

**SUBJECTIVE WELL-BEING IN FEMALE PARTNERS OF THE
TRAUMATICALLY HEAD-INJURED: THE ROLES OF TIME, LIFE
CIRCUMSTANCES, PERSONALITY AND SURVIVOR FUNCTIONING**

by

Susanne R. Schibler

M.A., Simon Fraser University, 1989

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

in the Department
of Psychology

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SIMON FRASER UNIVERSITY

June 1996

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APPROVAL

Name: Susanne R. Schibler
Degree: Doctor of Philosophy
Title of Dissertation: Subjective Well-being in Female Partners of the
Traumatically Head-injured: The Roles of Time,
Life Circumstances, Personality and Survivor
Functioning.

Examining Committee:

Chairperson: Dr. Anand Paranjpe

~~Dr. Marilyn L. Bowman~~
Senior Supervisor

~~Dr. Raymond M. Coopman~~

~~Dr. Marlene Moretti~~

Dr. Rosemary Vernon-Wilkinson
University of British Columbia

~~Dr. Neil Watson~~
Internal Examiner

Dr. Catherine A. Mateer
University of Victoria
External Examiner

Date Approved: *June 11 1996*

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Subjective Well-being in Female Partners of the Traumatically

Head-injured: The Roles of Time, Life Circumstances,

Personality and Survivor Functioning

Author: _____
(signature)

Susanne R. Schibler

(name)

July 8/96

(date)

ABSTRACT

The present study centered around the adjustment of female partners of traumatically head-injured men. Subjects were sixty women, who knew their male partner at the time of his head-injury and were living with him at the time of data collection. Results were presented in terms of three objectives that the present study was designed to meet. A first objective was to add to a growing base of descriptive information about post-injury adjustment in family members of the head-injured. The findings indicated that the present sample's adjustment consistently fell between that of normal adults (who were better adjusted) and psychiatric samples (who were more poorly adjusted). Moreover, the present sample reported more adjustment problems than other samples of family members of the traumatically head-injured. A second objective was to investigate the role of time since injury as a mediator of the adjustment of family members and their head-injured partners. Overall, the present study provided no evidence for systematic changes in adjustment over time: none of the adjustment variables changed strongly and consistently as a function of time, and no trend toward better or worse adjustment over time emerged. A third objective was to investigate the relative efficacy of three families of variables (Life Circumstances, Personality Disposition, Head-Injured Man's Functioning) to predict three aspects of family member Subjective Well-being. The family of Life Circumstances variables was most strongly associated with Subjective Well-being, followed by Personality Disposition and the Head-Injured Man's Functioning. An inspection of the importance of individual predictors within the families of variables suggested that, in each case, there was one powerful predictor variable. These predictor variables were social adjustment problems

(which was by far the best predictor), family member neuroticism and family member ratings of the head-injured man's psychosocial competency. Results were interpreted in terms of their clinical and empirical implications.

ACKNOWLEDGEMENTS

The development and execution of this project involved the support of many individuals. I would like to thank my senior supervisor, Dr. Marilyn Bowman, for her enthusiasm, her creative input at every stage of this research, and her help with data collection. I am also grateful to Dr. Ray Koopman, for his help with data analysis and presentation, and for being so generous with his time. I would like to thank Dr. Marlene Moretti for her interest in my research area and her insightful comments, and Dr. Rosemary Vernon-Wilkinson for fostering my involvement in neuropsychology and helping with data collection. I want to extend my sincere thanks to Dr. Catherine Mateer for serving as my external examiner, and to Dr. Neil Watson for serving as my internal external examiner.

I would like express my sincere appreciation to Ms. J. Kell and Mr. J. Scollon of the Head Injury Association of British Columbia, who supported my research from the start, and who served as my "guardian angels" during the data collection phase. Moreover, I would like to thank the following professionals and support group leaders, who provided me with valuable suggestions and contributed their time and effort to the data collection process: Dr. V. Amell, GF Strong Rehabilitation Centre, Vancouver, B.C.; Dr. I. Schultz, Psychology Department, Workers' Compensation Board of British Columbia, Richmond, B.C.; Ms. C. Clark, Royal Columbian Hospital, New Westminster, B.C.; Ms. J. E. Connell, therapist in private practice, New Westminster, B.C.; Ms. T. Crouse, Columbia Rehabilitation Centre, Calgary, Alberta; Ms. J. Flather Murrell, Support Group Leader, Burnaby, B.C.; Ms. B. Grantham, Support Group Leader, Duncan, B.C.; Ms. L. Hirsekorn, Community Therapists Inc., Vancouver, B.C.; Dr. L.W. Krywaniuk,

Neuropsychologist in private practice, Vancouver, B.C.; Drs. A. Mattson & J. Douglas, Head Injury Unit, Workers' Compensation Board of British Columbia, Richmond, B.C.; Ms. K. McGeorge, Support Group Leader, Langley, B.C.; Dr. S. Miller, Columbia Centre for Rehabilitation, Vancouver, B.C.; Dr. C. P. Peel, Neuropsychologist in private practice, Surrey, B.C.; Ms. J. Reid, Support Group leader, Smithers, B.C.; Mr. D. Rich, John Simpson Centre, Burnaby, B.C.; Dr. D. Russell, Neuropsychologist in private practice, Nanaimo, B.C.; Ms. E. Seales, M.V.H. Rehabilitation Services Ltd., Vancouver, B.C.; Ms. A. Van Drongelen, Nanaimo, B.C.; Dr. U. Wild, Neuropsychologist in private practice, Vancouver, B.C.; Ms. V. Zilkie, Horizon Community Occupational Therapists, Inc., Kelowna, B.C.

I would also like to thank the people who are important in my personal life. I am grateful to my parents, Peter and Rita Schibler, for their excitement about my research, and their general support of my career choice. As promised, this one's for you. I would like to thank my brother Christian for being such a good friend, and my friends Jennifer Reiss, Sandra Vermeulen, Brian Grady and Joanne MacKinnon, for their encouragement and for adding play to my work. I would also like to thank Sharon Driscoll for her support and helpful perspective.

Last but not least, I want to extend my sincere appreciation to the sixty women who generously dedicated their time and effort to completing my questionnaire packages. May your strength and courage serve as an example to all of us.

DEDICATION

To my parents, Rita and Peter Schibler

TABLE OF CONTENTS

APPROVAL . . . . .	.ii
ABSTRACT . . . . .	.iii
ACKNOWLEDGEMENTS . . . . .	.v
DEDICATION . . . . .	.vii
LIST OF TABLES. . . . .	.xii
TESTIMONY. . . . .	.xv
I. INTRODUCTION . . . . .	.1
The Effects of Traumatic Head-Injury on Survivors. . . . .	.2
Physical Consequences . . . . .	.2
Cognitive-Perceptual Consequences. . . . .	.3
Personality and Emotional Consequences. . . . .	.6
Psychiatric Consequences. . . . .	.8
Psychosocial Consequences. . . . .	.10
The Effects of Traumatic Head-Injury on Family Members . . . . .	.13
Differential Impact on Wives versus Mothers . . . . .	.16
The Natural History of Patient Recovery and Family Member Adjustment. . . . .	.18
Stages of Recovery from Head-Injury. . . . .	.18
Secondary Regression and 'Denial' of Deficit. . . . .	.19
Theoretical Stages of Family Member Adjustment. . . . .	.22
Wortman and Cohen Silver's Critique of Stage Models of Adjustment . . . . .	.25
The Prediction of Post-Injury Family Member Adjustment. . . . .	.26
First Generation Studies - The Use of Psychiatric Disturbance and Subjective Burden as Outcome Criteria . . .	.26

Second Generation Studies . . . . .	.29
Time Since Injury . . . . .	.30
Financial Strain . . . . .	.32
Injury Severity . . . . .	.33
Head-Injured Person's Psychosocial Competency . . . . .	.35
Family Member Personality Disposition . . . . .	.36
Family Member Social Adjustment and Role Performance . . . . .	.38
The Present Study . . . . .	.39
Objectives . . . . .	.39
Subjective Well-being . . . . .	.40
Hypotheses . . . . .	.41
II. METHOD . . . . .	.48
Procedure . . . . .	.48
Data Collection . . . . .	.48
Data Presentation and Analysis . . . . .	.50
Subjects . . . . .	.52
Subjects' Head-Injured Partners . . . . .	.55
Injury-related Information . . . . .	.57
Measures . . . . .	.61
Mood Disturbance . . . . .	.61
Positive Affect . . . . .	.63
Satisfaction With Life . . . . .	.64
Financial Strain . . . . .	.65
Social Adjustment Problems . . . . .	.65
Personality Disposition . . . . .	.67
Perceived Psychosocial Competency . . . . .	.69

III. RESULTS . . . . .	.72
Putting the Results in Context - Subject Sample Composition . . . . .	.72
Outline of Presentation of Results . . . . .	.74
I. Descriptive Analysis of Subjects' Adjustment and their	
Head-Injured Partners' Functioning . . . . .	.74
Subjective Well-being . . . . .	.75
Life Circumstances . . . . .	.80
Personality Disposition . . . . .	.85
Head-injured Man's Functioning. . . . .	.88
II. Does the Adjustment of Subjects and their Head-Injured	
Partners Change as a Function of Time Since Injury? . . . . .	.90
III. What Predicts Family Member Subjective Well-Being? . . . . .	.97
Missing Data in the Injury Severity Variable . . . . .	.97
Introductory Comments - Prediction of Subjective	
Well-Being. . . . .	.102
Prediction of Mood Disturbance. . . . .	.104
Prediction of Positive Affect . . . . .	.110
Prediction of Satisfaction With Life . . . . .	.115
Summary. . . . .	.119
IV. DISCUSSION . . . . .	.124
How are They Doing? Descriptive Analysis of Subjects'	
Adjustment and their Head-Injured Partners' Functioning . . . . .	.126
The Present Sample versus Normal Adults or Pre-Injury	
Conditions . . . . .	.126
The Case of Personality . . . . .	.127
The Present Sample Versus Clinical Samples . . . . .	.130

The Present Sample Versus other Samples of Family Members of the Head-Injured	131
Does the Adjustment of Subjects and their Head-Injured Partners Change as a function of Time Since Injury?	133
What Predicts Family Member Subjective Well-Being?	136
The Importance of Social Adjustment.	137
The Importance of Family Member Neuroticism	138
The Importance of the Head-injured Man's Psychosocial Functioning	139
Clinical Implications.	140
Future Research Directions.	142
REFERENCES.	145
APPENDIX A - Stages in the Evolution of Family Reactions	159
APPENDIX B - Demographic Information Sheet	160
APPENDIX C - Modifications made to the Social Adjustment Scale - SR. .163	
APPENDIX D - Profile of Mood States Factor Scores and Effect Sizes for the Present Sample, College Students and Female Psychiatric Outpatients	165
APPENDIX E - Social Adjustment Scale - SR Subscale Scores and Effect Sizes for the Present Sample, Normal Adults and Clinical Samples.	166
APPENDIX F - Ranking of Patient Competency Rating Scale Items According to Reported Degree of Difficulty for Head-Injured Men. . . .	168
APPENDIX G - Comparisons of Sample Subsets With and Without Injury Severity Data	170
APPENDIX H - Exploration of the Effect of Litigation Status on Family Member and Survivor Functioning	174

LIST OF TABLES

1	First Generation Family Member Prediction Studies . . . . .	.28
2	Second Generation Family Member Prediction Studies . . . . .	.31
3	Design for Descriptive Hypotheses . . . . .	.42
4	Design for Exploration of Time Since Injury. . . . .	.44
5	Design for Prediction of Subjective Well-Being. . . . .	.46
6	Sources of Data Included in the Present Study. . . . .	.50
7	Subject Demographics . . . . .	.52
8	Subjects' Occupational Status at the Time of Injury and at Data Collection. . . . .	.53
9	Subjects' Levels of Occupational Involvement at the Time of Injury and at Data Collection . . . . .	.54
10	Head-Injured Men's Occupational Status at the Time of Injury and at Data Collection . . . . .	.55
11	Head-Injured Men's Levels of Occupational Involvement at the Time of Injury and at Data Collection. . . . .	.56
12	Time-Since-Injury Categories . . . . .	.57
13	Causes and Locations of Men's Head-Injuries. . . . .	.58
14	Injury Severity Criteria . . . . .	.60
15	Injury Severity Levels . . . . .	.61
16	Profile of Mood States Total Mood Disturbance Score and Normative Data. . . . .	.76
17	Positive Affect Score and Normative Data. . . . .	.78
18	Satisfaction With Life Scale Score and Normative Data. . . . .	.79
19	Correlations Between Three Aspects of Subjective Well-Being . . . .	.80
20	Perceived Financial Strain . . . . .	.81

21	Social Adjustment Scale - SR Summary Score and Normative Data . . . . .	.83
22	Eysenck Personality Inventory Scores and Normative Data . . . . .	.86
23	Patient Competency Rating Scale Score and Normative Data . . . . .	.89
24	Average Frequency of Endorsement of Patient Competency Rating Scale Response Categories . . . . .	.90
25	Correlations of Adjustment Variables with Time Since Injury . . . . .	.91
26	Correlations of Adjustment Variables with Time Since Injury Restricted to 24 or 12 Months . . . . .	.93
27	Correlations of Adjustment Variables and the Square Root of Time Since Injury . . . . .	.94
28	Principal Components Analysis of Time Since Injury and Adjustment Variables - Initial Statistics . . . . .	.95
29	Principal Components Analysis of Time Since Injury and Adjustment Variables - Rotated Factor Loadings and Variance Accounted For . . . . .	.96
30	Univariate Comparisons between Cases With and Without Injury Severity Data . . . . .	.99
31	Correlation Matrices For Cases With and Without Severity Data . . . . .	.101
32	Prediction of Mood Disturbance with Life Circumstances Factors . . . . .	.105
33	Prediction of Mood Disturbance with Personality Factors . . . . .	.105
34	Prediction of Mood Disturbance with Factors Related to the Head-Injured Man's Functioning . . . . .	.106
35	Prediction of Mood Disturbance Using all Factors. . . . .	.109
36	Prediction of Positive Affect with Life Circumstances Factors. . . . .	.111
37	Prediction of Positive Affect with Personality Factors . . . . .	.111
38	Prediction of Positive Affect with Factors Related to the Head-Injured Man's Functioning . . . . .	.112

39	Prediction of Positive Affect Using all Factors	114
40	Prediction of Satisfaction With Life with Life Circumstances Factors.	116
41	Prediction of Satisfaction With Life with Personality Factors.	117
42	Prediction of Satisfaction With Life with Factors Related to the Head-injured Man's Functioning.	118
43	Prediction of Satisfaction With Life Using all Factors	120
44	Summary of Prediction of Subjective Well-Being	122

TESTIMONY

"I feel [women living with head-injured men] are the forgotten victims of our partner's accident. My emotional life has been a real roller coaster since the accident...

Your questions made me realize that though I have released a lot of the anger, I am still emotionally jittery and I need to do something about this. Ironically, my husband has improved and I seem to be slipping back! Maybe subconsciously I feel I can finally give up being the strong one and let go of all the feelings I have been storing.

Right after the accident we both made it through on denial and being grateful for any improvement my husband experienced... We enjoy close family relations and I can share my concerns regarding my husband but in sharing I feel guilty and disloyal so I do not share too often. With friends I have been very careful who I shared with because I want to protect my husband's reputation as a strong, well respected community worker. He is a talented man and is still very much involved in the community and does well as long as he teams with people who can supply what he lacks since his accident. Despite the fact that he lost his job, we are fortunate in many ways. This whole episode has been a growing experience for both of us... though I wouldn't wish it on anyone."

Letter from Subject #20

"I have everything important to me except my husband as he was."

Comment from Subject #42

"... Every day [my husband] has different moods. If any of my immediate family is visiting, he is very fidgety and irritable. He is abrupt and sarcastic. That makes me so angry inside. ... I am forever apologizing for him. ... [His] rudeness makes it very hard for me and my family. Before [his] accident, we went fishing, dancing, visiting friends and eating out. [He] used to cook big meals which were delicious and enjoyed by everyone... Remember that I love [him] very much, which makes me bear my cross. ... Someday, I hope [my husband] will change."

