Stuart Biddle

Exercise is good for the mind!

A healthy mind in a healthy body' and all that! I know you have heard it before, but until quite recently there was little evidence to support such a statement other than horizonal and anecdotal comments. Now, with a rapid expansion of research into the psychological effects of exercise and physical activity, we are in a better position to review the evidence and suggest possible reasons why exercise may promote good mental health.

What is 'mental health'?

I was trying to avoid this, but I suppose I can't! Although mental health could refer to almost anything concerning psychological well-being, we usually refer to it in terms of low levels of anxiety and depression, high levels of self-esteem, and general positive feelings of well-being and vigour.

There are several scientific sources of evidence concerning the mental health benefits of exercise. These include large population studies of physical activity and mental health and studies using short bouts of exercise, as well as literature reviews, both narrative and quantitative.

Habitual physical activity

Stephens (1988) analysed four large population surveys in the USA and Canada. These included 56,000 people, each of whom was assessed for level of physical activity as well as a number of mental health indices. The majority of Stephens' analyses (25 out of 32) showed an association between physical activity and mental health. He concluded that:

- The level of physical activity is positively associated with good mental health in the household population of the United States and Canada, when mental health is defined as positive mood, general well-being, and relatively infrequent symptoms of anxiety and depression.
- The relationship is independent of the effects of education and physical health status, and is stronger for women and those aged 40 years and over than for men and those under age 40.

The robustness of this conclusion derives from the varied sources of evidence: four population surveys in two countries over a ten year period, four different methods of operationalising physical activity and six different mental health scales.

Activity sessions

Other researchers have looked at the effects of single bouts of exercise on changes in mood. For example, it has been common to measure pre-exercise mood with POMS (not, note what the Americans like to call us, but the Profile Of Mood States!). The ideal mood profile is what has been referred to as the 'iceberg profile', as shown in Figure 1. This depicts positive mental health (at least positive mood) with low levels of tension, depression, anger, fatigue and confusion, and high levels of vigour.

Studies have shown that the iceberg profile often becomes more pronounced after single bouts of exercise, such as running on a treadmill. Interestingly, though not altogether surprisingly, the same iceberg profile has been found in sports competitors prior to successful performance, thus suggesting the need for an optimal mood state before competing.

Exercise v. other strategies

Several researchers have recently reviewed the literature in this area. One technique for this is a quantitative review — or meta-analysis — which statistically analyses trends across several studies investigating the same phenomenon. This technique supplements the information obtained through traditional narrative reviews, such as the one we conducted on exercise and mental health Biddle & Nunn, 1991.

To interpret the results from a meta-analysis, you need to understand the 'effect size' (ES) statistic. This statistic is expressed in standard deviation units and refers to the magnitude of the effect of exercise on mental health over non-exercise or alternative interventions (e.g. relaxation). At a rough guide to thumb, ESs up to 0.3 are low, 0.4-0.7 are moderate, and about 0.8 and above are quite strong.

Anxiety

Petruzzello and colleagues (1991) in the USA found only a small effect for exercise on the reduction of state anxiety (ES=0.24), with a slightly larger effect for trait anxiety (ES=0.34). State anxiety feelings are those experienced 'here and now' in different situations, whereas trait anxiety is your proneness towards anxiety, and can only really be affected by exercise over long periods of time.

The same researchers found that reductions in psychophysiological measures of anxiety (e.g. heart rate, blood pressure, etc.), were more favourably associated with exercise (ES=0.56).

Depression

A similar analysis was conducted by North et al. (1990) on exercise and depression. They found that exercise was effective in reducing depression levels (ES=0.53), and this was confirmed by a meta-analysis involving just aerobic fitness exercise, when McDonald and Hodgson (1991) found an overall ES of 0.55.

Self-esteem

The only meta-analysis that has been performed on exercise and self-esteem concerns children. Gruber's (1986) analysis showed a positive effect for exercise (particular aerobic fitness activities) on self-esteem (ES=0.48).

What does exercise achieve?

These quantitative reviews, other narrative reviews, and associated research are supportive of the 'consensus statements' published in 1987 by the American National Institute of Mental Health (Morgan & Goldstein, 1987). The key statements were:

- Exercise is associated with reduced state anxiety.
- Exercise has been associated with a decreased level of mild to moderate depression.
- Exercise results in the reduction of various stress indices.
- Exercise has beneficial emotional effects across all ages and in both sexes.

Why is exercise good for the mind?

Well, you may be convinced of the evidence. But why should exercise produce such effects? Unfortunately we are rather less certain here, although we can offer several possible explanations.

Biochemical

Biochemical explanations have been fuelled by reports of the 'runner's high' and people getting 'addicted' to exercise through the release of endorphins. Interesting though these notions are, it has proved much more difficult to support them with good evidence. The current summary statements can be offered:

1. Some exercisers do report strong feelings of elevated mood and can suffer minor withdrawal symptoms if prevented from exercising for some period of time. However, the exact reasons...
Does physical activity promote brain-power?

Second, although exercise may help students in school feel more relaxed (although this probably only occurs if the exercise is not too intense and is followed by sufficient time for the students to 'cool down', shower, etc.), the evidence that physical activity improves academic performance is controversial. Cognitive functioning can be enhanced through activity, but the evidence is clearest for very young children and older adults — those, one could argue, with most to gain.

But, despite this, exercise is certainly good for you — mentally and physically!

References

Do team sports build character?

First, there is certainly no evidence supporting the current Government's view that compulsory participation in (team) sport will have the desired beneficial effects of reducing aggression and delinquency and enhancing character. That side of the mental health literature actually provides a less positive view. The limited evidence that does exist points to a tendency for competitive (particularly contact) activities to be associated with less moral behaviour.

Table 1. Percentage frequency of participation in three out-of-school active pursuits during the previous year. Provisional 1994 data; Year 10 pupils.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never or hardly ever</th>
<th>Once or twice monthly</th>
<th>Weekly</th>
<th>At least twice weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jogging</td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td></td>
<td>60.4</td>
<td>65.2</td>
<td>19.7</td>
<td>21.4</td>
</tr>
<tr>
<td>Fitness exercises</td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td></td>
<td>51.2</td>
<td>61.7</td>
<td>16.7</td>
<td>22.8</td>
</tr>
</tbody>
</table>

Table 2. Percentage values for VIGTOT — the number of out-of-school active pursuits engaged in at least twice a week. Provisional 1994 data; Year 10 pupils.

<table>
<thead>
<tr>
<th>VIGTOT</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3+</th>
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</thead>
<tbody>
<tr>
<td>Boys</td>
<td>20.9</td>
<td>28.8</td>
<td>21.5</td>
<td>28.8</td>
</tr>
<tr>
<td>Girls</td>
<td>51.4</td>
<td>27.0</td>
<td>11.2</td>
<td>10.3</td>
</tr>
</tbody>
</table>