The Original 1982-84 Research Paper

The Effects of Regular Exercise on patients with Chronic Fatigue

Introduction:

Between 1982-4 The South Australian Institute for Fitness Research and Training had undertaken two studies of the effects of regular exercise on volunteers with chronic fatigue.

The objectives of the programmes were to determine the fitness levels of such patients prior to training them in jogging and exercise classes twice per week and giving follow up tests at three monthly and six monthly medicals to determine their progress.

The fitness level was determined by requiring each volunteer to ride a stationary cycle on which varying loads of resistance were applied to the wheel whilst, at the same time, pulse rate was being recorded. By this means it is possible to graph the amount of load in kilograms required to give a pulse rate of 150 beats per minute. This figure is a gauge to each individuals relative fitness and is known as the physical working capacity (PWC 150)

We also aimed to determine the extent to which worry or stress was responsible for the fatigue by asking each applicant to complete a modified version of the Middlesex Hospital Questionnaire of Crown and Crisp. (Although it included questions of physical symptoms, thus giving a higher score for those who had multiple symptoms anyway, it nevertheless provided a relative guide for comparison.)

Finally, our second study included questions aimed at elucidating the affects of the fatigue on lifestyle.

Results:

As the result of twenty-five medicals and questionnaires (Diagram 1), it was found that fifteen enrolees had fitness levels below average,
seven were average, and two were above average. (One was not known at the outset.)

There were eight examples of those with low fitness who had lower scores for their tendency to worry (below 30), which indicated that the fatigue may be attributable to limited aerobic capacity.

There were five examples of those whose fitness was average to high who had questionnaire scores indicating a higher tendency to worry (above 40) indicating that stress may be the primary factor causing fatigue. Other figures were not so clear.

With regard to training (Diagram 2), seven did not start, and eight did not complete three months and were not retested and, of the remainder, nine continued for three months. Of these nine, five continued for six months.

In the first three months, three participants did not benefit from training. A further three improved slightly, and three significantly, but were still below normal levels.

Of the five individuals who persisted for six months, improvement generally continued at a lower rate. One example of a participant who originally developed chronic fatigue following a coronary improved dramatically. Another individual demonstrated persistent low figures despite continued training and he undoubtedly has the condition due to impaired aerobic capacity.

Four participants who did not train attended a medical after six months and demonstrated relatively static fitness levels. (Diagram 2).

In a second study of twelve volunteers, we asked questions on lifestyle. Of these, eight who had to make restrictions and changes all had low to very low fitness levels. The remaining four with average or above fitness did not report a need to change lifestyle. The work of Wheeler et al. provides documented information on the varying extent to which this ailment affects patients’ lifestyle but has no correlating data to account for this.

Conclusion:
It appears as though there are two distinct causes of chronic fatigue. Firstly, abnormal low aerobic capacity and, secondly, stress (as per the
questionnaire results). However, there were examples of individuals in whom other factors may be involved. There was further evidence that the measurably low aerobic capacity was responsible for the changes or restrictions to lifestyle seen in many patients with chronic fatigue.

Regular exercise improves the fitness levels of most individuals. However some, particularly those with very low capacity, do not appear to benefit from the training. The latter may have an impairment in their aerobic capacity perhaps resulting from poor diaphragm accommodation which results in low ventilatory efficiency, in exhausting work as found by Wolf, Cohen et al.

In consideration of all these factors it would seem that the provision of a moderate exercise programme is worthwhile for patients with chronic fatigue because of the benefit achieved by some participants, and further research in this area would be valuable in assessing cause and prognosis.

Acknowledgements:
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Bibliography


I.F.R.T. Instructors' Information Sheet for individuals with chronic fatigue

Aims
1. To improve the physical working capacity of the participants.
2. To provide information about the condition.
3. To provide instructions on how to control the condition.
4. To gain scientific information on the condition to aid research.