Letter from Subject #1

CHAPTER I

INTRODUCTION

It is only recently that researchers and clinicians have begun to direct their attention toward the impact of traumatic head-injury on survivors' family members (Cavallo, Kay & Ezrachi, 1992; Liss & Willer, 1990). This new interest can be attributed to the greater prevalence of survivors of severe head-injury due to recent advances in medical technology and acute care (Elsass & Kinsella, 1987; Higgenbottom, 1993; Jacobs, 1988; Karpman, Wolfe & Vargo, 1986; Lishman, 1973; Moore & Stambrook, 1995; Moore, Stambrook, Gill & Lubusko, 1992), and to an increasing appreciation of the all-encompassing effects of head-injury on daily living (Chelune & Moehle, 1986; Liss & Willer, 1990). Given that most traumatically head-injured persons are young (Garden, Bontke & Hoffman, 1990; Moore & Stambrook, 1995; Urbach & Culbert, 1991) and have a normal life-expectancy, their altered intellectual, emotional and psychosocial status poses a long-term burden for family members (Thomsen, 1974).

The present study focuses on the post-injury adjustment of female partners of traumatically head-injured men. This study has three objectives: First, various aspects of family member and survivor adjustment are documented in order to add to a growing body of information about female partners of the head-injured. Second, the role of time (since injury) as a mediator of adjustment in the female family members and the head-injured men is investigated. Third, the relative efficacy of three families of variables (family member Life Circumstances, family member Personality Disposition and the Head-injured Man's Functioning) to predict the women's Subjective Well-being is evaluated.

The first part of the following review summarizes common consequences of traumatic head-injury for survivors and family members, and describes the process of recovery and adjustment. The second part introduces the factors that have been most consistently associated with variations in family member adjustment.

The Effects of Traumatic Head-Injury on Survivors

Higgenbottom (1993, p.3) cited the following statistics in a recent report about traumatic head-injury: "Every year in British Columbia, four thousand men, women and children suffer a traumatic brain injury. One in four of these people will die from their injuries; one in five will survive to have ongoing inpatient and outpatient rehabilitation needs. One in six hospital, extended care and long-term care beds in this province is occupied by the survivor of a brain injury. The estimated national costs for the treatment, rehabilitation and care of survivors are \$4 billion annually. For British Columbia, the annual estimate is \$650 million."

Given that traumatic head-injury typically results in diffuse brain damage, it affects virtually every aspect of functioning (Goldstein & Levin, 1987). Specifically, difficulties are typically observed within the realms of physical, cognitive-perceptual, personality, emotional, psychiatric and psychosocial functioning.

Physical Consequences

Traumatic head-injury is often accompanied by pain, ambulation problems, stiffness and bodily weakness that result either from physical injuries that occurred at the same time as the head-injury (Klonoff, Snow &

Costa, 1986), or that stem from the neurological insult sustained. Given that the description and treatment of purely physical sequelae tend to fall outside of the realm of neuropsychology, relatively little attention has been paid to them in the mental health literature. The only exception is the symptom complex referred to as Post-Concussional Syndrome, which is typically seen after mild traumatic head-injury (McKinlay, Brooks & Bond, 1983; McLean, Temkin, Dikmen & Wyler, 1983) and/or early in the recovery process (Lishman, 1973; McLean et al., 1983). Post-Concussional Syndrome typically includes headaches, dizziness, blurred vision, hypersensitivity to noise and light, low energy or fatigue, and disturbances in basic cognitive functions such as concentration (Elsass & Kinsella, 1987; Jacobs, 1988; Klonoff et al., 1986; Levin, Grossman, Rose & Teasdale, 1979; Lishman, 1973; McKinlay et al., 1983; McLean et al., 1983). The Post-Concussional Syndrome literature reveals controversy over whether these symptoms result directly from neurological insult, or whether they constitute a psychological reaction to trauma (Lishman, 1973; McKinlay et al., 1983).

Cognitive-Perceptual Consequences

Cognitive-perceptual consequences of traumatic head-injury can be grouped into six broad categories of dysfunction (Prigatano & Fordyce, 1986) that reflect a loosely constructed hierarchy of increasing complexity and demand. One area of cognitive-perceptual functioning that is virtually always affected by traumatic head-injury is attention and concentration (Klonoff et al., 1986; Levin et al., 1979; Lishman, 1973; Prigatano & Fordyce, 1986). Head-injured persons typically suffer from distractibility (Prigatano & Fordyce, 1986) and problems with sustained attention, selective attention and divided attention (Prigatano & Fordyce, 1986; Stuss et al., 1985). Tasks

that require shifting attention tend to pose a special challenge to the head-injured (Prigatano & Fordyce, 1986).

A second cognitive-perceptual problem area is memory and new learning (Klonoff et al., 1986; Lishman, 1973; Prigatano & Fordyce, 1986). Whereas long-term memory processes are disrupted in some cases (Levin et al., 1979) but not in others (Prigatano & Fordyce, 1986), the storage and retrieval of recent memories are highly susceptible to traumatic head-injury (Levin et al., 1979; McLean et al., 1983; McMillan & Glucksman, 1987; Prigatano & Fordyce, 1986), especially when interference is present (Stuss & Benson, 1984; Stuss et al., 1985). A survey conducted by Karpman et al. (1986) indicated that head-injured people reported memory disturbance as one of the most distressing long-term consequences they had to cope with.

A third cognitive-perceptual area that is sensitive to traumatic head-injury is information processing, in terms of both capacity and speed (Stuss et al., 1985). Psychomotor slowing and resulting cognitive and behavioral inefficiency are commonly reported in descriptions of severely head-injured persons (Goldstein & Levin, 1987; Klonoff et al., 1986; Levin et al., 1979; Lishman, 1973; McLean et al., 1983; McMillan & Glucksman, 1987; Prigatano & Fordyce, 1986).

A fourth problem area is perception and judgement (Prigatano & Fordyce, 1986). Head-injured persons are often inefficient in screening environmental information (Levin et al., 1979), interpreting situational cues (Goldstein & Levin, 1987; Prigatano & Fordyce, 1986), profiting from feedback by analyzing settings (Goldstein & Levin, 1987), and anticipating the future consequences of their actions (Lishman, 1973). Not surprisingly, this results in cognitive-perceptual flaws such as poor predictive judgment

(Lishman, 1973), unrealistic self-appraisal and impaired social awareness (Prigatano, 1987).

A fifth problem area is executive functioning (Lezak, 1983; Luria, 1966; Prigatano & Fordyce, 1986), which is typically associated with frontal lobe functioning (Stuss & Benson, 1984) and which was defined by Goldstein and Levin (1987, p. 331) as the "process of placing thoughts and plans into action". Lezak (1983) contrasts cognitive functioning with executive functioning by emphasizing that the former is concerned with what (needs to be accomplished, is known), while the latter focuses on how (it shall be accomplished). She delineated four steps in executive functioning: 1) goal formulation, or the realization and definition of an objective ("What do I want or need?"), 2) planning, or the analysis of the situation ("How will I get what I need?"), 3) initiation and carrying out of behavior ("Am I doing things to obtain what I need?"), and 4) effective performance of purposive behavior ("Are my activities fulfilling my objective?") (Lezak, 1982, 1983, 1985). Goldstein and Levin (1987) proposed a similar stage model of problem-solving, which involved motivation, formulation of a problem or strategy, execution of the plan, and comparison of the solution against the problem.

Effective executive functioning requires such higher-order cognitive abilities as convergent and divergent reasoning, abstract thinking, concept formation, flexibility in problem-solving, and ongoing self-monitoring and attending to feedback about one's behavior (Goldstein & Levin, 1987; Lezak, 1982, 1983; Prigatano & Fordyce, 1986). All of these abilities are frequently impaired in the traumatically head-injured, whose thinking tends to be concrete, stimulus-bound, perseverative and impulsive (Goldstein & Levin, 1987; Lezak, 1978; Mauss-Clum & Ryan, 1981). Moreover, problems with low motivation and initiative, which are common sequelae of head-injury

(Goldstein & Levin, 1987; Lezak, 1982, 1983; Prigatano & Fordyce, 1986), affect many aspects of problem-solving; such as whether a problem is perceived and a solution is attempted, whether appropriate cognitive and behavioral strategies are selected, and whether behavior is modified in accordance with situational demands (Goldstein & Levin, 1987).

A last problem area concerns the linguistic functions (Klonoff et al., 1986; Prigatano & Fordyce, 1986), where both expressive and receptive aphasic disturbances can be observed following head-injury. In terms of speech production, head-injured persons' verbalizations may show impoverishment in fluency, pacing and diction (Jacobs, 1988; Levin et al., 1979; Prigatano & Fordyce, 1986; Prigatano, Roueche & Fordyce, 1986). Moreover, speech initiation, word finding, naming, repetition, reading and writing may be impaired (Levin et al., 1979; Prigatano & Fordyce, 1986). Receptive aphasic deficits tend to center around comprehension difficulties such as impaired understanding of instructions (Levin et al., 1979). Non-aphasic linguistic consequences of traumatic head-injury include talkativeness (Klonoff et al., 1986; Prigatano & Fordyce, 1986; Prigatano et al., 1986; Stuss & Benson, 1984) and tangentiality of speech due to poor self-monitoring and similar cognitive deficits (Levin et al., 1979). Jacobs' (1988) survey of a large severely head-injured sample suggested that communication was especially problematic when the situation was complex, when abstract skills were required, or when the conversation occurred outside the home (and thus in an unfamiliar setting).

Personality and Emotional Consequences

Lishman (1973, p. 311) defines personality change as "a change in reactions to events and to people, in simple terms 'a change from the type of

person we knew before". This statement echoes the frequent experiences of head-injured persons' family members of "living with a stranger" and explains why relatives tend to find personality change the most difficult post-traumatic consequence to cope with (Thomsen, 1974). Personality change can be immediately obvious or subtle (Lishman, 1973) and can result from neurological trauma (i.e., brain damage sustained in the injury), psychological reactions due to trauma (e.g., inability to cope with environmental demands as a result of reduced cognitive and psychological resources) and long-term or characterological factors (Lishman, 1973; Prigatano, 1987). Although reports of post-traumatic personality change range from the negative (e.g., bitterness, frustration) to the neutral (e.g., cautiousness, seriousness) and the positive (e.g., increased maturity and understanding) (Karpman et al., 1986; Tyerman & Humphrey, 1984), a survey of the literature suggests a preponderance of negative changes.

Among the most commonly reported organic post-injury personality changes are child-like or immature behavior (Lezak, 1978; Lishman, 1973; Prigatano, 1987; McKinlay, Brooks, Bond, Martinage & Marshall, 1981; Weddell, Oddy & Jenkins, 1980), disinhibition (Lishman, 1973; Weddell et al., 1980), impulsivity (Elsass & Kinsella, 1987), belligerence (Klonoff et al., 1986; Prigatano, 1987), negativism (Klonoff et al., 1986), impatience or difficulty delaying gratification (Elsass & Kinsella, 1987; Mauss-Clum & Ryan, 1981; Prigatano, 1987), low frustration tolerance or irritability (Klonoff et al., 1986; Lishman, 1973; Mauss-Clum & Ryan, 1981; Prigatano, 1987; Thomsen, 1984; Tyerman & Humphrey, 1984; Weddell et al., 1980), asponaneity (Prigatano, 1987), and apathy or low motivation (Jacobs, 1988; Levin & Goldstein, 1987; Lezak, 1978; Lishman, 1973; Prigatano, 1987).

In terms of emotional consequences, both the modulation and the experience of affect tend to be affected by traumatic head-injury. Deficits in emotional control are often manifested in terms of lability or mood swings (Elsass & Kinsella, 1987; Jacobs, 1988; Klonoff et al., 1986; Lezak, 1978; McKinlay et al., 1981; Thomsen, 1984), blunting of affect (Lishman, 1973), and hyperemotionality (Goldstein & Levin, 1987). Thomsen (1974) reported that "pathological" laughing and weeping was a source of particular embarrassment for relatives of head-injured persons.

In terms of the experience of affect, reports of anxiety, bewilderment, sadness, loneliness and anger abound in the traumatic head-injury literature. Difficulties with verbal aggression and temper tantrums are common (Jacobs, 1988; Levin et al., 1979; Lezak, 1988; Lishman, 1973; Mauss-Clum & Ryan, 1981; McKinlay et al., 1981; Oddy, Coughlan, Tyerman & Jenkins, 1985; Prigatano, 1987; Tyerman & Humphrey, 1984), and at times escalate into violent acting out against family members (Brooks, Campsie, Symington, Beattie & McKinlay, 1986; Prigatano, 1987).

Psychiatric Consequences

In many cases, emotional disturbance reaches the proportion of psychiatric disorder. Goldstein and Levin (1987) view depression as the most common emotional characteristic of head-injured persons. Sadness, loneliness, reduced energy, low enthusiasm, frustration and the experience of loss are prominent features of post-injury dysphoria (Goldstein & Levin, 1987; Jacobs, 1988; Karpman et al., 1986; Klonoff et al., 1986; Levin et al., 1979; Lezak, 1983; Lishman, 1973; McKinlay et al., 1981; Prigatano, 1987; Tyerman & Humphrey, 1984).

Anxiety disorders, involving chronic diffuse anxiety, phobias (e.g., avoidance of accident-related places or activities), post-traumatic stress reactions (e.g., dreams or flashbacks to the accident), and obsessional features are also frequently documented (Jacobs, 1988; Levin et al., 1979; Lishman, 1973; Tyerman & Humphrey, 1984).

Unfortunately, most studies investigating psychiatric functioning following head-injury fail to classify cases according to formal diagnostic systems such as the DSM - IV (American Psychiatric Association, 1994). Nevertheless, these studies provide an estimate of the prevalence of relatively severe mental disturbance. Tyerman and Humphrey (1984), for example, found that 64% of a severely head-injured sample studied within 2 and 15 months post-injury experienced significant psychological disturbance. Sixty per cent were classified as clinically depressed and 44% as clinically anxious. Similarly, Elsass and Kinsella (1987) found that 53% of severely head-injured persons qualified as "psychiatric cases" on the General Health Questionnaire, compared to 27% of a group of demographically matched control subjects. Kinsella, Moran, Ford and Ponsford (1988) found that 59% of a severely injured sample rated as psychiatric cases on the General Health Questionnaire. In this study, 32% were classified as clinically depressed and 26% were classified as clinically anxious.

In addition to mood disorder, neurotic or personality-based psychiatric problems are also common in head-injured persons. Given the physical trauma of head-injury, it is not surprising that hypochondriacal reactions and somatization of psychological distress are likely psychiatric presentations (Lishman, 1973). Moreover, given the high frequency of cognitive-perceptual impairment (e.g., memory problems and a failure to understand the intentions of others) (Prigatano, 1987), paranoid reactions are also commonly

documented (Klonoff et al., 1986; Newton & Johnson, 1985; Prigatano, 1987). According to a seminal early review of psychiatric disorder in the head-injured (Lishman, 1973), mental disturbances are attributable to a host of etiological factors, including injury-related variables (e.g., amount and location of neurological damage), environmental factors, emotional responses to the injury, and premorbid personality.

Psychosocial Consequences

Given the all-encompassing nature of the consequences of traumatic head-injury, it is not surprising that survivors' quality of life is significantly impaired in areas as diverse as interpersonal relationships, independent living, work, recreation and leisure, and community involvement (Jacobs, 1988; Jellinek, Torkelson, Richard & Harvey, 1982; Klonoff et al., 1986; Levin et al., 1979; Lishman, 1973; Tyerman & Humphrey, 1984). Jacobs (1988) found that about 25% of a severely head-injured sample had behavioral or emotional problems that significantly interfered with daily living.

In terms of interpersonal relationships, both the nature and the frequency of contact are affected by head-injury (Weddell et al., 1980). Factors that lead the head-injured person to form "qualitatively different" relationships (Weddell et al., 1980) include misinterpretation of social cues, poor judgment, immaturity, decreased initiative, slowness, need for immediate need gratification and attention, lack of consideration for others, emotional lability, and inappropriate social verbalizations or behavior (Elsass & Kinsella, 1987; Klonoff et al., 1986; Lishman, 1973; Mauss-Clum & Ryan, 1981; Prigatano, 1987; Prigatano & Fordyce, 1986; Weddell et al., 1980). In addition, Elsass and Kinsella (1987) found that, compared to control subjects, severely head-injured persons showed impairment in approaching people

(e.g., starting a conversation), were more sensitive to criticism, had greater difficulty becoming interested in anything, and exhibited a higher frequency of inappropriate stereotypic responses. Weddell et al. (1980) described the relationships of the head-injured as more superficial.

