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**ENERGY CRISIS: PREVALENCE, SEVERITY,
TREATMENT AND PERSISTENCE OF FATIGUE
AFTER MILD TRAUMATIC BRAIN INJURY**

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TO

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ABSTRACT

The objectives of this research were to investigate the prevalence and severity of post-mild traumatic brain injury (MTBI) fatigue in a non-litigant New Zealand sample and to evaluate the effectiveness of a treatment programme. Subsequently, a third objective evolved – the investigation of the natural history of post-MTBI fatigue and the degree to which reliable clinically significant change occurred over time regardless of intervention type. The research took the form of two studies where analysis was based on group data followed by analysis of the Study Two data at an individual participant level.

Study One, a longitudinal prospective study examined fatigue prevalence, severity, predictors and co-variables over six months post mild traumatic brain injury (MTBI). Participants completed the Fatigue Severity Scale (FSS), Rivermead Postconcussion Symptoms Questionnaire (RPSQ), Hospital Anxiety and Depression Scale (HADS) and the Short Form 36 Health Survey-Version 2 (SF-36v2). Complete data were available for 159 participants. Key measures; prevalence - RPSQ Item 6: severity - FSS. The effect of time on fatigue prevalence and severity was examined using ANOVA. Multiple regression analysis identified statistically significant covariates. The study found post-MTBI fatigue prevalence was 68%, 38% and 34% at 1 week, 3 and 6 months respectively. There was a strong effect for time over the first three months and moderate to high correlations between fatigue prevalence and severity. Early fatigue strongly predicted later fatigue. Depression, but not anxiety, was a predictor. Fatigue was seen as laziness by family or friends in 30% of cases. Conclusions for Study 1 were that post-MTBI fatigue is a persistent postconcussion

symptom, exacerbated by depression but not anxiety. It diminishes in the first three months and then becomes relatively stable, suggesting the optimum intervention placement is at three months or more post-MTBI.

Study Two was a quasi-experimental longitudinal prospective controlled study which had a two by three, treatment by time, repeated measures research design. Participants with a history of MTBI were recruited from three Concussion Clinics. Post-MTBI fatigue was identified through Item 6 of the Rivermead Postconcussion Symptoms Questionnaire (RPSQ) and the outcome measures were the FSS, Fatigue Assessment Scale, RPSQ, Hospital Anxiety and Depression Scale and Sydney Psychosocial Re-integration Scale. All treatment group participants ($N = 18$) came from the same Concussion Clinic as the principal researcher, and control participants ($N = 23$) came from other Concussion Clinics. The question of whether the participants thought their significant others perceived them as lazy was also explored in Study Two. A 12 week manualised programme (PERT) was developed specifically for Study Two and was delivered by either a clinical psychologist or occupational therapist through a combination of personal and phone sessions. No significant time by group effect was found for any of the outcome measures. A time effect was found for all of the outcome measures. During the search for explanations for these findings it was discovered that the two conditions were more similar than expected. The majority (85.7%) of the control group had, in accordance with current rehabilitation practice, engaged in exercise and/or received interventions similar to the treatment group which presented a confound to the study. The data from the two groups was combined and analysed for information regarding reliable clinically significant change RCSC in individual participants. No significant correlations with demographic variables such as time since

injury, age, gender, level of education, work type and injury type were found. Female gender was related to positive RCSC at three months post-baseline but not at six months post-baseline. Fatigue severity was significantly positively related to participants' belief that relatives perceived them as lazy. Study Two provided no evidence to support this treatment for post-MTBI fatigue. Prevalence and severity of post-MTBI fatigue reduced over the six months of Study Two, however on examination of individual data the majority of the participants showed no reliable clinically significant change, supporting the need for further research into finding an effective post-MTBI fatigue treatment. The small sample size and the similarity of the treatment and control group conditions were major factors in confounding the findings of the study.

There is a comparatively large percentage of individuals reporting prevalence and severity of post-MTBI fatigue in New Zealand samples and, although the combined psychoeducation and aerobic exercise approach could not be evaluated, the postconcussion and general literature suggests there is merit in continuing research into its effectiveness in treating post-MTBI fatigue.

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THESIS RESEARCH OUTPUTS

Parts of this thesis research have been published in refereed journal literature and presented at national and international conferences.

Norrie, J. (2005, August). *“Hitting the wall”: Fatigue and traumatic brain injury.*

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presented at the Rehabilitation: Challenges of Participation and Reintegration

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the Joint Conference of the Australian Psychological Society and New

Zealand Psychological Society, Auckland, New Zealand.

