

An investigation into the relationship between physical activity and happiness in adults.

by Anne Turner

A dissertation submitted in accordance with the
requirements of the University of Chester for the degree
of Master of Science.

September 2008

18,025 words

Dedication

This work is dedicated to my dad, Jack Turner, 1928 – 2007.

Student Declaration

This work is original and has not been submitted previously in support of a degree qualification or other course.

Signed.....*Anne Turner*.....

Date.....*17/10/2008*.....

Abstract.

An investigation into the relationship between physical activity levels and happiness in adults.

The main purpose of the study was to investigate if there was a relationship between daily physical activity levels and self reported happiness. The design of the study was cross-sectional. Fifty-one university employees, comprising of twenty-eight males and twenty three females (mean age = 47 years) each completed a three-day physical activity diary and a self administered happiness questionnaire. 67% of the employees were academic and the remainder were administration or technical staff. Correlation analyses were used to assess the relationship between happiness and activity levels in total, occupational and leisure-time activity. The results of the study show the null hypotheses to be correct, as there was no significant relationship between total activity levels and happiness. ($p > 0.05$). Results also identified that there was no significant relationship between happiness and occupational or leisure-time activity. Happiness scores were associated with gender, and females were found to have a significantly happier than males ($p=0.001$), although the reason for this was not identified in this study. Participants with low activity levels were found to have a lower mean happiness score than more active participants but this was not statistically significant. Forty-four participants (86%) were found to meet current government guidelines for recommended levels of daily activity.

The study concluded that higher levels of activity were not directly associated with increase happiness. It also supports previous research identifying happiness as a multidimensional concept dependant on many social and environmental factors.

Acknowledgements

I would like to thank Dr Stephen Fallows for all his help, guidance and encouragement.

I would also like to thank Michael Jeffrey and the staff at the Hollings Faculty, Manchester Metropolitan University for willingly and enthusiastically taking part in my study. In particular, I would like to thank Emma, Maurice and Steve for always being prepared to listen and advise, and the staff in the department office for putting up with my endless requests.

Finally, a special thanks to my family and friends for their support and patience.

Contents

i) Glossary	11
ii) List of abbreviations	12
iii) List of tables	13
iv) List of figures	14

Chapters

1. Introduction	15
2. Literature Review	19
2.1 Introduction to the Literature Review	19
2.2. Physical Activity	20
2.2.1. Recommended levels of physical activity	21
2.2.2. Trends in physical activity	21
2.2.3. Current levels of physical activity	23
2.2.3.1. Activity levels according to gender	23
2.2.3.2. Activity levels according to age	24
2.2.3.3. Activity levels and social class	25
2.2.4. Leisure time activity	26
2.2.5. Occupational activity	28
2.3. Activity and mental health	31
2.3.1. Physical activity and depression	32
2.3.2. Physical activity, anxiety and stress	34
2.3.3. Physical activity and self esteem	35
2.3.4. Physical activity, psychological wellbeing and mood	36

2.4. Mechanisms relating activity to improved mental wellbeing	38
2.4.1. Biochemical mechanisms	38
2.4.2. Physiological mechanisms	39
2.4.3. Psychological mechanisms	40
2.4.3.1. Self-efficacy hypothesis	40
2.4.3.2. Mastery hypothesis	41
2.4.3.3. Distraction hypothesis	42
2.4.3.4. Social interaction hypothesis	42
2.5. Physical activity and happiness	43
2.5.1. The concept of happiness	44
2.5.2. Causes of happiness	44
2.5.3. The relationship between happiness and activity	47
3. Methodology	
3.1. Participants	51
3.2. Study design	52
3.3. Measures	54
3.3.1. Physical Activity Diary	54
3.3.1.1 Calculation of physical activity levels	55
3.3.2. Motion Sensor Armband	57
3.3.3. The Oxford Happiness Questionnaire	58
3.4. Data Analysis	60

4. Results	
4.1. Baseline data	62
4.2. Health Characteristics of the participants	63
4.3. Employment characteristics of participants	65
4.4. Activity levels of participants	66
4.4.1 Occupational activity	68
4.4.2 Non-occupational activity	70
4.4.2.1. Non-occupational leisure-time activity	70
4.4.2.2. Non-occupational household activity	72
4.4.3. Transport	72
4.5. Comparison of SWA's and PAD's	73
4.6. Happiness scores	74
4.6.1. Happiness and gender	75
4.6.2. Happiness and activity	76
4.6.3. Happiness and activity level groups	78
4.6.4. Happiness and age	79
5. Discussion and Conclusion	80
5.1. Study limitations	90
5.2. Areas for future research	91
5.3. Conclusion	92
6. References	94