In terms of frequency of interpersonal contact, the head-injured tend to become more dependent on family members (Brooks et al., 1986; Elsass & Kinsella, 1987; Mauss-Clum & Ryan, 1981) and less involved with friends and acquaintances (Oddy, Humphrey & Uttley, 1978b; Thomsen, 1974; Weddell et al., 1980). Kozloff (1987) found that, as the time since injury increased, social network size decreased and density increased. In other words, a few key figures (mostly family members) who were in close contact with one another, eventually came to serve all the survivor's social and care-taking needs. Other authors noted that the head-injured had fewer close friends (Oddy et al., 1978b; Thomsen, 1974; Weddell, Oddy & Jenkins, 1980), received fewer visits from pre-injury friends (Lezak, 1987; Humphrey & Oddy, 1980; Thomsen, 1974), had less opportunity to meet new friends (Thomsen, 1974), showed a preference for solitary activities, and avoided group situations (Levin et al., 1979).

Although it is clear that social withdrawal and isolation are extremely common among the head-injured (Elsass & Kinsella, 1987; Karpman et al., 1986; Klonoff et al., 1986; Levin et al., 1979; Lezak, 1987; McKinlay et al., 1981; Newton & Johnson, 1985; Oddy et al., 1985; Prigatano, 1987; Thomsen, 1984), it is less certain whether this is a source of distress for survivors. While some head-injured samples report loneliness and boredom (Thomsen, 1974; Weddell et al., 1980), others do not appear dissatisfied with their socially isolated states (Elsass & Kinsella, 1987). Elsass and Kinsella (1987) speculated that this lack of distress could be explained in terms of cognitive

limitations that render the head-injured unable to cope with intense relationships, or in terms of a low sense of self-worth that leads them to have reduced expectations of relationships.

Numerous studies indicate that the head-injured have fewer interests and hobbies than normal adults (Klonoff et al., 1986; Oddy et al., 1985; Humphrey & Oddy, 1980; Weddell et al., 1980). Lezak (1987) found poor use of leisure time to be a major problem as late as five years post-injury. An even graver psychosocial consequence of traumatic head-injury, however, is the low probability of returning to pre-injury levels of employment (Jacobs, 1988; Brooks, Campsie, Symington, Beattie & McKinlay, 1987; Tyerman & Humphrey, 1984). Levin et al. (1979) found that only 22% of a severely head-injured sample returned to full-time employment by approximately one year post-injury. Jacobs (1988) found that, in a sample of severely head-injured subjects one to six years post-injury, only 27% relied on wages as their primary source of income (compared to 78% before the injury). Seventy per cent of this group had left their jobs due to the injury, 10% had been laid off or fired, and only 2% continued work uninterrupted. In this study, causes for unemployment (as reported by family members) included problems with perception, attention span, memory, new learning, comprehension, behavior and stamina. Many subjects were forced to return to live with their parents as a result of financial problems due to unemployment. Similarly, in a severely injured sample tested five years post-injury, 70% were still unemployed (Brooks et al., 1987). Return to work was negatively correlated with age, and positively correlated with pre-trauma occupational level, pre-trauma energy level, and post-trauma maturity. Initial injury severity (although restricted in range) and physical status had no effect on return to work rates. In this study, unemployment was associated with cognitive

problems (e.g., lower fluid intelligence levels, impaired attention, verbal learning and memory, attentional problems) self-care problems (poor personal hygiene, inability to take responsibility) and emotional deficits (lability, depressed mood, difficulties controlling anger) (Brooks et al., 1987).

The Effects of Traumatic Head-Injury on Family Members

Given that head-injury often renders its victims mentally and functionally dependent, it dramatically affects the lives of family members, who tend to become survivors' emotional, social, financial and physical supporters (Elsass & Kinsella, 1987). A number of systemically-oriented authors have commented that head-injury causes instant disequilibrium within the family unit, thus rendering previously established family rules and roles obsolete (DePompei, Zarski & Hall, 1987, 1988; Mathis, 1984; Spanbock, 1987). Head-injured persons who were considered the family bread-winners prior to the injury, for example, may become overprotected "grown-up children" or scapegoats for all future family conflict (DePompei et al., 1988).

Children may have special difficulties coping with a behaviorally, emotionally and characterologically altered parent (Urbach & Culbert, 1991). Moreover, they may experience anxiety over changing family circumstances, such as a decreased standard of living, a change in residence, an increase in maternal absence, added responsibilities, and the threat of separation or divorce (Urbach & Culbert, 1991). They may rebel against the attention paid to their head-injured parent, and may respond by acting out their frustrations or withdrawing from the family unit altogether (Blazyk, 1983;

Florian, Katz & Lahav, 1989; Kozloff, 1987; Lezak, 1978; Urbach & Culbert, 1991).

There is little doubt, however, that head-injury is most stressful for the adults who are forced to assume the role of care-taker¹. Ironically, at this time of great need for support from others, family members often find themselves socially isolated (Kozloff, 1987; Lezak, 1978, 1986; Liss & Willer, 1990; Mauss-Clum & Ryan, 1981; Rosenbaum & Najenson, 1976). Social withdrawal may be self-imposed, to avoid embarrassment regarding the head-injured person's inappropriate behavior (Jacobs, 1988; Lezak, 1978; Rosenbaum & Najenson, 1976; Thomsen, 1984) or to escape the lack of empathy and understanding demonstrated by others (Lezak, 1978, 1987, 1988). Family members are frequently criticized for adopting an overprotective or neglectful attitude toward the survivor by people whose contact with the family is peripheral (Lezak, 1978, 1987, 1988). Social isolation may also be forced upon family members by the eventual withdrawal of friends and acquaintances once the head-injured person's survival is ensured (Florian et al., 1989; Kozloff, 1987; Lezak, 1978, 1986; Mauss-Clum & Ryan, 1981; Rosenbaum & Najenson, 1976) or by the head-injured person's refusal to socialize (Elsass & Kinsella, 1987; Lezak, 1978; Prigatano, 1987). Moreover, many family members choose to give up their jobs and leisure-time pursuits in order to dedicate themselves to the care of the head-injured person full-time (Lezak, 1978).

Not surprisingly, emotional turmoil is common in family members following the head-injury of a loved one (Linn, Allen & Willer, 1994;

¹ Given the composition of the subject sample of the present study, the male and female forms are used for head-injured persons and their care-takers, respectively.

Karpman et al., 1986). Family members often experience depression, anxiety or chronic anger (Lezak, 1988; Linn et al., 1994; Livingston, Brooks & Bond, 1985a,b; Tarter, 1990). Novack, Bergquist, Bennett and Gouvier (1991), for example, found that 33% of a sample of primary caregivers presented as clinically anxious and 9% presented as clinically depressed at the time of their head-injured relative's admission to a rehabilitation program. According to these authors, uncertainty about the future was a major contributor to family member anxiety. Mauss-Clum and Ryan (1981) found that 84% of their sample of wives of head-injured men reported high frustration, 74% reported irritability, 79% reported depression and 63% reported anger. Tarter (1990) found that perceived stress in parents of head-injured persons correlated with many aspects of emotional distress and psychiatric maladjustment, including paranoid ideation, depression, anxiety, hostility, somatization, and obsessive-compulsive disorder.

Anger at the head-injured person, medical staff, or other family members often sets in as survivors fail to improve as expected (Blazyk, 1983; Brooks, 1991; DePompei et al., 1988; Lezak, 1978, 1986; Mauss-Clum & Ryan, 1981). Frustration and despair result from being trapped in the role of a care-taker, and may lead family members to harbor fantasies of separation, or to regret that the head-injured person survived (Brooks, 1991; Lezak, 1978; Thomsen, 1984). Guilt, feelings of responsibility, and self-blame may result, and may further contribute to a vicious cycle of emotional turmoil (Lezak, 1978, 1986; Liss & Willer, 1990; Thomsen, 1974). In some cases, family member emotional distress becomes sufficiently severe to warrant psychiatric intervention (Brooks, 1991; Lezak, 1978; Livingston et al., 1985a,b; Rosenbaum & Najenson, 1976).

Differential Impact on Wives versus Mothers

There has been a fairly consistent theme in the literature that wives have greater difficulty coping with the altered status of their spouses than mothers with that of their sons (for literature reviews addressing this issue, see Brooks, 1991; Florian et al., 1989; Liss & Willer, 1990; Livingston & Brooks, 1988). Mauss-Clum and Ryan (1981), for example, found that wives experienced more post-injury anger and depression than mothers. One explanation for this pattern concerns the relationship between age and recovery from neurological insult: Given that married people who sustain head-injuries tend to be older than single people, their recovery process may be slower and more difficult (Moore et al., 1992), thus causing primary caregivers (i.e., wives) more distress. A number of other explanations, however, focus on the differences between the maternal and spousal relationships. First, while survivors' sudden dependency requires mothers to re-enter the role of absolute care-taker, wives are forced to assume an entirely new role that requires them to subvert their own needs for those of the survivor and to assume responsibilities that were previously fulfilled by their mate (Blazyk, 1983; Brooks, 1991; Jacobs, 1988; Lezak, 1978, 1987, 1988; Liss & Willer, 1990; Mauss-Clum & Ryan, 1981; Panting & Merry, 1972; Rosenbaum & Najenson, 1976; Thomsen, 1984). Israeli wives of head-injured men, for example, expressed great difficulties in coping with the break-down of the gender-based division of labor that tends to characterize traditional relationships (Rosenbaum & Najenson, 1976). Second, while parents are often able to share the care-taking burden, wives are left on their own with the task of caring for someone whose capabilities may resemble those of a two- to three-year-old (Lezak, 1978, 1986; Oddy et al., 1985;

Panting & Merry, 1972). Third, wives are often forced to give up the dreams for the future that they shared with their partner (Liss & Willer, 1990) and to function without their main source of support and affection (Lezak, 1988). Fourth, wives are often left with an incapable child-rearing partner and an unsatisfactory sexual partner (Florian et al., 1989; Lezak, 1978, 1987, 1988; Livingston, 1987; Mauss-Clum & Ryan, 1981; Rosenbaum & Najenson, 1976).

In an investigation of post-injury sexuality, Kreutzer and Zasler (1989) commented that the existing literature suggested that hyper- and hyposexuality were about equally common in head-injured persons. The majority of their male head-injured sample, however, reported a decrease in sex drive and frequency of intercourse. Many research participants reported erectile difficulties, a decreased sense of sex appeal, low self-confidence and depression. No single research participants were in a relationship, and one third of the married men reported impoverished relationships with their spouses compared to pre-injury functioning. Similarly, Garden et al. (1990) reported that 55% of a sample of female spouses and male head-injured survivors experienced a decline in frequency of intercourse, and 47% were dissatisfied with this change.

To summarize, Lezak (1978, 1986, 1987, 1988) referred to the fate of partners of the head-injured as the paradoxical situation of being a "single spouse", who does not have a companion and is not free to find one. Although some spouses report that the role changes imposed by head-injury resulted in positive change, such as increased family cohesion (Karpman et al., 1986) and personal growth (Mauss-Clum & Ryan, 1981; McKinlay & Hickox, 1988), the literature suggests that marital conflict and separation are the more frequently observed outcomes (Lezak, 1987, 1988).

The Natural History of Patient Recovery and Family Member Adjustment

Stages of Recovery from Head-injury

A number of authors have postulated stages that survivors progress through during the first two post-injury years (Bond, 1979; Cripe, 1987; Sohlberg & Brock, 1985). During the first stage, which begins immediately after the injury and lasts from moments to months (Bond, 1979; Cripe, 1987), patients are unconscious due to brainstem dysfunction (Cripe, 1987). Neurological deficit is at its maximum (Bond, 1979) and medical care is geared toward ensuring survival (Bond, 1979; Sohlberg & Brock, 1985; Stambrook, Peters & Moore, 1989). The second stage begins once consciousness is regained (Bond, 1979; Cripe, 1987) and basic responses to environmental stimulation are observed. Patients may still be confused, disoriented and agitated, and will have limited recall of this period later (Cripe, 1987; Stambrook et al., 1989). The third stage, which lasts until approximately three to six months after the injury (Bond, 1979; Bond & Brooks, 1976; Cripe, 1987), begins once post-traumatic amnesia has lifted and rapid physical and mental gains are made (Bond, 1979; Cripe, 1987; Meier, Strauman & Thompson, 1987). In the last stage, which begins between three months and one year post-injury (Cripe, 1987), improvement slows as medical recovery reaches its completion (Bond, 1979; Cripe, 1987; Meier et al., 1987). Between one and two years post-injury, improvement typically levels off almost entirely, and little future gain is made (Bond, 1979; Cripe, 1987; Lezak, 1986, 1987, 1988; Meier et al., 1987; Oddy et al., 1985).

Early physical and cognitive changes thus generally occur in the direction of improvement, and are relatively well-accounted for by injury-

related variables (Cripe, 1987; Lishman, 1973; Stambrook et al., 1989). Psychosocial functioning, however, may never recover fully. Follow-up studies have shown ongoing psychosocial deficits five years (Brooks et al., 1986; Lezak, 1987), seven years (Brooks, McKinlay, Symington, Beattie & Campsie, 1987; Oddy et al., 1985) and 10 to 15 years (Rappaport, Herrero-Backe, Rappaport & Winterfield, 1989; Thomsen, 1984, 1987) after the injury. In addition, psychosocial outcome hinges on factors as diverse as injury severity, location and type (Bond & Brooks, 1976; Lishman, 1973; Meier et al., 1987), age and socio-economic status (Bond & Brooks, 1976; Lishman, 1973; Meier et al., 1987), premorbid vocational and personality adjustment (Lishman, 1973; Moore & Stambrook, 1995), and the complexity of the function assessed (Bond & Brooks, 1976; Brooks & Aughton, 1979b; Lezak, 1987, 1988; Meier et al., 1987).

Secondary Regression and 'Denial' of Deficit

To further complicate matters, changes in psychosocial functioning do not necessarily occur in the direction of improvement. Many survivors show "secondary regression" (Lezak, 1986, 1987) approximately 6 to 12 months after the injury, once they have regained their basic mental functions (Bond, 1979; Brooks et al., 1987; Fordyce, Roueche & Prigatano, 1983; Lezak, 1987, 1988). Fordyce et al. (1983), for example, found a "chronic" group of head-injured persons (more than six months post-injury) more emotionally distressed, confused in their thinking, and socially withdrawn than an "acute" group (within 6 months of injury). Several explanations have been put forth to account for the frequently observed secondary regression in psychosocial functioning as the time since injury increases.

First, this finding may reflect a bias in the reports of survivors and their family members, who may be unaware of the full extent of impairment until the basic functions have recovered (Cripe, 1987; Lishman, 1973; McKinlay & Brooks, 1984). It is, for example, difficult to identify subtle personality change in a patient who is disoriented. Moreover, survivors may not attempt to meet pre-injury demands (e.g., work or social life) until initial recovery has taken place, and may thus not immediately recognize the extent of the changes in their functional capacities (Prigatano, 1987).

Second, reports of secondary regression may stem from a greater intolerance for the head-injured person's impairment as improvement slows and frustration mounts (Brooks & McKinlay, 1983; Brooks et al., 1986; Brooks et al., 1987; McKinlay & Brooks, 1984; McKinlay et al., 1981).

Third, secondary regression may reflect an actual deterioration in psychosocial and emotional functioning as the survivor's neurological and intellectual conditions improve, and as he gains awareness about his new post-injury limitations (Brooks et al., 1987; Fordyce & Roueche, 1986; Fordyce et al., 1983; Lezak, 1978; Lishman, 1973; McKinlay & Brooks, 1984; Roueche & Fordyce, 1983). In the early post-injury stages, head-injured persons are often observed to lack insight and to minimize their deficits (Prigatano, 1987). This has been reported to be a relatively common source of conflict between survivors and their family members and/or rehabilitation workers (Thomsen, 1974; Prigatano, 1987; Prigatano & Fordyce, 1986). Several studies (Cavallo et al., 1992; McKinlay & Brooks, 1984; Prigatano, Altman & O'Brien, 1990) found that differences in perceived competency between head-injured persons and family members tended to be relatively minor in the areas of sensory and motor functioning, and more pronounced in the areas of behavioral and psychosocial functioning. Prigatano et al. (1990),

for example, found few differences in the assessment of self-care, more differences in the assessment of financial responsibility and driving ability, and many differences in the assessment of emotional and social competency. As is typically observed (see also Cavallo et al., 1992; McKinlay & Brooks, 1984), head-injured persons in this study viewed themselves as higher-functioning than family members did. Cavallo et al. (1992) found that, in groups where head-injured persons and family members showed high disagreement, head-injured persons tended to endorse more subjectively-distressing symptoms (e.g., executive/cognitive problems), while family members endorsed more externally-disruptive symptoms (e.g., behavioral/interpersonal/affective problems).