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ABBREVIATIONS

5HT	5-Hydroxytryptamine or Serotonin
ANOVA	Analysis of Variance
APOE	Apolipoprotein E
CBT	Cognitive Behaviour Therapy
CDC	Centres for Disease Control and Prevention
CFS	Chronic Fatigue Syndrome
CMRO2	Cerebral Metabolic Rate of Oxygen
CT	Computed Tomography
DAI	Diffuse Axonal Injury
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
DTI	Diffusion Tensor Imaging
FAS	Fatigue Assessment Scale
FSS	Fatigue Severity Scale
DWI	Diffusion Weighted Imaging
GCS	Glasgow Coma Scale

HADS	Hospital Anxiety and Depression Scale
ICD	International Classification of Diseases
IQ	Intelligence Quotient
LOC	Loss of Consciousness
MCID	Minimum Clinically Important Difference
MS	Multiple Sclerosis
MTBI	Mild Traumatic Brain Injury
NIH	National Institutes of Health
OEF	Oxygen Extraction Fraction
PCS	PostConcussion Syndrome
PET	Positron Emission Tomography
PMRS	Proton Magnetic Resonance Spectroscopy
PPCS	Persistent PostConcussion Syndrome
POMS	Profile of Mood States
PERT	Postconcussion Energy Recovery Training
PTA	PostTraumatic Amnesia
PTSD	PostTraumatic Stress Disorder

QOL	Quality Of Life
rCBF	regional Cerebral Blood Flow
RCI	Reliable Change Index
RCT	Randomised Controlled Trial
RPSQ	Rivermead Postconcussion Symptoms Questionnaire
SPECT	Single Photon Emission Computed Tomography
SPRS	Sydney Psychosocial Reintegration Scale
TBI	Traumatic Brain Injury
WAIS-R	Wechsler Adult Intelligence Scale – Revised
WHO	World Health Organisation

TABLE OF CONTENTS

ABSTRACT	iv
ACKNOWLEDGMENTS.....	vii
THESIS RESEARCH OUTPUTS	ix
ABBREVIATIONS	xi
LIST OF TABLES	xix
LIST OF FIGURES	xxi
LIST OF APPENDICES	xxii
CHAPTER 1: Overview	1
CHAPTER 2: Mild Traumatic Brain Injury	6
MTBI Definition	7
Postconcussion Syndrome	9
PCS Base Rates in General Population.....	10
Natural History of MTBI.....	13
Aetiology of PCS	19
<i>Biological factors</i>	20
<i>Neurogenic factors</i>	21
<i>Psychosocial factors</i>	23
Models of PCS	26
<i>Diathesis-stress model</i>	26

<i>Neuropsychological model</i>	27
<i>Physiological model</i>	28
<i>Multifactorial models of postconcussion syndrome</i>	29
Treatment for PCS	30
Summary	35
CHAPTER 3: Fatigue	36
Definition of fatigue	36
<i>Normal fatigue</i>	39
<i>Pathological fatigue</i>	40
Fatigue and Energy	40
Fatigue and Excessive Sleepiness	41
Fatigability	41
Base Rates of Fatigue in the General Population	42
Post-MTBI Fatigue	45
Characteristics of Post-MTBI Fatigue	45
Post-MTBI Fatigue and Other Illness-Related Fatigue	49
Post-MTBI Fatigue Onset.....	50
Prevalence of Post-MTBI Fatigue.....	51
Correlates of Fatigue and Post-MTBI Fatigue.....	56
Pathophysiology of Post-MTBI Fatigue	58
<i>Diffuse axonal injury</i>	60
<i>Psychological symptoms</i>	61

<i>Genetic factors</i>	61
<i>Advances in imaging technology</i>	62
Towards a Model of Post-MTBI Fatigue.....	65
<i>A neurophysiological model</i>	65
An Ecological Model of Post-MTBI fatigue	65
CHAPTER 4: Study One: Prevalence of Post-MTBI Fatigue	
in a New Zealand Sample	69
Mild traumatic brain injury and fatigue: A prospective	
longitudinal study	72
<i>Method</i>	80
<i>Results</i>	85
<i>Discussion</i>	93
CHAPTER 5: Treatment for Post-MTBI	108
Treatment of Fatigue in Other Illnesses.....	108
Psychoeducation	113
Exercise as Therapy for Fatigue.....	114
Other Targets for Fatigue Treatment	116
Summary	117
CHAPTER 6: Development of the Treatment Programme	
for Post-MTBI Fatigue	118
Rationale	118
Psychoeducation	120

Aerobic Exercise.....	123
Client and Therapist Manuals.....	125
Postconcussion Energy Recovery Training (PERT)	126
PERT programme content week by week.....	128
The Manuals – physical appearance	133
Other postconcussion manuals	134
CHAPTER 7: Study Two: Evaluation of the Effectiveness	
of a Treatment for Post-MTBI Fatigue	136
Introduction.....	136
Method	139
<i>Study Setting</i>	141
<i>Participants</i>	142
<i>Measures</i>	146
<i>Procedure</i>	150
Statistical Analysis.....	154
Results	158
<i>Part 1: Evaluation of the effectiveness of the PERT</i>	
<i>programme</i>	158
<i>Part 2: Analysis of Combined Treatment and Control Group</i>	
<i>data</i>	165
<i>Part 3: Post hoc questions arising from findings of</i>	
<i>Reliable Clinically Significant Change analysis</i>	171