Methods
1. General principle
"The plan of life of the patient is to be worked out with care. Usually normal but quiet work and play are to be advised, with avoidance of late hours, coffee, tea, over-indulgence in alcohol and tobacco, strenuous vacations, excitement in general, too many hours at work, and new and burdensome tasks or duties. Often the patient himself is aware of this necessity, but he has perhaps disliked to humor his symptoms or to fall behind his fellows in strenuous living in the business, professional, and social world. With clear medical advice, however, he realizes the wisdom of doing so, and gradually he adjusts himself to suit his symptoms, and is surprised at recapturing a feeling of well being."

2. Chronic fatigue and the heart: Information
(a) Car engine analogy:
A car with a good engine may be troubled on acceleration or hill climbs if the carburetor or distributor are out of adjustment or condition, but the car may travel on flat roads at an even speed. Similarly, an individual with a good heart may be troubled by exertion due to a problem elsewhere in the body, yet there is no problem in moderate exercise and lifestyle.

(b) Using diagrams as aids explain:
(1) No coronary artery disease or blockage and no sign of subsequent heart muscle damage. A narrow or blocked artery may cause muscle damage and cardiograph abnormality. Damaged arteries can now be bypassed if necessary.
(2) No heart valve disease. The healthy valves ensure that blood flows in one direction through the heart and there is no sign of back flow. Artificial valves can now be implanted if necessary.
(c) If fainting occurs, and the participant falls to the ground, blood flow to the brain is aided by the reduced affect of gravity and the participant wakes up.
(d) Charles Darwin developed chronic fatigue at 30 and died at 72. Florence Nightingale became chronically fatigued in her 30’s and died at 93.

3. Exercise principles of treating chronic fatigue:
(a) no sprinting or accelerating
(b) no heavy lifting or strenuous work
(c) gradually improvement (allowing for fluctuations)
(d) work at own level with pulse 120/140 bpm even if this means periodically reducing performance
(e) if over-exercise occurs and the volunteer appears distressed by faintness and dizziness, he should stop exercise and alternately pace about and rest and take deep breaths until recovering, but may continue to feel some distress for a while.

4. Personal and social principles:
Develop independence of mind an action based on the notion that:-
(a) there is a need to perform in moderation and therefore
(b) a need to ignore or resist social pressures to perform at normal levels.

5. Medicals at:
1. Commencement
2. Three months
3. Six months
And for . . .
(a) patient surveillance
(b) source of research information

Note: This information applies to chronic fatigue. However, some recruits who experience palpitations may not necessarily have fatigue and therefore may respond normally to exercise and not need to be restricted in their activities. Such individuals should be encouraged to train regularly and to keep fit.

Addendum

The accuracy of the patients perception of fatigue

One of the questions about chronic fatigue is whether or not the patients perception of fatigue is reliable or is a subjective exaggeration of normal symptoms.

To answer that question I looked at the laboratory test results for their aerobic capacity which had been recorded in their files, and placed each person in order of fitness.

I then phoned the instructor and asked him to tell me who was running in first place on the training track, and then who was coming second through to last.

He did not have access to the records and did not know the details. However, the person who he reported as running first had the highest aerobic capacity, and all of them were running in the exact order of the scientific results, and the person who was coming last had the lowest. They were perceiving their capacity accurately.
### Data Chart

<table>
<thead>
<tr>
<th>Initial Physical Working Capacity (pulse 150)</th>
<th>Initial Emotional Tension Levels (MHQ)</th>
<th>Male / Female</th>
<th>Fitness Level (weight adj.) VO₂ max mL (Kg-min)</th>
<th>Fitness Comparison (age adj.)</th>
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L = low  SL = somewhat low  A = average  H = high  VH = very high

A: MHQ’s generally about or below 30 with fitness levels low and somewhat low.
B: MHQ’s variable tending to be above 30 and 40 and fitness levels variable with many average and above.
Diagram 2