Some authors (e.g., Rosen, 1986) view the tendency for survivors to initially deny mental deficit as a psychogenic defensive maneuver to facilitate post-injury coping. Others (e.g., Bond & Brooks, 1976; Cripe, 1987; Levin et al., 1979; Lezak, 1987, 1988; Roueche & Fordyce, 1983), noting that the shift from 'denial' to awareness coincides with the end of medical recovery, attribute this early lack of insight directly to neurological damage.

A last explanation of secondary regression centres around the emergence of indirect, second-order psychosocial sequelae of head-injury (Lishman, 1973; McKinlay & Brooks, 1984). A head-injured person's new awareness of his deficits, for example, may result in depression and hostility, which may leave him abandoned by his friends. Social isolation may in turn lower his self-esteem, increase his dependence on his family and reinforce his patient role. Such vicious cycles may lead to psychosocial deficits that are disproportionate to the initial severity of the injury (Lishman, 1973).

Theoretical Stages of Family Member Adjustment

Whereas the course of survivors' recovery has been relatively well-charted and empirically validated, the natural history of family member adjustment remains highly speculative and theoretical. Based upon their clinical observations, a number of authors have postulated distinct, but overlapping, stages that characterize family members following the head-injury of a loved one (Blazyk, 1983; Lezak, 1986; Mauss-Clum & Ryan, 1981; Spanbock, 1987). Groveman and Brown (1985), for example, used Kuebler-Ross' (1969) stage model of coping with terminal illness to explain survivor and family member functioning following traumatic head-injury. They saw parallels between head-injury and terminal illness in terms of the "core issues of loss, dependency, stress, guilt, denial, and the need for multiple adjustments in order to continue to process of living" (Groveman & Brown, 1985, p. 441). Lezak (1986) developed a similar model of evolving family reactions to traumatic head-injury (see Appendix A).

Typically, family members respond to the injury with shock, desperately hoping for the preservation of their loved one's life (DePompei et al., 1987; Mauss-Clum & Ryan, 1981; Spanbock, 1987). Once the patient's medical condition has stabilized, and family members feel relieved and grateful, the "honeymoon stage" (DePompei et al., 1987; Lezak, 1986; Spanbock, 1987) begins. For the first three post-trauma months (Lezak, 1986), family members are unreceptive to prognoses of long-term deficit, feel confident that a full recovery will occur, and place their energies in assisting the survivor to regain his pre-morbid status (Blazyk, 1983; DePompei et al., 1987; Lezak, 1986; Spanbock, 1987). Groveman and Brown (1985), linking this period to Kuebler-Ross' (1969) Denial and Isolation stage, emphasized

the tendency for family members to collude with survivors' minimization of post-injury deficit in order to avoid their own feelings of inadequacy, anger or helplessness. Lezak (1996), however, takes exception to the term 'denial', which implies an active refusal to recognize an unpleasant event. She discusses a number of factors that contribute to family members' early lack of insight. First, family members may hold beliefs about illness that do not apply in the case of head-injury (e.g., "the patient will recover fully"). Second, family members may not pay attention to professional opinions about recovery as a result of hastily-made erroneous predictions of hospital staff (e.g., "the patient might not survive"). Third, family members may have been exposed to unrealistic depictions of traumatic head-injury in popular culture (e.g., head-injury has no serious consequences in comic strips). Fourth, family members may use their past knowledge of the survivor to guide their predictions (e.g., "he has always been a fighter").

The beginning of the next stage of family member adjustment coincides with the end of the rapid recovery stage in survivors, about three to six months post-injury (Lezak, 1986). Although family members are not yet able to detect higher-level patient deficits, they begin to feel anxious and bewildered (Lezak, 1986) as the survivor fails to return to his premorbid status. They view the head-injured person as being unwilling to improve, and full recovery as being conditional upon motivation (Lezak, 1986). The next stage, which lasts from approximately six months to two years post-injury, begins once family members become more aware of the full extent and the potential permanence of the head-injured person's deficits (Lezak, 1986). Given that this stage coincides with the shift from 'denial' to awareness in survivors, emotional turmoil and conflict within the family are at their highest intensity (Lezak, 1986; Rosenbaum & Najenson, 1976). Family

members feel discouraged, frustrated, anxious and helpless, and view the survivor as being irresponsible, self-centered and lazy (Lezak, 1982, 1986). Groveman and Brown (1985) tie this period to Kuebler-Ross' (1969) Anger stage, which is characterized by feelings of "envy, rage and resentment" (p. 442) and often involves rejection of the survivor. They view anger as replacing denial, and as being motivated by fear about the future.

The "reality stage" (Spanbock, 1987) begins as family members reach full awareness of the extent and permanence of change in the survivor, about nine months after the injury or later (Lezak, 1986; Spanbock, 1987). Family members feel angry about being trapped in a relationship with a stranger, and experience confusion and guilt about their fantasies of leaving the head-injured person (Lezak, 1986; Mauss-Clum & Ryan, 1981). According to Groveman and Brown (1985), this stage may be preceded by a last attempt at selective denial in the form of Bargaining, which frequently involves the wish to achieve a sense of normalcy by pushing patients toward terminating treatment and resuming pre-injury activities.

A time-limited stage of "mourning" for the lost pre-injury person occurs fifteen months or longer after the injury (Lezak, 1986; Spanbock, 1987). Groveman and Brown (1985) link this period to Kuebler-Ross' Depression stage, which occurs "when the [head-injured] patient and his/her family can no longer employ denial as a viable position, when anger can no longer ward off the reality of deficits, [and] when attempts at bargaining have not succeeded in ameliorating the full impact of a loss" (p. 444).

The last stage is postulated to begin once family members have dealt with most of their emotional pain, 18 to 24 months after the injury or later (Lezak, 1986; Spanbock, 1987). Groveman and Brown (1985) refer to this as

the stage of Acceptance, and view it as the sense of resolution that follows the "painful redefinition of the patient's role in the family and society" (p. 445).

A number of authors (e.g., Groveman & Brown, 1985; Lezak, 1986, 1978; Spanbock, 1987) are thus optimistic that emotional, and possibly physical, disengagement from the survivor allows family members to successfully reorganize their lives at this point. Brooks (1991), however, considers this position idealistic.

Wortman and Cohen Silver's Critique of Stage Models of Adjustment

Wortman and Cohen Silver's (1989) seminal article "The Myths of Coping with Loss" critiques the stage model of recovery from loss altogether. Specifically, these authors identify and question five assumptions regarding the grieving process: 1) that intense distress and depression are inevitable following a loss, 2) that this distress is necessary and its absence is indicative of psychopathology (e.g., denial, emotional fragility), 3) that the loss must be "worked through" or processed, 4) that recovery occurs within a relatively brief period of time, and 5) that resolution is achieved once the meaninglessness of the crisis has been resolved, and the loss is accepted intellectually and emotionally. Reviewing empirical findings related to a variety of losses (e.g., permanent physical disability, loss of cognitive function, death), Wortman and Cohen Silver state that there is no evidence that an absence of initial distress is associated with later emotional or health problems; that early signs of intense efforts to "work through" losses often signal subsequent difficulties; and that "chronic grief" is commonly noted in the bereavement literature. In terms of the latter point, Wortman and Cohen Silver comment that resolution may take much longer than the six to twelve month margin that is generally accepted as "normal" nowadays, and that

some people never come to terms with their loss. The authors recommend that more long-term studies of grief reactions be conducted, in order to learn about individual differences in pace and direction. Specifically, while current theories of grief and loss may account for the experiences of individuals who move from high to low distress over time, they do not account for the reverse pattern (low to high distress over time), for a complete absence of high distress, or for ongoing high distress (Wortman & Cohen Silver, 1989).

Wortman and her colleagues (Lehman, Wortman & Williams, 1987; Wortman & Cohen Silver, 1989) comment that ongoing or "chronic" stress reactions are particularly common in cases where the loss was untimely or unexpected.

These authors thus make an argument that yields very different predictions for family members of the traumatically head-injured than those made by the stage theorists. It is one aim of the present study to comment on the role of time since injury as a mediator of family member adjustment, and to discuss these findings in terms of their implications for the pursuit of stage theory development.

The Prediction of Post-Injury Family Member Adjustment

First Generation Studies - The Use of Psychiatric Disturbance and Subjective Burden as Outcome Criteria

Many studies designed to predict post-injury family member adjustment define outcome as psychiatric disturbance or "subjective burden" (e.g., Brooks et al., 1987; Livingston, 1986; Livingston et al., 1985a,b). The use of measures of psychiatric disturbance, such as the General Health Questionnaire or the Leeds Anxiety and Depression Scales (e.g., Livingston,

1986; Livingston et al., 1985a,b; Oddy, Humphrey & Uttley, 1978a) is somewhat problematic with family members of the head-injured. Not only do these instruments limit conclusions to depression, anxiety or general psychiatric disturbance (e.g., Livingston et al., 1985a,b; Rosenbaum & Najenson, 1976), but their appropriateness for the detection of maladjustment in non-psychiatric populations is questionable. Furthermore, their lack of temporal specificity renders them unsuitable for investigations concerned with the ongoing changes in family member adjustment.

The use of Subjective Burden as an indicator of post-injury family member functioning was popularized by a number of researchers from the University of Glasgow (Brooks & Aughton, 1979a; McKinlay et al., 1981; Brooks & McKinlay, 1983; Brooks et al., 1986; Brooks et al., 1987). Subjective burden is a self-reported index of distress experienced by the caregiver, and is conceptualized as stemming from objective burdens such as changes in family routines, activities, health, financial status and housing conditions (Type 1 objective burden) and post-traumatic impairment of the head-injured person (Type 2 objective burden) (Brooks & Aughton, 1979a; Livingston et al., 1985a,b; McKinlay et al., 1981). Research using this paradigm typically examines the relationship between Type 2 objective burden and family member subjective burden (Liss & Willer, 1990). In other words, these studies examine the relative efficacy of various aspects of the head-injured person's functioning (e.g., physical, emotional) to predict family member subjective burden. Table 1 provides a summary of the key studies conducted by the Glasgow researchers. As will be discussed later, this research suggests that survivor personality changes, emotional functioning and behavioral functioning are important predictors of family member subjective burden. Only one of these studies (Brooks et al., 1987) included family member

Table 1

First Generation Family Member Prediction Studies

Reference	Sample	Outcome variable	Best predictors	Unimportant predictors
Brooks & Aughton (1979a)	35 family members severe head-injury 6 months post	Subjective burden	Childish behavior Loss of interest Change in sex life Depression, Anxiety	Physical ability
McKinlay et al. (1981)	55 family members severe head-injury 3, 6, 12 months post	Subjective burden	Emotional, Subjective functioning (e.g., slow, headaches)	Physical ability Language function
Brooks & McKinlay (1983)	52 family members severe head-injury 3, 6, 12 months post	Subjective burden	Poor emotional control Reduced energy Immaturity Emotional coldness Unhappiness, Meanness	Physical ability
Brooks et al. (1986)	42 family members severe head-injury 5 years post	Subjective burden	Injury severity Disturbed behavior Emotional functioning Subjective functioning Dependence Language	Physical ability Memory
Brooks et al. (1987)	134 family members severe head-injury 2 - 7 years post	Subjective burden	Emotional functioning Behavior, Dependence Language, Memory	Physical ability Family member variables

variables (age, relationship to survivor, availability of a confidante) as potential predictors, and did not find them to be associated with subjective burden.

Unfortunately, subjective burden tends to be measured with single-item Likert scales that are custom-designed for specific studies (Brooks, 1991) and often lack psychometric adequacy. Moreover, the vague definition of the subjective burden concept is problematic in terms of construct and ecological validity. It is, for example, difficult to recommend a specific course of intervention on the basis that a family member falls into the "high burden" category.

Second Generation Studies

Despite their methodological shortcomings, studies using psychiatric measures or subjective burden scales laid the groundwork for a systematic investigation of post-injury family member adjustment. Moreover, this research gave rise to a number of more sophisticated "second generation" studies that targeted specific subsets of family members (e.g., wives or parents); included survivor variables and family member variables as predictors; and conceptualized family member outcome in terms of ecologically valid, multidimensional constructs. Linn et al. (1994), for example, studied spousal depression and anxiety following head-injury. They found that both types of mood disturbance were associated with (female) gender; but that survivor social aggression was an important predictor of depression, whereas the length of the marriage was an important predictor of anxiety. Peters, Stambrook, Moore and Esses (1990) studied post-injury marital adjustment in wives of head-injured men. This was best predicted by patient-related variables (injury severity, the head-injured person's

psychosocial maladjustment) and financial strain. The women's personalities, coping styles and reports of recent life-changing events were not important factors. Tarter (1990) found that factors related to both the head-injured person and to the family member predicted perceived stress in parents of adult survivors. Parents who experienced high stress reported social interaction impairment, reduced alertness and emotional lability in their head-injured offspring; exhibited psychiatric maladjustment (e.g., paranoid ideation, depression, anxiety, obsessive-compulsive disorder); and used certain maladaptive coping strategies (e.g., avoidance/escape, confrontation). Kosciulek (1994) found that general adjustment in primary caregivers of head-injured persons was highest when subjects coped by using positive appraisal (e.g., maintaining a good outlook) and family tension management (e.g., doing activities together, sharing feelings). Table 2 summarizes these studies in order to exemplify the recent growth in ecologically valid "second generation" research of post-injury family member adjustment. In Table 2, as well as in several subsequent tables, the notation 'HI' refers to 'head-injured'.

The following sections present a detailed review of the literature in terms of the associations of various predictor variables² to family member adjustment.

Time Since Injury

While some studies suggest that the level of overall family member burden and psychiatric status remain constant over the first post-injury year (Livingston, 1987; Livingston et al., 1985a; McKinlay et al., 1981), others find

² For the purpose of the present study, the terms "predictor" and "prediction" are used to discuss associations between variables, and do not necessarily imply directionality in causation.

Table 2

Second Generation Family Member Prediction Studies

Reference	Sample	Outcome variables	Best predictors	Unimportant Predictors
Peters et al. (1990)	55 wives various severities few mos - 8 yrs post	Dyadic (marital) adjustment	Financial strain HI psychosocial funct. HI physical restriction Injury severity	Time post injury Wife's life changes Wife's personality Wife's coping
Tarter (1990)	48 parents of adult HI severity not given 1 year or more post	Perceived stress	HI psychosocial funct. Parent psychopathology Parent coping style	HI physical funct. HI communication
Linn et al. (1994)	60 spouses severe injuries average 5.8 yrs post	Depression Anxiety	Spouse's gender HI social aggression Spouse's gender Years married	Time since injury Injury severity HI physical funct.
Kosciulek (1994)	150 Primary caregivers injury severity and time since injury not given	General adaptation	Positive appraisal Tension management	Social support Education/ assertiveness

higher distress as the time since injury increases. Brooks et al. (1986) found that most of their sample of family members fell into the low-to-medium burden category one year post-injury. Four years later, however, there was a preponderance of medium-to-high subjective burden reports in the same sample. Brooks and McKinlay (1983) found that family members reported more negative personality changes in the survivor as the time since injury increased, and that the relationship between survivor status and family member burden became stronger over time.

There is also evidence that the *nature* of family member distress varies as a function of time. Oddy et al. (1978a) found higher levels of family member depression immediately after the injury than at six and 12 months. Livingston (Livingston et al., 1985b; Livingston, 1987) found no depression, but high levels of anxiety, in a sample tested three months post-injury.

Taken together, these studies suggest that investigations of the natural history of family member adjustment need to examine changes in specific domains of functioning, rather than using global adjustment indices (e.g., subjective burden). Furthermore, information needs to be gained beyond the first post-injury year, to illuminate the full spectrum of change over time. It is one aim of the present study to investigate the role of time under these circumstances.

Financial Strain

One factor that undoubtedly affects family member adjustment is financial strain following head-injury (Jacobs, 1988; Lezak, 1986). Higgenbottom (1993) speculated that in British Columbia, about 51% of traumatically head-injured men were eligible for funding through the Insurance Corporation of British Columbia, the Workers' Compensation

Board, or extended or private coverage. As he pointed out, this left 49% financially unprotected. Karpman et al. (1986) found that 50% family members listed financial insecurity as their most pressing post-injury concern.