CHAPTER 8: Discussion.....	174
Contribution to Current Research	187
Limitations	195
Conclusions	201
REFERENCES	203
APPENDICES	235

LIST OF TABLES

Tables	Page
Table 2.1 Base Rates of Common PCS Symptoms in Non-MTBI Samples	12
Table 2.2 Summary of Studies Reporting MTBI Prognosis	15
Table 2.3 Treatment for Mild Traumatic Brain Injury and Postconcussion Syndrome	32
Table 3.1 Common Elements in the Definitions of Subjective Fatigue Gleaned from the Literature	38
Table 3.2 Base Rates of Fatigue in the General Population	43
Table 3.3 Prevalence of Post-MTBI Fatigue in MTBI Samples	53
Table 4.1 Prevalence and Severity of Post-MTBI Fatigue at 1 week, 3 months and 6 Months for All Participants	86
Table 4.2 Prevalence and Severity of Post-MTBI Fatigue at Each Interval for Population with Data Available at All Three Intervals	87
Table 4.3 Comparison of the Single Item Measure of Fatigue RPSQ Item 6), the Nine Item FSS, the Four Item SF36v2 Vitality Subscale, Depression and Anxiety over Time and Within the Measures ($N = 159$)	88
Table 4.4 Descriptive Statistics for Fatigue and Energy for 1 Week, 3 Months and 6 Months Post Injury	90
Table 4.5 ANOVA Summary of the Within-Subjects Effects for Fatigue Prevalence and Severity, and Energy Over the First 6 Months Post MTBI	91
Table 4.6 Summary of Hierarchical Regression Analysis with Fatigue Severity, Depression and Anxiety, at 3 Months, as Predictors of Fatigue	

Severity at 6 Months Post MTBI.....	93
Table 4.7 Sensitivity and Specificity of RPSQ Item 6 (fatigue) ≥ 1.5 in Discriminating Pathological Fatigue at 6 Months (FSS6 ≥ 3.7) ($N = 192$)	93
Table 5.1 Treatment Approaches for Fatigue Across a Range of Illness Conditions.....	109
Table 7.1 Demographic and Injury-related Factors	145
Table 7.2 Descriptive Statistics for Prevalence and Severity of Post-MTBI Fatigue for Treatment and Control Groups	159
Table 7.3 Summary of Results of the Within Subjects ANOVA for Secondary Outcome Measures	164
Table 7.4 Descriptive Statistics for Prevalence and Severity of Post-MTBI Fatigue in the Whole Sample.	165
Table 7.5 Change Scores for The FSS and FAS Measures at 3 and 6 Months Post Baseline.....	168
Table 7.6 Summary of the Change Status of Participants at 3 and 6 Months for the Post-MTBI Fatigue Severity Measures FSS and FAS	169
Table 7.7 Summary of Results of One-way Repeated Measures ANOVA for Secondary Outcome Measures.....	171

LIST OF FIGURES

Figures	Page
Figure 3.1	Task-related brain activation on fMRI63
Figure 3.2	Neurophysiological model of post-MTBI fatigue66
Figure 3.3	Proposed ecological model of post-MTBI fatigue67
Figure 6.1	List of topics covered each week of the PERT programme..... 127
Figure 6.2	Schedule for delivery of the PERT programme 128
Figure 6.3	PERT manual fatigue and energy rating scales 129
Figure 7.1	Flowchart of post-MTBI fatigue treatment evaluation research design 151
Figure 7.2	Schedule for assessment of control group 154
Figure 7.3	Change in energy and fatigue over the 12 week PERT programme 161
Figure 7.4	Fatigue and energy ratings, exercise and naps in minutes 162

LIST OF APPENDICES

Appendix	Page
Appendix A:	Information Sheet – Treatment Group 236
Appendix B:	Information Sheet – Control Group 240
Appendix C:	Consent To Be Contacted – Control Group..... 243
Appendix D:	Consent To Participation - All 245
Appendix E:	Structured Interview Form 246
Appendix F:	Online Information Sheet 249
Appendix G:	Online Questionnaires 252
Appendix H:	Online Diary Data Entry 263
Appendix I:	Pert Programme - Therapist Manual..... 265
Appendix J:	Abstracts of Publications and Conference Presentations 314
Appendix K	Statement of Contribution to Doctoral Thesis
	Containing Publications 324
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