**Did Not Train**
These volunteers were tested at the outset, and some did not attend training at all, or complete the training sessions for at least 3 months.
- **Volunteers tested at outset but did not complete 3 months training and were not retested.**
- **These volunteers did not train but were called in to be tested again after 3 months and 6 months**

**Trained**
These volunteers participated in the exercise programme. They were tested at the outset, and after 3 months and then 6 months of training.
- **The aerobic capacity of a male athlete.**
- **The aerobic capacity of an average fit male 850 (and an average fit female 550).**
- **Nine volunteers completed 3 months training, and five of those continued to complete 6 months or more.**
48 interviews about the cause of chronic fatigue

The chronic fatigue study also included a questionnaire about symptoms and lifestyle and questions about the cause and nature of the ailment from 48 interviews from about 60 phone calls. Those interviews are summarised below.

1. After a bout of glandular fever during Matriculation exams the person never got over it. Now has tiredness, missed heartbeats, stomach pains and dizziness.
2. Started with tension in the home, and now tired all the time. Would not be depressed if it was not for the tiredness, and has headaches. Works sitting all day as a typist with difficulty and strains to read. Never had a lot of stamina. When she was a housewife she could arrange her workload to suit her energy level, but when she got a job the demands of the workload drain her energy.
3. Was a very fit person who used to go surfing, but after giving birth she had a breakdown and shock treatment, and 20 years later still gets tired and dizzy, and leads a restricted lifestyle which is a "bloody nuisance" because she can't go out at night.
4. An alcoholic with palpitations, chest pains and tiredness who was depressed by his symptoms and reluctant to attend courses which involve social situations.
5. A university lecturer who had a family history of nervous breakdowns, and was bedridden with fatigue, first occurring after study pressure. He has been told that he is very fit on a treadmill.
6. Home stress, and work stress caused many symptoms including palpitations, breathlessness and nausea. She sees herself as just a machine in a meaningless job who is always rushing around and is put down by males, and told that everything is her fault, she gets no recognition, and has no control over her own workload due to her superiors.
7. Previously nervous but fit until the death of her husband three years earlier. She gets palpitations on waking, and is lethargic, and feels guilty about laziness and hypochondria because her doctors can't find anything wrong with her.
8. This woman had measles during childbirth and on the day of giving birth developed palpitations, giddiness, and hyperventilation, which continued for four years, and since then she had been prone to symptoms. The symptoms caused her misery when they wouldn't go away, and she found it hard to explain them to her husband.

9. A healthy man had been interviewed on radio when he was attempting to break a world endurance record, and was praised as a role model for today's youth for his positive thinking, determination, and stamina. When I phoned him to enquire about his subsequent health he said that he became fatigued during the attempt, and returned to work and was still suffering from tiredness three months later when his boss told him that he was lazy and sacked him, and he had continued to be tired since.

10. This man had depression following Bell's Palsy due to a virus in the 7th cranial nerve?

11. This person was healthy until June 1982, when she got a virus and became dizzy, fatigued, and faint, and had not recovered, and slowed down, gained weight, and complained of lethargy.

12. This person was tired, breathless, and nervous.

13. This woman's husband caused her stress, and she had kids, and did shift work.

14. Teacher stress was the cause of fatigue

15. This person reported sudden tiredness which was inexplicable.

16. This person injured his back at home, changed jobs, and lost confidence.

17. This man was an opal miner who got Quinsy, which is a throat infection, he collapsed, and has "been useless since then" - February 83.

18. This woman described herself as a worrier, and boredom contributed to her fatigue which was "helped a lot" by a curette.

19. This woman reported that suddenly one day seven years ago she became tired for no reason, and had tried everything reasonable to cure the problem because she was in despair about her families reaction to her fatigue, and her doctors' negative attitude about it.