Head-injury has direct costs, such as medical, legal and rehabilitation expenses (Jacobs, 1988; McMordie & Barker, 1988), and indirect costs. The latter include the loss of, or reduction in, the earnings of both head-injured persons and family members, who may be forced to miss work to supervise the survivor or to accompany him to medical appointments (Jacobs, 1988; McMordie & Barker, 1988). McMordie and Barker (1988) cite some dismal statistics regarding financial strain following head-injury: 53% of the survivors in their (American) sample had no earnings at all; 91% had a reduced family income, 47% had to borrow money and 26% lost personal possessions to pay their bills. Given that the head-injured person often served as the family breadwinner prior to his injury, financial strain tends to be more problematic for wives than for parents (Mauss-Clum & Ryan, 1981; McMordie & Barker, 1988). Peters et al. (1990) found that financial strain was a powerful predictor of post-injury marital functioning, and Kozloff (1987) found that higher-level income was associated with better short-term recovery in the head-injured person and with the maintenance of a larger social network.

Injury Severity

Injury severity is typically measured in terms of the length and depth of coma or the length of post-traumatic amnesia (PTA). Injury severity tends to be associated with both survivor and family member adjustment in the early post-trauma stages, but to lose its predictive power as the time since

injury increases (Brooks, 1991; Lezak, 1978; Livingston, 1986; Livingston et al., 1985a; Livingston & Brooks, 1988; McKinlay et al., 1981; Peters et al., 1990). McLean et al. (1983), for example, found a relationship between post-traumatic amnesia and the degree of cognitive deficit in a mildly head-injured sample three days post-injury, but not one month post-injury.

McKinlay et al. (1981) found a strong association between post-traumatic amnesia and family member subjective burden at 3 months post-injury, a weaker association at 6 months, and only a (statistically insignificant) trend at 12 months. Similarly, Oddy et al. (1978a) found no relationship between family member depression and length of PTA, length of hospitalization, and survivor physical disability six and 12 months post-injury.

Some studies have established a link between injury severity and lower-level (physical, basic cognitive), but not higher-level (emotional, behavioral, social) survivor deficits (Brooks et al., 1987). In his early review of the sequelae of traumatic brain injury, Lishman (1973), for example, noted a "conspicuous lack of relationship between injury severity and enduring neurotic disability" (p. 314). In contrast, other studies found injury severity to be a valuable predictor of higher-level survivor functioning, as well as family member adjustment. Brooks and Aughton (1979a), for example, found injury severity to be an important predictor of learning, memory and performance IQ in severely injured subjects within 24 months post-injury. Klonoff et al. (1986) established injury severity as an important predictor of quality of life in survivors 2 to 4 years post-injury. Peters, Stambrook, Moore, Zubek, Dubo and Blumenschein (1992) found that several aspects of wives' marital adjustment (e.g., expressed affection, feelings of cohesiveness) were related to the severity of their head-injured husbands' injuries.

Head-Injured Person's Psychosocial Competency

Given that family members tend to experience distress due to patient deficits that affect daily living, the head-injured person's psychosocial functioning tends to be a powerful predictor of family member adjustment. Survivor psychosocial functioning was, for example, consistently linked to family member subjective burden by the Glasgow researchers (Brooks & Aughton, 1979a; Brooks & McKinlay, 1983; Brooks et al., 1986, 1987; McKinlay et al., 1981). In other studies, it was associated with family member psychosocial adjustment (Florian et al., 1989; Livingston & Brooks, 1988), emotional functioning (O'Brien & Costa, 1987; Livingston, 1986, as cited in Livingston & Brooks, 1988) and marital satisfaction (Peters et al., 1990).

The relationship between the head-injured person's status and family member adjustment is mediated by both the nature of patient deficit and the passage of time. In terms of the former, family members tend to cope well with sensory-motor and intellectual deficits, but to experience difficulties as a result of characterological, affective and behavioral changes (Brooks, 1991; Brooks & Aughton, 1979a; Brooks et al., 1987; Cavallo et al., 1992; Florian et al., 1989; Jacobs, 1988; Lezak, 1978; Livingston & Brooks, 1988; Livingston et al., 1985a; McKinlay et al., 1981; O'Brien & Costa, 1987). Among those characteristics that appear to be particularly distressing are mental and behavioral rigidity, childishness, self-centeredness, dependence, irritability, loss of interest, impulsivity, emotional blunting or lability, depression, anxiety, aggressiveness, violence, confusion, and socially inappropriate behavior (Brooks & Aughton, 1979a,b; Brooks et al., 1987; Lezak, 1978, 1987, 1988; Livingston, 1986; McKinlay et al., 1981; O'Brien & Costa, 1987).

The relationship between survivor symptomatic status and family member adjustment also varies as a function of time, although the findings are somewhat contradictory. Brooks and McKinlay (1983) found a weak association between subjective burden and survivor personality change three months post-injury, but obtained a strong relationship six months post-injury. Moreover, while dependence was linked to subjective burden at three months, this effect had disappeared by six and 12 months post-injury. In a different sample, McKinlay et al. (1981) found a relationship between subjective burden and the length of PTA at three months, but not at 12 months, when behavioral and emotional difficulties became more salient. Bond, Brooks and McKinlay (1979) found memory problems to be predictive of family member burden three and six, but not 12 months, post-injury. At the latter testing, emotional and behavioral difficulties became strongly associated with high family member distress (Bond et al., 1979).

Family Member Personality Disposition

Personality variables have received minimal attention in investigations of family member adjustment after traumatic head-injury (Brooks, 1991; McKinlay & Brooks, 1984). Given that they function as perceptual filters that affect how experiences are processed, however, their consideration is crucial for a complete understanding of the aftermath of head-injury for family members. The personality dispositions that family members bring to the post-injury situation translate into variations in stress tolerance, coping and susceptibility to distress (Brooks & McKinlay, 1983; Livingston & Brooks, 1988; McKinlay & Brooks, 1984). Highly neurotic subjects, for example, are predisposed toward negative affect (e.g., anxiety, worry, anger, guilt), emotional instability, chronic dissatisfaction, poor

impulse control and psychosomatic distress (Costa & McRae, 1980, 1985; Eysenck & Eysenck, 1968; Watson & Clark, 1984; Watson & Pennebaker, 1989). Highly extraverted subjects are predisposed toward positive affect, optimism, warmth, excitement-seeking and sociability (Costa & McRae, 1980, 1985). The role of family member personality disposition following head-injury was addressed by Novack et al. (1991), who found low correlations between caregivers' state and trait measures of anxiety at the time of the head-injured person's admission to rehabilitation, and much higher correlations at the time of discharge. Whereas all caregivers therefore experienced high state anxiety shortly after the head-injury (resulting in low state-trait correlations), only those with high trait anxiety continued to report high state anxiety over time. Two other studies that included personality dispositions as potential mediators of post-injury family member adjustment found that neuroticism correlated positively with post-injury distress within the first year (McKinlay & Brooks, 1984) and up to seven years later (Brooks, 1991), while no such relationship was obtained for extraversion.

Given the subjective nature of both outcome variables and predictors in investigations of post-injury family member adjustment (e.g., subjective burden, perceived patient dysfunction), findings are inevitably colored by dispositionally-based response styles. McKinlay and Brooks (1984), for example, found that family member neuroticism correlated with reports of the head-injured person's psychosocial dysfunction. The influence of dispositional variables therefore needs to be quantified and separated from more objectively-based differences in adjustment (Brooks et al., 1987; McKinlay & Brooks, 1984; Watson & Pennebaker, 1989; Watson & Clark, 1984). Moreover, in order to fully document the spectrum of family member

adjustment, positive and negative aspects of adjustment need to be assessed independently. Recent research (e.g., Diener, Emmons, Larsen & Griffin, 1985; Pavot, Diener, Colvin & Sandvik, 1991; Watson, Clark & Tellegen, 1988) has demonstrated that positive and negative affect, and their dispositional underpinnings (extraversion and neuroticism, respectively) are not the endpoints of a single continuum. Instead, they represent orthogonal dimensions that independently contribute to overall adjustment (Costa & McCrae, 1980; Watson & Clark, 1984). Neuroticism thus predisposes toward negative affect, but does not necessarily reduce pleasure. Similarly, extraversion predisposes toward positive affect, but need not affect the experience of distress. Not only does this finding explain the previously mentioned absence of a (negative) correlation between extraversion and family member burden, but it also suggests that low distress cannot be interpreted as high satisfaction.

Family Member Social Adjustment and Role Performance

While family member post-injury social isolation has been well-documented, changes in the performance of other roles have received little attention. In a sample tested three months post-injury, Livingston et al. (1985a) found problems in marital and nuclear family functioning, but not in roles performed outside the home. By the end of the first post-injury year, however, dissatisfaction with role performance had spread to work, social and leisure activities, parenting and contact with extended family members (Livingston et al., 1985b). In addition, marital and social adjustment had further deteriorated between three and six months post-injury, and remained problematic throughout the first year (Livingston et al. 1985b; Livingston, 1987). Injury severity was not associated with family member role

dysfunction, but pre-injury family member medical history, family member psychiatric background, and survivor symptomatic status emerged as powerful predictors. Survivor status became especially salient during the latter half of the first post-injury year and accounted for over 50% of the variance in family member role dysfunction (Livingston et al., 1985b). Rosenbaum and Najenson (1976), who also addressed the effects of head-injury on family member role performance, found greater dysfunction in the care-takers of head-injured patients than in those of paraplegics. In this study, decreased social interaction was highly correlated with family member depression (Rosenbaum & Najenson, 1976).

To summarize, although the literature concerned with the prediction of family member post-injury adjustment is still limited, a number of studies have shed light on the potential efficacy of a variety of predictor variables.

The Present Study

Objectives

The aims of the present study were threefold. A first objective was to document the post-injury adjustment of female partners of head-injured men in detail, in order to add to a growing body of information about this population. A relatively recent review of the literature (Liss & Willer, 1990) pointed out that research focusing specifically on spousal adjustment to traumatic head-injury was scant, and that many studies failed to distinguish between parents, spouses and other family members of the head-injured. A second aim was to examine the role of time since injury in family member and survivor adjustment. Specifically, it was of interest whether there were

systematic changes over time, as posited by the stage theories of post-injury adjustment (e.g., Lezak, 1986; Spanbock, 1987). A third aim was to assess the efficacy of three families of variables (Life Circumstances, Personality Disposition, Head-injured Man's Functioning) to predict the women's Subjective Well-being.

Subjective Well-being

As opposed to previous studies, which defined family member outcome in terms of unidimensional indices of *maladjustment* (e.g., subjective burden), the present study focused on the multifaceted construct of Subjective Well-being. Recent research (Andrews & Robinson, 1991; Diener et al., 1985; Pavot et al., 1991) has emphasized the consideration of two broad dimensions in the measurement of subjective well-being: emotion-cognition and positive-negative valence. These dimensions can be crossed to yield positive affect, negative affect and life dis/satisfaction, which have emerged as relatively independent (statistical) factors of subjective well-being (Andrews & Robinson, 1991; Diener et al., 1985; Pavot et al., 1991). According to Andrews and Robinson (1991), subjective well-being, which is a "psychological summing up of an individual's quality of life" (p. 61), varies as a function of external circumstances, the gap between achievement and aspiration, and psychosocial factors such as stress, social support, role performance and personality disposition. Furthermore, subjective well-being appears to be an aggregate of an individual's functioning in various life domains (Andrews & Robinson, 1991).

In order to fully sample family member subjective well-being, the present study included measures of negative affect or mood disturbance (over the past week), positive affect (over the past week), and satisfaction with life.

Whereas the first two factors focus on emotion and are temporally and situationally specific, satisfaction with life is a cognitively-based, global index of adjustment (Diener et al., 1985; Pavot et al., 1991). Furthermore, while emotional disturbance is keyed in the direction of pathology, positive affect and satisfaction with life focus on psychological health.

Hypotheses

I. How are They Doing? Descriptive Analysis of Subjects' Adjustment and their Head-Injured Partners' Functioning

The trauma of head-injury tends to have wide-ranging adverse effects on survivors and family members. It was therefore predicted that the present sample would report generally impoverished adjustment vis a vis normal adults or pre-injury circumstances. Specifically, it was expected that the present sample would report:

1. A reduced sense of Subjective Well-being; including high mood disturbance, low positive affect and low satisfaction with life.
2. Unsatisfactory Life Circumstances; including high financial strain and high social adjustment problems.
3. Impairment in the Head-injured Man's Functioning; including a decrease in occupational involvement (compared to before the injury) and problematic psychosocial competency.

Given that Personality Disposition variables were conceptualized as being relatively resistant to environmental events, it was expected (Hypothesis 4) that subjects would not differ from normal adult samples in terms of two broad dispositional variables (extraversion and neuroticism). Table 3 presents a visual display of the design for this set of hypotheses.

Table 3

Design for Descriptive Hypotheses

Variable family	Variable	Expected outcome
Subjective Well-being	Mood disturbance	High
	Positive affect	Low
	Satisfaction with life	Low
Life Circumstances	Financial strain	High
	Social adjustment problems	High
Personality Disposition	Extraversion	Same
	Neuroticism	Same
HI Man's Functioning	Occupational involvement	Low
	Psychosocial competency	Low

Note. 'Expected outcome' refers to comparisons to normal adults or pre-injury conditions.

2. Does the Adjustment of Subjects and their Head-Injured Partners Change as a Function of Time Since Injury?

The nature of adjustment of family members and their head-injured partners may be mediated by the length of the time-since-injury interval. In other words, adjustment may follow predictable patterns over time, as proposed by the stage theorists (e.g., Lezak, 1986; Mauss-Clum & Ryan, 1981; Spanbock, 1987). The present study explored the role of time in the following domains: family member Subjective Well-being (mood disturbance, positive affect and satisfaction with life), Life Circumstances (financial strain and social adjustment problems) and the Head-injured Man's Functioning (occupational involvement and psychosocial competency). Table 4 presents the design for this section. The following questions were explored:

1. Does time since injury play a role in the adjustment of family members and their head-injured partners? Based on the existing literature (e.g., Lezak, 1986; Mauss-Clum & Ryan, 1981; Spanbock, 1987), it was expected that time would be correlated with the adjustment variables.
2. Which adjustment variables are most strongly associated with time since injury? It was expected that all variables, except mood disturbance (which was expected to be high at any point in time) and the man's occupational involvement (which was expected to remain low), would vary over time. Table 4 indicates the predicted directions of change.
3. Do these associations suggest a trend toward better or more impaired adjustment over time? Based on the existing literature (Brooks, 1991; Lezak, 1982, 1986; Spanbock, 1987), it was predicted that family members with longer time-since-injury intervals would report more impaired adjustment.

4. Should the development of stage theories of post-injury adjustment be pursued in future research? This will be addressed in the Discussion section.

Table 4

Design for Exploration of Time Since Injury

Variable family	Variable	Expected change over time
Subjective Well-being	Mood disturbance	None
	Positive affect	Decrease
	Satisfaction with life	Decrease
Life Circumstances	Financial strain	Increase
	Social adjustment problems	Increase
HI Man's Functioning	Occupational involvement	None
	Psychosocial competency	Decrease

3. What Predicts Family Member Subjective Well-Being?

The last objective of this study was to evaluate the efficacy of three families of variables to predict three aspects of family member Subjective Well-being (mood disturbance, positive affect, satisfaction with life). Two

criteria, which firmly grounded the present study in existing research, served as guidelines for predictor selection. First, predictors that have shown consistent associations with post-injury family member adjustment (e.g., head-injured man's psychosocial competency) were selected. Second, variables that have been identified as potential mediators (e.g., family member personality) and whose role needs to be more systematically investigated, were included. On the basis of these guidelines, the following three families of predictor variables were chosen: Life Circumstances (financial strain, social adjustment problems), which address family members' situational/external adjustment; Personality Disposition (extraversion, neuroticism), which addresses family members' dispositional/internal adjustment; and the Head-Injured Man's Functioning (injury severity, occupational involvement, psychosocial competency). Table 5 displays the design for this portion of the present study. The following hypotheses were tested:

1. Each family of variables (Life Circumstances, Personality Disposition, Head-injured Man's Functioning) is important in the prediction of Subjective Well-being. It is therefore expected that each family will show a non-zero multiple correlation with Subjective Well-Being.
2. The relative efficacy of the predictor families to explain Subjective Well-being, however, varies. It is expected that Personality Disposition will be most highly correlated with Subjective Well-being, followed by Life Circumstances and then by the Head-injured Man's Functioning.

Table 5

Design for Prediction of Subjective Well-Being

Variable family	Variable
<u>Predictors:</u>	
Life Circumstances	Financial strain Social adjustment problems
Personality Disposition	Extraversion Neuroticism
HI Man's Functioning	Injury severity Occupational involvement Psychosocial competency
<u>Outcomes:</u>	
Subjective Well-being	Mood disturbance Positive affect Satisfaction with life

3. In terms of individual predictor variables, it is expected that neuroticism, social adjustment problems and head-injured man's psychosocial competency are the best³ predictors within their respective families.
4. The same three individual predictor variables are also expected to be the most important predictors of Subjective Well-being when all predictors, regardless of family membership, are entered into the analysis at once.