7. Appendices

7.1 Approval Documents

7.2. Participant Information Pack

7.2.1. Participant Consent Form

7.2.2. Participant Information Sheet

7.2.3. SenseWear Armband Instruction Sheet

7.2.4. Physical Activity Diary

7.2.5. Oxford Happiness Questionnaire

7.3. Example of a completed Physical Activity Diary

7.4. Microsoft Excel Spreadsheets used for analysis of results

7.4.1. Examples of participant spreadsheets showing calculations in each domain and for each intensity of activity.

7.4.2. Happiness Consolidation Sheet for all participant scores.

7.5. SPSS Calculations.

7.5.1. Descriptive statistics – Happiness

7.5.2. Descriptive statistics – Physical Activity

7.5.3. Independent t-test between happiness scores and gender

7.5.4. Correlations to investigate relationship between happiness and energy expenditure (EE)

7.5.5. Correlations to investigate the relationship between happiness and minutes of activity per day

7.5.6. Independent t-test between leisure-time activity and happiness

7.5.7. Correlations to investigate the relationship between happiness and moderate/vigorous and vigorous activity

- 7.5.8 One way ANOVA to investigate the difference between the happiness scores in each of the three age groups.
- 7.5.9. One way ANOVA to investigate the difference between the happiness scores in each of the three age groups.
- 7.5.10. Correlation to investigate the relationship between daily energy expenditure (kcal) when taken from the PAD's and SWA's.
- 7.6. Comparison of SWA Armband and Physical Activity Diaries**
- 7.7. Example of Sensewear Armband individual report.**
- 7.8. Sensewear Armband product information.**

i. Glossary

Body Mass Index (BMI)	Weight in kilograms divided by height in metres squared: kg/m^2
Exercise	Exercise includes bouts of physical activity which is volitional, planned, structured, and repetitive. It is aimed at improvement or maintenance of any aspect of fitness or health and therefore forms only part of the overall measurement of physical activity. (Caspersen, Powell and Christenson.1985)
Fitness	A set of attributes that people have or achieve which relates to the ability to perform physical activity, and maybe used to determine general health or physical performance. (Caspersen, Powell and Christenson, 1985)
MET	Metabolic equivalent, 1 MET equals a person's metabolic rate of energy expenditure when at rest.
Physical Activity	Any force exerted by skeletal muscle that result in energy expenditure above resting level. This includes all human movement including work and leisure time activity, walking, transportation, exercise and sport. (Caspersen, Powell and Christenson 1985).

ii) List of Abbreviations

Abbreviation given in text	Full title
ACSM	American College of Sports Medicine
BHF	British Heart Foundation
BMI	Body Mass Index
CDCP	Center for Disease Control and Prevention (USA)
cm	Centimetres
CVD	Cardio Vascular Disease
DH	Department of Health (UK)
GHQ	General Health Questionnaire
HDA	Health Development Agency
HSE	Health And Safety Executive (UK)
IC	Information Centre
IOM	Institute Of Medicine (USA)
kg	kilogram
kcal	kilocalories
LEAP	Local Exercise Action Plans
MIND	National Association for Mental Health (UK)
NHS	National Health Service
NICE	National Institute of Clinical Excellence
OA	Occupational Activity
OHQ	Oxford Happiness Questionnaire
ONS	Office for National Statistics
PADs	Physical Activity Diaries
POMS	Profile of Mood States
POST	Parliamentary Office of Science and Technology (UK)
Std Dev	Standard Deviation
SWA	Senswear Armband
UK	United Kingdom
USA	United States of America
WHO	World Health Organisation
yrs	years

iii) List of Tables.

- Table 2.1. Mean Scores of life satisfaction and happiness as a function of exercise participation, gender and age.
- Table 3.1. Oxford Happiness Questionnaire – Example questions and scores.
- Table 3.2. Review of studies using the Oxford Happiness Questionnaire.
- Table 4.1. Health characteristic of the participants.
- Table 4.2. Percentage of participants in each BMI category, based on NHS groupings.
- Table 4.3. MET scores and intensity levels applied to activities.
- Table 4.4. Percentage of participants who were 'Inactive' 'Active' and 'Very Active' in accordance with DH guidelines.
- Table 4.5. Levels of happiness based on mean happiness scores for males and females.
- Table 4.6. Correlation values showing the strength of the relationship between happiness and energy expenditure.
- Table 4.7. Mean happiness scores for each activity group.
- Table 4.8. Mean happiness scores for each age group.
- Table 7.1. Daily expenditure levels (kcal) from PAD's and SWA's.
- Table 7.2. A comparison of over and under estimation values in daily energy expenditure taken from PAD's and SWA's.

iv) List of Figures.

Figure 4.1. Employment characteristics of all participants.

Figure 4.2. Daily moderate/vigorous activity levels of participants compared to DH recommendations.

Figure 4.3. Mean daily energy expenditure spent in each activity domain by male and females.

Figure 4.4. Types of exercise defined by popularity within the sample group.

Figure 4.5. Graph to show daily energy expenditure (kcal) using data from PAD's and SWA's.