Even though there is no research evidence that competitive sports build 'character' . . .

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Exercise is good for the mind!

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'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 heresay 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 on 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:

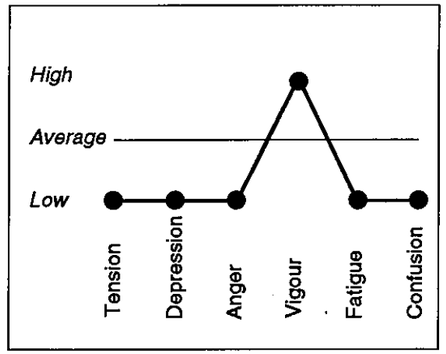
- *The level of physical activity is positively associated with good mental health in the household population of the United States and Canada, when mental health is defined as positive mood, general well-being, and relatively infrequent symptoms of anxiety and depression.*
- *The relationship is independent of the effects of education and physical health status, and is stronger for women and those age 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 (no, not what the Aussies 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

Fig. 1. Hypothetical 'iceberg' Profile Of Mood States (POMS), often thought to reflect the mental health of physically active people.



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 phenomena. This technique supplements the information obtained through traditional narrative reviews, such as the one we conducted on exercise and mental health (Biddle & Mutrie, 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). As a rough rule of thumb, ESs up to .3 are low, .4–.7 are moderate, and about .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=.24), with a slightly larger effect for trait anxiety (ES=.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=.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=.53), and this was confirmed by a meta-analysis involving just aerobic fitness exercise, when McDonald and Hodgdon (1991) found an overall ES of .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=.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 & Goldston, 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

are not entirely clear.

2. Addiction to exercise may be biochemical (endorphin production is increased during exercise), but in reality few people are this extreme in their reaction.

We cannot measure endorphins in the brain, except in animals, and endorphin levels in human blood may not mirror those in the brain.

Physiological

Proposed physiological reasons for exercise-mental health links include reductions in muscle tension following exercise. This is well supported and does help explain the relaxed 'feel good' effect — or 'afterglow' — that often follows exercise.

Psychological

Finally, there are several psychological reasons why people may feel good after exercise. These include increases in feelings of mastery and competence, time away from daily stresses and hassles, improved self-esteem, etc. All are possible, but not all have been convincingly demonstrated through good research.

Conclusion

We know that exercise has beneficial physical effects, such as control of body-fat and blood pressure, reduced risk of coronary heart disease, etc. However, despite the acceptance that exercise may make you 'feel better', health educators appear less aware of the evidence and possible reasons for a link between exercise and positive mental health. Such a link is more likely to be made if exercise is enjoyable, indulged in through choice rather than pressure, and where the activity suits the individual preferences of the child or adult, such as selecting non-competitive or competitive activities.

If I may be permitted to end on two controversial notes . . .

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!

Does physical activity promote brain-power?

Second, although exercise may help students in schools 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 old adults — those, one could argue, with most to gain.

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

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