³ Operational definitions of "best" or "most important" predictors are provided in the Results section.

CHAPTER II

METHOD

Procedure

Data Collection

Research participation in the present study involved completing a questionnaire package and supporting materials, and returning these documents to the researcher by mail. Potential research participants were considered appropriate for this study if they were a) female, b) proficient in speaking and understanding English, c) in a relationship with (but not biologically related to) a man who suffered a documented traumatic head-injury, and d) living with this man at the time of data collection. Moreover, subjects must have known their male partner at the time of his head-injury. The male head-injured partner had to be a) within the ages of 18 and 70, inclusive, b) free of hospitalizations for previous head-injuries and c) free of a history of stroke or degenerative disease (e.g., Alzheimer's).

Data collection occurred between May 1993 and November 1995, and took place in several phases. First, approximately 35 agencies and/or professionals serving head-injured persons or their families in British Columbia and Alberta were asked to distribute questionnaire packages to suitable clients. Clients from 15 of these sources submitted valid questionnaire packages, producing a total of 44 subjects. Second, leaders of British Columbia support groups for survivors of head-injury and/or family members were asked to hand out questionnaire packages to group members. Ten group leaders agreed to participate, and members of four groups

returned valid questionnaire packages, producing a total of 7 subjects. Third, handouts requesting participation in the present study were distributed at two conferences attended by head-injured persons and their family members. The first conference was the Eighth Annual Pacific Coast Brain Injury Conference (held in Vancouver, B.C., in October 1994) and the second was the 15th Annual New Beginnings Conference (held in Calgary, Alberta, in June 1995). Four requests for questionnaire packages were received, all were returned, and all were fit for inclusion. A last phase of data collection was arranged with members of the Head Injury Unit of the Workers' Compensation Board of British Columbia. Team members mailed out a handout, describing the present study and requesting participation, to appropriate clients. Fifteen clients contacted the researcher and five returned the packages and produced valid information.

Table 6 summarizes the sources of data included in the present study. Overall, 468 questionnaire packages were distributed, and 69 (14.7%) were returned. Attrition clearly occurred at the level of potential subjects (e.g., individuals accepted, but chose not to complete, questionnaire packages) and at the agency level (e.g., staff changes, low motivation to distribute packages). Moreover, most agencies did not return questionnaire packages that were left over once data collection was completed, thus inflating the proportion of "missing" questionnaires. Nine respondents who returned questionnaire packages were disqualified from inclusion, as they failed to meet all participation criteria or produced invalid data for other reasons.

Table 6

Sources of Data Included in the Present Study

Agency type (number of agencies in this category)	Subjects obtained
Neuropsychologist in private practice (5)	14
Community hospital (1)	2
Workers' Compensation Board	18
Rehabilitation firm (3)	3
Occupational therapy firm (1)	2
Vocational rehabilitation firm (2)	7
Provincial support group (4)	7
Provincial head-injury society (1)	2
Activity centre for the brain injured (1)	1
Conference (2)	4
Total	60

Data Presentation and Analysis

Descriptive Indexes. In order to compare scores obtained by the present sample to scores obtained by another sample (e.g., a normative group from the literature) or at another time (e.g., pre-injury versus post-injury), the following descriptive indexes were used throughout this study:

1) Cohen's d (effect size for location or mean differences): This index describes the size of the difference between two sample means in practical terms. It is defined as $(M_1 - M_2) / SD$, where M_1 and M_2 are the two sample means and SD is either a pooled standard deviation or one sample's standard deviation (as specified in each case). To interpret effect sizes, the following convention was followed (Cohen, 1992): .20 = small effect size, .50 = medium effect size, .80 = large effect size. Differences between sample means were also tested for statistical significance with t-tests.

2) Standard Deviation Ratio (effect size for dispersion differences): This index describes the size of the difference between two sample standard deviations and is defined as SD_1 / SD_2 . This ratio can be squared to produce an F statistic, which allows for significance testing of heterogeneity of variance.

Significance Levels. Unless otherwise indicated, a probability level of $p < .05$ was considered statistically significant in the present study.

Missing Data. Missing data were estimated using the BMDP AM program (two-step method), which estimates the missing value of a variable by regressing that variable on up to two variables selected by stepwise regression. Data estimation was performed only for those variables that were used in multivariate analyses. None of these variables were missing more than 1.7% (one of sixty cases), which resulted in estimation for a total of 8 data points. The case of the injury severity variable, where 26.7% of the sample was missing data, is discussed separately in the Results section.

Subjects

Subjects were 60 female partners (59 wives or common-law partners, 1 girl-friend) of traumatically head-injured men. All subjects lived with their spouse or boyfriend at the time of data collection. Table 7 presents subjects' demographic characteristics, and illustrates that the average research participant was in her early 40s (age range = 21.42 to 71.17 years), had a high school education (range = 5 to 20 years), had known the head-injured man for a long time (range = 3 to 60 years), and had lived with him for a long time (range = 2 to 47 years). Sixty-two per cent of the subjects reported that offspring (in some cases grown-up) were living with them at the time of data collection.

Table 7

Subject Demographics

	n	M	SD
Age	60	42.24	11.23
Education	59	12.81	2.66
Years known head-injured man	59	20.15	11.98
Years lived with head-injured man	59	17.32	10.85
Subjects with offspring in home:	37		
Number of offspring		2.14	1.01
Age of offspring		11.89	7.88

Subjects' occupational statuses at the time of their partner's head-injury and at the time of data collection are summarized in Table 8. At the time of the injury, nearly half of the women were working full-time and nearly half were working part-time or in a modified capacity (e.g., homemaker/housewife, student/job training). At the time of data collection, there was a slight decrease in full-time employment and a corresponding increase in unemployment.

Table 8

Subjects' Occupational Status at the Time of Injury and at Data Collection

Employment category	% Subjects at injury (n = 59)	% Subjects at data coll. (n = 59)
Not working:		
Unemployed or between jobs	5.1	8.5
Retired	3.4	6.8
Working part-time/modified capacity:		
Working part-time	20.3	16.9
Working as a homemaker	22.3	25.4
Student or in job training	5.1	5.1
Working full-time:	42.4	30.5
Other:	1.7	6.8

Note. The 'Other' category included items such as medical/stress leave or maternity leave.

In order to evaluate the difference between subjects' occupational involvement at the time of the injury and at data collection, the nominal employment categories presented in Table 8 were converted to a 3-point ordinal scale (1 = not working, 2 = working part-time, 3 = working full-time). Cases falling into the 'Other' category were deleted from this analysis since they could not be scaled. Table 9 presents the resulting means and standard deviations of pre-post occupational involvement. A small-sized effect suggested that occupational involvement was somewhat lower at data collection than at the time of the injury (Cohen's $d = .24$, calculated as the mean of the difference scores divided by the standard deviation of this mean). A matched samples t-test suggested that the means were not substantially different ($t = 1.84$, $p = .071$). Both means indicated that the majority of subjects were employed on a part-time or modified basis.

Table 9

Subjects' Levels of Occupational Involvement at the Time of Injury and at Data Collection

	n	M	SD
At time of injury	58	2.35	.64
At data collection	55	2.16	.69

Subjects' Head-Injured Partners

Subjects were asked to provide information about their male partners and the head-injuries they sustained (see demographic information sheet in Appendix B). The average head-injured man was in his mid-40s ($M = 44.07$ years, $SD = 10.44$, age range = 23.58 to 68.92) and had a high school education ($M = 11.81$ years, $SD = 2.65$, range = 3 to 17). The men's occupational statuses at the time of the head-injury and at the time of data collection are summarized in Table 10.

Table 10

Head-Injured Men's Occupational Status at the Time of Injury and at Data Collection

Employment category	% At injury (n = 60)	% At data coll. (n = 59)
Not working:		
Unemployed or between jobs	3.3	63.3
Retired	1.7	6.7
Working part-time/modified capacity:		
Working part-time	3.3	5.0
Student or in job training	3.3	3.3
Working full-time:	88.3	20.0
Other:	0.0	1.7

At the time of the head-injury, most men were employed on a full-time basis. At the time of data collection, nearly two thirds of the men were not working, and less than a quarter was employed full-time. The nominal employment categories were again converted to a 3-point ordinal scale (1 = not working, 2 = working part-time, 3 = working full-time), and cases falling into the 'Other' category were deleted. Table 11 presents the resulting means and standard deviations of pre-post occupational involvement. A very large-sized effect suggested that occupational involvement was substantially lower at data collection than at the time of the injury (Cohen's $d = 1.46$, calculated as the mean of the difference scores divided by the standard deviation of that mean). A matched samples t-test confirmed that the two means differed dramatically ($t = 11.16$, $p = .0001$). Moreover, a sign test indicated that the proportion of cases that moved from a higher employment level to a lower one (73.3%) far outnumbered the proportion of cases that made a reverse shift (1.7%) or no shift at all (25%) ($z = 3.39$, $p = .0007$).

Table 11

Head-Injured Men's Levels of Occupational Involvement at the Time of Injury and at Data Collection

	n	M	SD
At time of injury	60	2.83	.49
At data collection	59	1.49	.82

According to the female subjects, 8.3% and 8.5% of the men abused drugs or alcohol at the time of the head-injury and at data collection, respectively.

Injury-related Information

Time Since Injury. Data collection occurred from 1 month to 13 years 11 months (M = 3.75 years, SD = 3.46) post-injury. Table 12 presents a breakdown of the present sample in terms of post-injury categories that are typically used in stage models of recovery (e.g., Lezak, 1986), and suggests a preponderance of men within the 2-5 year category.

Table 12

Time-Since-Injury Categories

Post-injury interval	% Subjects (n = 59)
0 - 3 months	6.8
4 - 12 months	13.6
1 - 2 years (13 - 24 months)	15.3
2 - 5 years (25 - 60 months)	39.0
5 - 10 years (61 - 120 months)	16.9
over 10 years (121 or more months)	8.5

Injury Causes and Locations. As can be seen in Table 13, nearly half of the men were injured in motor vehicle accidents and most of the remainder was hurt by falling or being hit by an object. Nearly three quarters of the accidents occurred at work, and most of the others occurred during leisure-time activities. While this is fairly typical of a male head-injured population, it also reflects the fact that 30% of the sample was collected at the Workers' Compensation Board of B.C. About one third (36.7%) of the men were involved in court, insurance or litigation cases at the time of data collection.

Table 13

Causes and Locations of Men's Head-Injuries

	% Subjects (n = 60)
<hr/>	
Injury causes:	
Motor vehicle accident	41.7
Hit by object	25.0
Fall	23.3
Assault or criminal injury	3.3
Other	6.7
Injury locations:	
Work (at or on the way to)	71.7
Leisure/Hobby	21.7
Other	6.7

Injury Severity. Initially, it was planned that injury severity information (e.g., length of post-traumatic amnesia) would be gathered from the head-injured men's medical files. Once data collection was in progress, however, it was recognized that the inconsistent availability and recording of such data was highly problematic. For the remainder of data collection, an alternative method of collecting and coding injury severity information was thus adopted. This entailed calculating an Injury Severity Index from subjects' responses to three questions: 1) "Was the patient put in hospital for his head-injury?", 2) "Was the patient unconscious/in a coma when the head-injury occurred?" and 3) "Did the patient have any surgery on his head at the time of the head-injury?". Whereas the first two questions required only "yes/no" responses, the third also questioned subjects as to whether the surgery was a) "brain surgery", b) "just minor stitching of cuts" or c) "other". In order to calculate the Injury Severity Index, "yes" responses were coded as 1, and "no" responses were coded as 0. In question three, only "brain surgery" was assigned a 1. The resulting scale thus ranged from 0 (mild head-injury) to 3 (severe head-injury involving coma, hospitalization and brain surgery). Given that the method of collecting injury severity data was changed mid-stream, this information was only available for 73.3% (n = 44) of the present sample.

Table 14 summarizes injury severity information in terms of the frequencies of men who lost consciousness, were hospitalized, and/or had surgery at the time of their head-injury.

Table 14

Injury Severity Criteria

	Number of subjects (n = 60)		
	Yes	No	Unsure or unavailable
Loss of consciousness/coma:	32	11	17
Hospitalization:	38	6	16
Surgery:	23	21	16
Brain surgery	8		
Minor stitching of cuts	11		
Other	3		
Unsure	1		

Table 15 presents the distribution of men in terms of Injury Severity Index levels. Approximately 7% suffered mild head-injuries that did not result in loss of consciousness, hospitalization, or brain surgery at the time of injury (Level 0). About one quarter experienced one of these criteria (Level 1), about half experienced two (Level 2), and about 16% experienced all three (Level 3), thus having suffered severe head injuries. Given that this study required head-injured men to be living at home, and to still be in a relationship with their female partner, it is not surprising that the majority of the present sample fell within a moderate head-injury severity range.

Table 15

Injury Severity Levels

Severity of Injury	# Subjects (n = 44)	% Subjects
Level 0 (no severity criteria met)	3	6.8
Level 1 (1 criterion met)	11	25.0
Level 2 (2 criteria met)	23	52.3
Level 3 (3 criteria met)	7	15.9

Measures*Mood Disturbance*

Family member mood disturbance was measured with the Profile of Mood States (McNair, Lorr & Droppleman, 1971), which consists of 65 adjectives. Subjects rated whether they felt a certain way (e.g., tense) "during the past week including today" on a 5-point scale ranging from "not at all" to "extremely". The Profile of Mood States measures six affective states whose occurrence has been well-documented in family members of the head-injured (e.g., Lezak, 1986): Tension-anxiety (9 items), Depression-dejection (15 items), Anger-hostility (12 items), Fatigue-inertia (7 items), Vigor-Activity (weighted negatively, 8 items) and Confusion-Bewilderment (7 items). Six mood factor scores and a Total Mood Disturbance score (the sum of the six mood factors, with Vigor-Activity being negatively weighted) can be computed

(McNair et al., 1971, 1992). The latter score, which is used in the present study, is a reliable "single global estimate of affective state" (McNair et al., 1992, p. 6) due to the high intercorrelations between the six mood factors.

The Profile of Mood States has excellent internal consistency, ranging from .84 (Confusion-Bewilderment) to .95 (Depression-Dejection) for female psychiatric outpatients (McNair et al., 1971, 1992). Given that the Profile of Mood States was designed to assess "transient, fluctuating affective states" over a period that is "both sufficiently long to depict the [subject's] typical and persistent mood reactions to [her] current life situations" (McNair et al., 1992, p. 2) and sufficiently short to be sensitive to temporal change, test-retest correlations are lower than that expected for stable personality traits. McNair et al. (1971, 1992), for example, reported a coefficient range of $r = .65$ (Vigor-Activity) to $r = .74$ (Depression) for psychiatric outpatients for a 20-day test-retest period.

In terms of validity, the factor structure of the Profile of Mood States has been extensively examined, and validated to various degrees (e.g., Boyle, 1978; Kaye, Powell Lawton, Gitlin, Kleban, Windsor & Kaye, 1988; Norcross, Guadagnoli & Prochaska, 1984; McNair et al., 1992). The Profile of Mood States has been shown to correlate highly with other well-established measures of affect (e.g., the Taylor Manifest Affect Scales, see McNair et al., 1992). Moreover, it has been shown to discriminate between diagnostic categories and clinical dispositions (e.g., hospitalized versus outpatient), and to be sensitive to psychotherapy, pharmacological interventions and emotion-inducing conditions (see McNair et al., 1992, for a review).

Subjects in the present study were compared to a sample of undergraduate college students who represented normal affective functioning, and a group of female psychiatric outpatients (McNair et al.,

1971, 1992). Half of the latter sample was diagnosed as neurotic and 20% were diagnosed as personality disordered. Forty-seven per cent had received prior psychiatric treatment.

Positive Affect

Positive affect was measured with the Positive and Negative Affect Schedule (Watson et al., 1988), which requires subjects to rate the extent to which they have felt ten positive (e.g., enthusiastic) and ten negative affective states. Answer choices are presented on a five-point scale and range from "very slightly or not at all" to "extremely". The Positive and Negative Affect Schedule has been validated with instructions covering various time frames, ranging from momentary mood states to general affective dispositions (Watson et al., 1988). In order to maintain consistency with the Profile of Mood States, instructions covering "the past week, including today" were used in the present study. Although only the Positive Affect dimension was used in the present study, the entire instrument was administered to avoid context effects that might bias the Positive Affect score.