20. This person exercised a lot and participated in the City to Bay Fun Run.

21. This person was on sickness benefits.

22. An 82 year old had been healthy until a long bus tour and a virus, and now is very tired, needs to rest, and is confined to a helping hand home.

23. Three years earlier the woman had her third child with extra family worries which accumulated, and then 1 year ago had tiredness,
giddiness, loss of appetite, nausea, and weight loss, and found that rest in hospital, medication, and exercise helped.

24. Had problems for three years which became worse after viral pneumonia in July.

25. This elderly lady's husband became ill, and then she was "run off her feet" with caring for his needs, and has been tired all the time in the three months since.

26. This woman said she was a tense and anxious type of person.

27. This woman was a Government Administrative Officer who developed agoraphobia since a period of work stress.

28. This woman said she had agoraphobia and couldn't leave home without help.

29. A 65 year old man developed symptoms soon after becoming a POW (prisoner of war) in 1941 - 40 years earlier - he has had to restrict his lifestyle ever since, and eventually accepted it, and got used to it.

30. This elderly woman said she had always been nervous, and described herself as being agoraphobic for about 17 years, and the death of her husband made her symptoms worse. She suffered from dizzy spells and was "afraid to go along the street for fear of having another dizzy attack".

31. This middle aged man had back and neck problems, and exhaustion since a car accident six years earlier.

32. This man had paroxysmal tachycardia four years ago, and since then has been tired and exhausted all the time, and said that his blood oxygen was low.

33. This man said he was agoraphobic.

34. This elderly man was too old for the fitness course, and said he had muscular fatigue, probably M.E. (myalgic encephalomyelitis). The flu made it worse, and he had an enlarged heart, and congested cardiomyopathy.

35. This man was a relieving bank manager who worked day and night, and had a nervous breakdown about a year earlier, and had been agoraphobic for about 6 months.

36. This man had been hospitalised for a few months with disabilities which may have been related to anxieties involved in his work as an assistant service manager.

37. This man reported that his symptoms came on gradually.

38. This man did weight lifting.

39. This man worked 18 hours a day, and ran 4 businesses at once, and wore out. He then gave up working 18 hours per day and
expected to rejuvenate with rest, but didn't, and continued to suffer from fatigue ever since.
40. This woman had been to the Fitness Institute courses before and was a physically fit shift worker who tired easily.
41. This woman had ventricular fibrillation thirteen years ago, and was divorced 8 years ago, and has had dizziness for 5 years.
42. This elderly woman had been harassed by her neighbour, and was awoken during the night because of the noise made by her neighbour, and had a heart murmur, and headaches due to a spinal problem, and could not attend fitness classes because she had no transport.
43. This man had narcolepsy at work, and cataplexy, and elation caused it, so he avoided elation at the first sign of symptoms.
44. This man got viruses twice per year associated with fatigue, and was always fatigued, and when he did anything a little out of the ordinary he became unduly fatigued, and was extremely annoyed that it affects his lifestyle.
45. This woman said she was short in height and overweight at 13 stone. She had suffered from fatigue since her first child kept her awake all night, every night for 9 months, and the second child did the same 14 years ago.
46. This woman started getting fatigue when she left school and started work as a nurse doing night shift. She said that she now works only 1 day per week, and is a very calm person, and that her fatigue has "nothing to do with stress".
47. This woman enquired in relation to her son who was quiet and shy, and had asthma as a child, and became a very fit muscular man who did weight lifting, and was a canoe instructor, and played basketball. Three years ago he lost balance and became giddy and vomited, and couldn't get out of bed for 10 days to 2 weeks because of vertigo every time he lifted his head off the pillow. He recovered after 4 weeks and has had 2 or 3 mild attacks since, and now gets dizzy, and is fatigued all the time, and is tired and in bed by 9 p.m.
48. This woman reported symptoms which she said had preceded her marriage break-up.

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It is clear from this set of interviews that there are many different causes of fatigue, and many types, symptoms, and outcomes. M.B.