity</td>
<td></td>
</tr>
<tr>
<td>Triglycerides</td>
<td>+</td>
<td>NA, probably similar to adiposity</td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normotensive</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Hypertensive, adolescent</td>
<td>+</td>
<td>F: 12-32 wk, 3 d/wk</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I: intensity to improve aerobic fitness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D: 30 min/session</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T: aerobic</td>
<td></td>
</tr>
<tr>
<td>Hypertensive, adolescent</td>
<td>0</td>
<td>Resistance training</td>
<td></td>
</tr>
<tr>
<td>Hypertensive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-overweight</td>
<td>+</td>
<td>NA, probably different mechanisms for overweight and non-overweight</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other cardiovascular variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endothelial function</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Inflammation</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Heart rate variability</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Coagulation</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Cardiovascular/aerobic fitness</td>
<td>≥8 years</td>
<td>+</td>
<td>F: &gt;3 d/wk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I: vigorous, 80% VO₂max</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D: 30-45 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T: variety of activities</td>
</tr>
<tr>
<td>Asthma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic fitness</td>
<td>Asthmatic</td>
<td>+</td>
<td>F: 2-3 d/wk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I: as in aerobic programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D: 6 wk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T: variety of activities</td>
</tr>
<tr>
<td>Asthmatic symptoms</td>
<td>Asthmatic</td>
<td>Clusters</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>with obesity, 0</td>
<td></td>
</tr>
<tr>
<td>Skeletal health secondary to steroids</td>
<td>Asthmatic</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mental health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>+</td>
<td>NA, influence varies with mode of physical activity</td>
<td></td>
</tr>
<tr>
<td>Depression symptoms</td>
<td>Adolescents</td>
<td>+</td>
<td>NA, influence varies with mode of physical activity</td>
</tr>
<tr>
<td>Self-concept</td>
<td></td>
<td></td>
<td>Influence may vary with mode of activity</td>
</tr>
<tr>
<td>Global self-concept</td>
<td>+</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Physical self-concept</td>
<td>+</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>
Table. (Continued)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Sample*</th>
<th>Effect†</th>
<th>Amount‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport competence</td>
<td>+</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Social self-concept</td>
<td>weak +</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Academic self-concept</td>
<td>weak +</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

### Academic performance

| Grades, standardized test, GPA | + | NA, added physical education |
| Indirect indicators – concentration, memory, behavior | + | NA |

### Injuries

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Physical education classes</th>
<th>No injuries reported</th>
<th>F: 3 d/wk</th>
<th>I: moderate to vigorous</th>
<th>D: 10-40 min</th>
<th>T: physical education</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

### Musculoskeletal health

<table>
<thead>
<tr>
<th>Bone mineral</th>
<th>Prepubertal</th>
<th>+</th>
<th>F: 2-3+ times/wk</th>
<th>I: moderate-high strain</th>
<th>D: 10-60 min</th>
<th>T: 10 min of impact activity, 45-60 min of general weight bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pubertal</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>Same as for prepubertal</td>
</tr>
<tr>
<td></td>
<td>Postpubertal</td>
<td>0, weak+ effect</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Youth athletes</td>
<td>+</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asthmatic, secondary to steroid use</td>
<td>0</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Muscular strength and endurance

| >6 years | + | F: 2-3 d/wk | I: Strength – 70%-85% 1RM, Endurance – 30%-60% 1RM, Sets – 2-5 | D: 30-45 min | T: variety of progressive resistance activities with adult supervision, reciprocal and larger muscle groups |

*Unless indicated otherwise, all samples are from the general school-age population.
†Key: + = positive (beneficial effect), – = negative (deleterious effect), 0 = null (insufficient data upon which to base a decision or no effect identified).
‡Amount of activity required to achieve the result; F=frequency, I=Intensity, D=duration, T=type of activity.
§NA – evidence for amount of activity is unclear.
REFERENCES


136. Crocker P, Sabiston C, Forrestor S, Kowalski N, Kowalski K, McDonough M. Predicting change in physical activity, dietary restraint,


142. Field T, Diego M, Sanders CE. Exercise is positively related to adolescents' relationships and academics. Adolescence 2001;36:105-10.


Adolescence and early adulthood as determinants of peak bone mass. E, Heikkinen J, et al. Exercise, smoking, and calcium intake during