The internal consistency of the Positive Affect scale (with instructions covering "several days") ranged between .86 and .88 for adults and undergraduates, respectively. The test-retest correlation for a two-week period was $r = .48$ (Watson et al., 1988). As is the case with the Profile of Mood States, the latter coefficient was not expected to approach the size typically observed for stable personality traits. The correlations between the Positive Affect and Negative Affect factors are negligible ($r = -.12$ to $-.23$), thus suggesting that the two factors are largely independent from one another (Watson et al., 1988). The Positive and Negative Affect Schedule has also demonstrated good convergent and discriminant validity with other

measures of mood states, including the Hopkins Symptom Checklist, the Beck Depression Inventory and the State-Trait Anxiety Inventory (see Watson et al., 1988). As is pointed out by Watson et al., high scores on these inventories typically result in a high Negative Affect - low Positive Affect profile on the Positive and Negative Affect Schedule.

Subjects in the present study were compared to a sample consisting of college students and university employees (Watson et al., 1988).

Satisfaction With Life

The Satisfaction with Life Scale (Diener et al., 1985), was used to provide a global judgment of life satisfaction. Respondents indicate their agreement with five statements on a seven-point scale. The Satisfaction with Life Scale, which was considered a promising new instrument in a recent review of existing measures (Andrews & Robinson, 1991), has several advantages over other instruments: it is a multi-item scale, it can be used with adults of all ages, and it emphasizes cognitively-based judgements rather than affect. The latter factor minimizes conceptual overlap with the Profile of Mood States and Positive and Negative Affect Schedule.

Recent validation studies estimated internal consistency as ranging from .85 to .93, and test-retest reliability as falling at .84 for one month and .82 or .83 for two months (Diener et al., 1985; Larsen et al., 1985; Pavot et al., 1991). The Satisfaction with Life Scale consists of a single factor, which has accounted for 66 to 74% of the variance in various studies (Diener et al., 1985; Pavot et al., 1991). The Satisfaction with Life Scale demonstrated good convergent validity with positive affect, extraversion ($r = .33$ to $.35$, Pavot et al., 1991), self-esteem ($r = .54$, Larsen et al., 1985), and peer reports of satisfaction with life (Diener et al., 1985; Pavot et al., 1991). It also correlated

highly with other multi-item life satisfaction scales (Larsen et al., 1985). Negative correlations were found with neuroticism ($r = -.48$) and with negative affect (Diener et al., 1985; Pavot et al., 1991).

Subjects in the present study were compared to normal college undergraduates (Diener et al., 1985).

Subjective Well-being. For the purpose of the present study, the construct of Subjective Well-being consisted of family member mood disturbance (Profile of Mood States Total Summary Score), positive affect (Positive and Negative Affect Schedule positive affect factor) and satisfaction with life (Satisfaction with Life Scale).

Financial Strain

Financial strain was measured on a 7-point Likert scale, which was included in the demographic information sheet. Subjects rated their perception of financial strain at the time of data collection "compared to before the head-injury". Response choices ranged from "Much better than before the injury (less money problems now)" to "Much worse than before the injury (more money problems now)".

Social Adjustment Problems

The Social Adjustment Self-Report Scale (Weissman & Bothwell, 1976), which has been previously used in research with family members of the head-injured (Livingston et al., 1985a,b; Livingston, 1987), served as a measure of subjects' social adjustment problems. The Social Adjustment Self-Report Scale consists of 42 items that assess role performance over the past two weeks in six domains of functioning: work (outside the home, as a

homemaker, or as a student), social and leisure activities, relationship with extended family, marital functioning (also applicable for cohabiting couples in a permanent relationship), parenting, and membership in the nuclear family unit. The items generally assess performance at expected tasks, friction with others, finer aspects of interpersonal relations, and inner feelings and satisfactions regarding role performance (Weissman & Bothwell, 1976; Weissman, Prusoff, Thompson, Harding & Myers, 1978). The items offer five response choices, where higher scores indicate greater impairment. Both domain-specific adjustment scores (e.g., parental functioning) and an overall adjustment score can be obtained (Weissman et al., 1978). The latter score, which was used in the present study, is calculated by averaging over all questionnaire items answered. This controls for variations in the number of items that are endorsed, since not all domains apply to all respondents (e.g., not everybody functions as a parent).

The internal consistency of the Social Adjustment Self-Report Scale was reported to average .74, and test-retest reliability was shown to average .80 (Edwards, Yarvis & Mueller, 1978). In terms of concurrent validity, the Social Adjustment Self-Report Scale has been shown to detect treatment-related changes in depressed women (Weissman & Bothwell, 1976), and to differentiate a variety of psychiatric groups from control subjects (Edwards et al., 1978; Weissman et al., 1978). Moreover, Social Adjustment Self-Report Scale scores tend to correlate highly with clinicians' ratings of adjustment (e.g., on the Hamilton Rating Scales, see Weissman et al., 1978) and self-report measures of mental health and emotional functioning (e.g., the SCL-90, see Weissman et al., 1978; or the General Health Questionnaire and Profile of Mood States, see Cooper, Osborn, Gath & Feggetter, 1982). The

Social Adjustment Self-Report Scale is relatively unaffected by demographic variables (Weissman & Bothwell, 1978; Weissman et al., 1978).

Subjects in the present study were compared to 1) a sample of normal adult women (Weissman et al., 1978), 2) a group of acutely depressed women (Weissman et al., 1978), and 3) a group of female relatives of traumatically head-injured persons assessed during the first post-injury year (Livingston et al., 1985a,b). Minor modifications were made to increase the appropriateness of the Social Adjustment Self-Report Scale for the present study. Appendix C documents these changes in detail.

Life Circumstances. For the purpose of the present study, the domain of Life Circumstances included subjects' perception of financial strain (7-point Likert scale) and social adjustment problems (Social Adjustment Scale - SR Overall Adjustment Score). This family of variables therefore summarized family members' perceptions of their situational or external adjustment.

Personality Disposition

The Eysenck Personality Inventory (Eysenck & Eysenck, 1968) was selected due to its brevity (57 questions which require dichotomous yes/no answers) and minor deviation from a more recently constructed measure by the same authors. This inventory assesses neuroticism and extraversion; two "pervasive, independent dimensions" of personality (Eysenck & Eysenck, 1968, p. 5), which are viewed as reflecting inherited individual differences in central nervous system arousability, and thus in temperament. Eysenck and Eysenck (1968, p. 6) describe high scores on neuroticism as being indicative of "emotional lability and overreactivity; worries, anxieties, and other

disagreeable emotional feelings; and frequent complaints of vague somatic upsets". Moreover, high scorers on this dimension, which has also been referred to as 'emotionality-stability', are viewed as being "predisposed to develop neurotic disorders under stress" (Eysenck & Eysenck, 1968, p. 6). High scores on extraversion, on the other hand, characterize an individual who is "outgoing, impulsive, uninhibited; craves excitement and takes chances; is carefree, easygoing and optimistic; and frequently takes part in group activities" (p.6).

The Eysenck Personality Inventory has excellent internal consistency and test-retest reliability (see Eysenck & Eysenck, 1968, for a review). In terms of the former, for example, Eysenck and Eysenck (1968) reported split-half reliability coefficients ranging from .86 to .93. Test-retest reliability coefficients for Eysenck Personality Inventory Form A (which was used in the present study) were .84 and .88 for neuroticism for one year and for 9 months, respectively. For extraversion, they ranged from .82 to .97 for one year and for 9 months, respectively (Eysenck & Eysenck, 1968).

Given that the Eysenck Personality Inventory was factor analytically derived, and was based on previously validated (factor analytically derived) inventories, the dimensions of neuroticism and extraversion are well-documented orthogonal higher-order personality factors (see Eysenck & Eysenck, 1968, for a review of early research). In terms of construct validity, Eysenck and Eysenck (1968) viewed the Eysenck Personality Inventory as embodying their two-dimensional framework of personality, where normal functioning was conceptualized as low neuroticism and mid- to average-range extraversion. Persons experiencing dysthymia or anxiety were expected to obtain high scores on neuroticism and low scores on extraversion. In terms of concurrent or predictive validity, neuroticism and extraversion have been

extensively shown to correlate with related scales of personality inventories, such as the Minnesota Multiphasic Personality Inventory or California Personality Inventory, and trait measures of affect, such as the Multiple Affect Adjective Checklist (Eysenck & Eysenck, 1968). Neuroticism and extraversion, however, have not been found to be linearly related to specific affective states (Eysenck & Eysenck, 1968), thus measuring more pervasive underlying characterological dimensions than those measured by mood state inventories (e.g., the Profile of Mood States or Positive and Negative Affect Schedule).

Eysenck Personality Inventory norms have been developed for college students and for a variety of demographic and clinical reference groups (Eysenck & Eysenck, 1968). The present sample will be compared to samples of normal adults (45% female) and "mixed neurotics" (49% female).

Personality Disposition. For the purpose of the present study, this domain included family member extraversion and neuroticism (Eysenck Personality Inventory), and therefore summarized family members' ratings of their dispositional or internal adjustment.

Perceived Psychosocial Competency

The Patient Competency Rating Scale (Roueche & Fordyce, 1983) was designed to assess daily functioning in traumatically head-injured persons. The Relative (family member) version of this 30-item inventory was used in the present study. Subjects rated their head-injured partners' competency in areas like self-care, housework, social interaction, working memory and emotional control on five-point scales, which ranged from "can't do" to "does with ease". Higher scores indicated higher competency, and average

perceived competency was calculated by obtaining the mean rating of all items completed (Fordyce & Roueche, 1986; Roueche & Fordyce, 1983).

Fordyce and Roueche (1986) reported high interrater reliability (average $r = .92$, ratings made by staff members) and test-retest stability ($r = .92$, ratings made by head-injured persons over one to two weeks). Family member ratings typically fell in between head-injured persons' ratings (which indicated the least impairment), and staff ratings (which indicated the most impairment) (Fordyce & Roueche, 1986; Prigatano & Fordyce, 1986). Most patient-family member disagreement occurred in the areas of perceived competency to handle emotional and social situations (Prigatano et al., 1990). In one study (Fordyce & Roueche, 1986), family member Patient Competency Rating Scale scores differentiated between head-injured persons who were able to return to work following rehabilitation, and survivors who remained unemployed.

A number of factors rendered this inventory highly superior to the more widely-used Katz Adjustment Scales (Katz & Lyerly, 1963) for the purpose of the present study. First, the item content of the Patient Competency Rating Scale was designed specifically for a head-injured population, whereas the Katz Adjustment Scales are more appropriate for chronic psychiatric patients. Second, the Patient Competency Rating Scale is significantly briefer. Third, the Patient Competency Rating Scale avoids the scoring inconsistencies that characterize the Katz Adjustment Scales (e.g., "generous" as a sign of maladjustment).

Subjects in the present study were compared to a sample of family members of severely head-injured persons who were assessed on the Patient Competency Rating Scale at least 3.5 years ($M = 7$ years) post-injury (Douglas, 1994).

Head-injured Man's Functioning. For the purpose of the present study, this family of variables included (family member ratings of) the head-injured man's psychosocial competency (Patient Competency Rating Scale), current occupational involvement (3-point scale, see Method), and injury severity (4-point scale, see Method).

CHAPTER III

RESULTS

Putting the Results in Context - Subject Sample Composition

There are many ways in which this subject sample resembled the general population of traumatically head-injured persons and their family members. For example, both the modal head-injured person and the survivors in the present study are relatively young men (Garden et al., 1990; Liss & Willer, 1990; Urbach & Culbert, 1991), likely worked in a blue-collar occupation (Moore & Stambrook, 1995), and likely were the breadwinners in a fairly traditional pre-injury family milieu.

At the same time, however, the present sample had some atypical characteristics that can be attributed to the data collection process, the research participation criteria, and the low data return rate (14.7%). In terms of the data collection process, nearly all subjects were solicited from agencies or professionals, and were thus connected to some sort of assistance (e.g., workers' compensation, cognitive rehabilitation, support group). It is not clear whether this signals a high-problem status or a special ability to navigate the health care system.

In terms of the research participation criteria, female subjects had to be proficient English-speakers, which may have reduced cultural diversity. Moreover, the head-injured men had to be free of previous or co-existing neurological trauma or disease (e.g., head-injuries, strokes, Alzheimer's). Most importantly, however, the head-injured men had to be in a relationship, and living with, a female partner they had known since the time of injury. It is widely known that post-injury separation rates are extremely high (Jacobs,

1988), and that lasting relationships are thus relatively rare. It was striking that all but one of the female subjects in the present study were married to their head-injured partners (although this was not required), and that most couples had lived together for many years. A number of factors may explain why these relationships lasted. First, the wives may not have seen divorce as a viable option, due to personal values, a strong sense of loyalty, or concern over their partner's future (Jacobs, 1988; Liss & Willer, 1990). Second, the pre-injury quality of these relationships may have been unusually high. Third, the couples may have had special skills to make their relationships last (e.g., communication, maintaining separate interests and friends). Fourth, the women may have possessed very solid coping strategies. Lastly, this group of head-injured men may have been especially high-functioning, although injury severity and patient competency data do not support this.

The low data return rate also needs to be considered as a factor that renders the present subject sample potentially different from the general population of head-injured people and their family members. Agencies may have selectively handed out packages (e.g., to relatively less distressed clients), or subjects who returned packages may have differed from those who did not. For example, subjects may have been motivated to complete the questionnaire packages in order to document (to themselves and the researcher) their favorable post-injury adjustment, or conversely, to express their distress and need for assistance (see also Linn et al., 1994).

Although these issues are not unusual in this research area, they do require that the findings of this study be interpreted within the context of the composition of the present subject sample. As Moore et al. (1992) and Peters et al. (1992) cautioned in their studies with similar sample compositions, studies of still-married couples with a head-injured partner may contain an

inherent bias toward well-adjusted subjects, and may thus underestimate the true stresses of traumatic head-injury.

Outline of Presentation of Results

The presentation of results follows the structure of the hypotheses.

Findings are therefore discussed in the following sections:

- I. Descriptive analysis of subjects' adjustment in the domains of Subjective Well-being, Life Circumstances and Personality Disposition. The head-injured men's psychosocial functioning is also addressed here. Table 3 (p. 42) presented the design for this section.
- II. Exploration of the role of time since injury in the adjustment of family members and head-injured partners. Table 4 (p. 44) detailed the design for this section.
- III. Prediction of three aspects of family member Subjective Well-being (mood disturbance, positive affect, satisfaction with life). Table 5 (p. 46) presented the design for this section.

I. Descriptive Analysis of Subjects' Adjustment and their Head-Injured Partners' Functioning

In order to describe the present sample's adjustment, subjects' scores were compared to existing normative data where this was available. In most cases, this entailed comparing the present sample's questionnaire scores to a sample of "normal" adults described in the literature (e.g., in the manuals of the inventories that were used). In some cases, the interpretive picture was rounded out by also comparing the present sample to a relevant clinical

sample from the literature (e.g., female psychiatric outpatients). Given that the present sample and the normative groups typically differed in terms of size and dispersion, independent samples t-tests using Satterthwaite's (1946, as cited in Howell, 1982) solution were conducted to compare means in most cases. Where Cohen's d's are presented, the standard deviation of the normative sample was used to compute effect size. This follows the convention used in psychological assessment practice, where the examinee's performance is compared to (or "normed against") that of a normative sample.

Subjective Well-being

This domain included family member mood disturbance, positive affect, and satisfaction with life.

Mood Disturbance. Table 16 presents summary statistics for the Profile of Mood States Total Mood Disturbance Score⁴ for the present sample, a normal sample of college students and a clinical sample of female psychiatric outpatients (McNair et al., 1992, 1971). A comparison of the present sample and the college students indicated that the samples' true means differed ($t = 2.91, p = .0050$), and that the present sample experienced higher mood disturbance than is typical for normal adults. In terms of practical significance, this constituted a medium-sized effect (Cohen's $d = .57$). The standard deviation ratio ($SDR = 1.48$) indicated that the distribution of the present sample had more variability than that of the college students, suggesting a greater range of mood disturbance in the former ($F = 2.20, p = .0001$).

⁴ The Total Mood Disturbance Score is the sum of the six Profile of Mood States factors (see Appendix D), with Vigor-Activity weighted negatively (McNair et al., 1971, 1992).

Table 16

Profile of Mood States Total Mood Disturbance Score and Normative Data

	n	M	SD
Present sample	59	60.97	46.70
Normal sample: College students	856	43.00	31.50
Clinical sample: Female outpatients	650	81.50	44.00

Present sample vs. college students:

Location: $d = .57, t = 2.91, p = .0050$

Dispersion: $SDR = 1.48, F = 2.20, p = .0001$

Present Sample vs. female outpatients:

Location: $d = -.47, t = -3.25, p = .0018$

Dispersion: $SDR = 1.06, F = 1.13, p = .49$

Note. McNair, Lorr and Droppleman's (1971, 1992) college student and female psychiatric outpatient norms were used.

A comparison of the present sample with a group of female psychiatric outpatients indicated that these samples' true means also differed ($t = -3.25, p = .0018$), suggesting that the present sample did not experience as much mood disturbance as the psychiatric outpatients. In terms of practical significance, this approached a medium-sized effect (Cohen's $d = -.47$). There

was no notable difference ($SDR = 1.06$) in the variability of the distributions of the present sample and the psychiatric outpatients ($F = 1.13, p = .49$).

To summarize, the overall level of mood disturbance experienced by the present sample fell in between the levels reported by normal adults and female psychiatric outpatients. Appendix D presents summary statistics and effect sizes (Cohen's d) for the six Profile of Mood States factors (e.g., tension-anxiety). A comparison between the present sample and a sample of all-female college students (McNair et al., 1971, 1992) indicated that the present sample endorsed substantially more anger-hostility (large effect), more fatigue-inertia (medium effect) more depression-dejection (small-medium effect), less vigor-activity (small-medium effect) and slightly more tension-anxiety (approaching a small effect). The present sample reported slightly less confusion-bewilderment (small to medium effect) than the college students.

The effect sizes comparing the present sample to the female psychiatric outpatients confirmed that the latter sample experienced more tension-anxiety, more depression-dejection, more confusion-bewilderment and less vigor-activity (medium effects). It is only in the domains of anger-hostility (insignificant effect) and fatigue-inertia (approaching a small effect) that the present sample resembled the psychiatric outpatients.

Positive Affect. Table 17 presents summary statistics for the positive factor of the Positive and Negative Affect Schedule for the present sample and a normal adult sample that included college students and university employees (Watson et al., 1988). A comparison between the present sample and the normal adults indicated that the samples' true means differed, suggesting that the present sample experienced lower levels of positive affect ($t = -3.71, p = .0004$). In terms of practical significance, this constituted a medium effect size (Cohen's $d = -.50$). The spread of the present sample's distribution resembled ($SDR = 1.01$) that of the normal adults ($F = 1.03, p = .84$).

Table 17

Positive Affect Score and Normative Data

	n	M	SD
Present sample	59	29.7	7.3
Normal sample: Adults	1002	33.3	7.2

Present sample vs. normal adults:

Location: $d = -.50, t = -3.71, p = .0004$

Dispersion: $SDR = 1.01, F = 1.03, p = .84$

Note. Watson et al.'s (1988) normal adult norms were used.

Satisfaction With Life. Table 18 presents summary statistics for the Satisfaction With Life Scale for the present sample and a sample of normal college students (Diener et al., 1985). A comparison between the present sample and the college students indicated that the samples' true means differed, suggesting that the present sample experienced lower levels of satisfaction with life than normal adults ($t = -5.54, p = .0001$). In terms of practical significance, this constituted a large effect size (Cohen's $d = -.97$). The spread of the present sample's distribution resembled (SDR = 1.22) that of the college students ($F = 1.49, p = .051$).

Table 18

Satisfaction With Life Scale Score and Normative Data

	n	M	SD
Present sample	59	17.3	7.8
Normal sample: College students	176	23.5	6.4

Present sample vs. college students:

Location: $d = -.97, t = -5.54, p = .0001$

Dispersion: $SDR = 1.22, F = 1.49, p = .051$

Note. Diener et al.'s (1985) college student norms were used.

Summary. As hypothesized, the present sample endorsed lower Subjective Well-being than normal adults. This included higher mood disturbance, lower positive affect and lower satisfaction with life. Table 19 presents the correlations between these three aspects of Subjective Well-being for the present sample.

Table 19

Correlations Between Three Aspects of Subjective Well-Being

	TMD	PAF	SWL
Total mood disturbance	1.00	-.32	-.49
Positive affect	-.32	1.00	.26
Satisfaction with life	-.49	.26	1.00

Life Circumstances

This domain included family members' perceptions of financial strain and social adjustment problems.

Financial Strain. Subjects were asked to rate financial strain at the time of data collection "compared to before the injury" on a 7-point Likert scale. The mean ($M = 4.90$, $SD = 1.49$) indicated "slightly worse" financial functioning than before the injury. A one-sample t-test showed that this mean differed from the "no different" answer choice ($t = 4.62$, $p = .0001$). Table 20 provides the frequency distribution of subjects' perceptions of financial strain: While about a quarter reported no difference compared to

before the injury, nearly two-thirds reported greater strain. The 12% that reported less strain likely included those subjects whose partners received financial settlements following their head-injuries.

Table 20

Perceived Financial Strain

	% Subjects (n = 59)
<hr/>	
More strain now:	
A lot worse	16.9
Considerably worse	16.9
Slightly worse	28.8
No difference:	25.4
Less strain now:	
Slightly better	1.7
Considerably better	8.5
A lot better	1.7

Social Adjustment Problems. Table 21 presents summary statistics for the Social Adjustment Scale - SR Overall Adjustment Score⁵ for the present sample, for a sample of normal adult women (Weissman et al., 1978), for a sample of acutely depressed women (Weissman et al., 1978), and for a sample of women living with head-injured men tested one year post-injury (Livingston et al., 1985b). A comparison of the present sample and the normal women (Weissman et al., 1978) indicated that the samples' true means differed ($t = 6.80, p = .0001$), and that the present sample experienced more social adjustment problems than the normal women. In terms of practical significance, this constituted a large effect (Cohen's $d = 1.00$). The distribution of the present sample did not differ ($SDR = 1.12$) from that of the normal women ($F = 1.17, p = .41$).

The present sample's mean also differed from that of a sample of acutely depressed women (Weissman et al., 1978) ($t = -9.67, p = .0001$), indicating that the present sample experienced fewer social adjustment problems. This constituted a large effect (Cohen's $d = -1.26$). The present sample's distribution resembled ($SDR = .83$) that of the acutely depressed women ($F = 1.50, p = .077$).

An especially interesting comparison was that between the present sample and a group of women living with head-injured men assessed one year post-injury (Livingston et al., 1985b). These samples' means also differed ($t = 2.33, p = .025$), suggesting that the present sample was experiencing more social adjustment problems than Livingston et al.'s

⁵ The SAS - SR Overall Adjustment Score is the mean of all items answered. Given that not all domains apply to all respondents (e.g., not all respondents function as parents), the number of items that this score is based on may vary.

Table 21

Social Adjustment Scale - SR Summary Score and Normative Data

	n	M	SD
Present sample	60	1.95	.38
Normal sample: Adult women	272	1.61	.34
Clinical sample: Acutely depressed	149	2.53	.46
Clinical sample: Women living with HI	44	1.74	.51

Present sample vs. adult women:

Location: $d = 1.00, t = 6.80, p = .0001$

Dispersion: $SDR = 1.12, F = 1.17, p = .41$

Present sample vs. acutely depressed women:

Location: $d = -1.26, t = -9.67, p = .0001$

Dispersion: $SDR = .83, F = 1.50, p = .077$

Present sample vs. women living with head-injured persons:

Location: $d = .41, t = 2.33, p = .025$

Dispersion: $SDR = .75, F = 1.86, p = .027$

Note. Weissman et al.'s (1978) norms for normal adult women and acutely depressed women, and Livingston et al.'s (1985b) norms for women living with head-injured persons, were used.

subjects. This constituted a small to medium sized effect (Cohen's $d = .41$). The distribution of the present sample was narrower ($SDR = .75$) than that of Livingston et al.'s sample ($F = 1.86, p = .027$), suggesting a smaller range of social adjustment problems in the former sample.

To summarize, the present sample's social adjustment was more problematic than that of normal adult women (Weissman et al., 1978), or that of women living with head-injured men tested one year post-injury (Livingston et al., 1985b). It was less problematic, however, than that of a sample of acutely depressed women (Weissman et al., 1978). Appendix E presents summary statistics and effect sizes (Cohen's d) for the six domains tapped by the Social Adjustment Scale - SR.

Compared to the normal adult women, the present sample reported a great deal more problems in the areas of marital functioning, nuclear family functioning and extended family functioning (large effects), more problems in the areas of work and parental functioning (medium effects), and slightly more problems in the area of social functioning (small to medium effect).

Compared to the acutely depressed sample, the present sample reported less difficulty in all domains (medium to large effects). Compared to Livingston et al.'s (1985b) sample of women living with head-injured men, the present sample reported more problematic adjustment in nuclear family functioning (medium to large effect), work and extended family functioning (medium effects), parental functioning (small to medium effect) and marital functioning (small effect). The two samples resembled each other in the domain of social functioning.

Summary. As hypothesized, the present sample reported problematic Life Circumstances. This included higher financial strain than before the injury, and greater social adjustment problems than normal adults.

Personality Disposition

This domain included family member extraversion and neuroticism. Given that personality variables were expected to be relatively resistant to environmental events, it was predicted that the mean levels of extraversion and neuroticism reported by the present sample would not differ from those of normal adults. In order to evaluate this assertion, approximate confidence intervals for effect sizes (Cohen's d) were calculated at $p < .05$, or a 95% confidence level. Given that there were differences in sample sizes and distributions, Satterthwaite's (1946, as cited in Howell, 1982) solution was used to calculate t -values. In the case where a confidence interval contained the value '0' (no difference between the means), this was interpreted as potentially supporting the hypothesis that the present sample did not differ from the normal adults. In the case where a confidence interval did not contain '0', this was interpreted as suggesting that the two samples differed. Table 22 presents summary statistics for the Eysenck Personality Inventory extraversion and neuroticism scores for the present sample, for a normal adult sample and for a clinical sample of "mixed neurotics" (Eysenck & Eysenck, 1968).

Extraversion. A comparison between the means of the present sample and the normal adult sample produced a small effect (Cohen's $d = -.20$), indicating slightly lower extraversion in the present sample. The confidence interval suggested that the true effect size ranged from a medium-sized difference ($-.46$) to a negligible difference ($.05$), and contained the possibility that the two samples did not differ (i.e., the value 0). In terms of sample dispersion, the spread of the distribution of the present sample resembled ($SDR = .95$) that of the normal adults ($F = 1.10$, $p = .67$).

Table 22

Eysenck Personality Inventory Scores and Normative Data

	n	Extraversion		Neuroticism	
		M	SD	M	SD
Present sample	59	11.2	4.2	12.9	4.6
Normal sample: Adults	1931	12.1	4.4	9.0	4.8
Clinical sample: Neurotics	61	10.0	4.4	14.4	5.5

Extraversion: Present sample vs. normal adults

Location: $d = -.20$, $CI = -.46 < d < .05$

Dispersion: $SDR = .95$, $F = 1.10$, $p = .67$

Extraversion: Present sample vs. mixed neurotics

Location: $d = .27$, $CI = .08 < d < .63$

Dispersion: $SDR = .95$, $F = 1.10$, $p = .72$

Neuroticism: Present sample vs. normal adults

Location: $d = .81$, $CI = .56 < d < 1.07$

Dispersion: $SDR = .96$, $F = 1.09$, $p = .70$

Neuroticism: Present sample vs. mixed neurotics

Location: $d = -.27$, $CI = -.60 < d < .06$

Dispersion: $SDR = .84$, $F = 1.43$, $p = .17$

Note. Eysenck and Eysenck's (1968) norms for normal adults and mixed neurotics were used.

A comparison between the present sample and a clinical sample of mixed neurotics also provided a small effect size (Cohen's $d = .27$), suggesting that the present sample reported slightly more extraversion. The confidence interval indicated that the true effect size ranged from a negligible difference (.08) to a medium difference (.63), but did not actually contain the true possibility of no difference (the value 0). The two samples are therefore likely to differ. The standard deviation ratio suggested that there was no difference (SDR = .95) between the distributions of the present sample and the mixed neurotics ($F = 1.10$, $p = .72$).

Neuroticism. A comparison between the means of the present sample and the normal adult sample produced a large effect (Cohen's $d = .81$), indicating that present sample reported substantially higher levels of neuroticism. The confidence interval suggested that the true effect size ranged from a medium difference (.56) to a large difference (1.07) and thus clearly ruled out the possibility that the two samples did not differ. The spread of the distribution of the present sample resembled (SDR = .96) that of the normal adults ($F = 1.09$, $p = .70$).

A comparison between the present sample and a clinical sample of mixed neurotics provided a small effect size (Cohen's $d = -.27$), suggesting that the present sample reported slightly less neuroticism. The confidence interval indicated that the true effect size ranged from a medium difference (-.60) to a negligible difference (.06), and contained the true possibility of no difference (the value 0). There was no difference (SDR = .84) in the distributions of the present sample and the mixed neurotics ($F = 1.43$, $p = .17$).

Summary. The findings partially supported the hypothesis about personality disposition, in that the present sample did not substantially differ

from normal adults in terms of extraversion. Contrary to prediction, however, the present sample reported much higher levels of neuroticism than is typical for normal adults.

Head-injured Man's Functioning

This domain included the head-injured man's psychosocial competency, occupational involvement and injury severity. Occupational involvement and injury severity were discussed in the Method section, where it was reported that most survivors were unemployed at the time of data collection, and that the modal injury severity was Level 2 (two of three severity criteria were met).

Perceived Psychosocial Competency. Subjects rated their head-injured partners' psychosocial competency on the Patient Competency Rating Scale (PCRS). Table 23 provides the means and standard deviations for the present sample and for a sample of family members of severely head-injured persons assessed at least 3.5 years (mean = 7 years) after the injury (Douglas, 1994). Given that Douglas presented PCRS sums, rather than averages over the 30 items, the present sample's scores were also reported in that scale. In terms of the more conventionally used average score, Douglas' sample obtained a mean of 3.74, suggesting that these subjects viewed their head-injured relatives as being able to complete most psychosocial activities "fairly easily".

The present sample's mean was 3.19 (SD = .72). This suggested that overall, subjects viewed their head-injured partners as being able to do most psychosocial activities "with some difficulty". The present sample's mean fell below that of Douglas' sample ($t = -3.18$, $p = .0036$), indicating greater impairment. In practical terms, this constituted an effect that approached a large size (Cohen's $d = -.74$). There was no difference (SDR = .96) in terms of

the dispersion of the distributions of the present sample and Douglas' sample ($F = 1.08, p = .78$).

Table 23

Patient Competency Rating Scale Score and Normative Data

	n	M	SD
Present sample	60	95.47	21.74
Douglas' (1994) sample	26	112.15	22.60

Present sample vs. Douglas' (1994) sample:

Location: $d = -.74, t = -3.18, p = .0026$

Dispersion: $SDR = .96, F = 1.08, p = .78$

Table 24 summarizes the average frequency (i.e., over 30 PCRS items) of endorsement of the five PCRS response categories by the present sample. For example, response category 2 ("Very difficult to do") was endorsed by an average of 14 subjects per item. Appendix F provides a ranking of PCRS items according to the degree of difficulty each item posed for subjects' head-injured partners. It appears that the activities that were most problematic related to the areas of emotional control, executive functioning (perseverance, flexibility), social interaction and memory.

Table 24

Average Frequency of Endorsement of Patient Competency Rating Scale
Response Categories

Response category	Average # subjects	% Subjects
Can't do	5.43	9.1
Very difficult to do	14.00	23.4
Can do with some difficulty	15.50	25.9
Fairly easy to do	14.07	23.5
Can do with ease	10.87	18.2

Summary. As hypothesized, subjects reported problems with the Head-injured Men's Functioning. This included reduced occupational involvement at data collection (see Method), and some impairment in psychosocial competency.

II. Does the Adjustment of Subjects and their Head-Injured Partners Change as a Function of Time Since Injury?

One purpose of the present study was to investigate the relationship between time since injury and several indicators of family member and survivor adjustment (Table 4 on p. 44 presented this design). The adjustment variables were the women's Subjective Well-being (mood disturbance, positive affect, satisfaction with life), the women's Life Circumstances

(financial strain, social adjustment problems), and the Head-injured Men's Functioning (occupational involvement, psychosocial competency).

Overall, the correlations between the adjustment variables and time since injury were low and failed to reach statistical significance (see Table 25). Two correlations reached a size that could be interpreted as a small effect⁶, and suggested reduced mood disturbance and reduced financial strain as time since injury increased. A simultaneous multivariate test of all correlations of the adjustment variables with time since injury did not reach significance ($F = .17, p = .99$).

Table 25

Correlations of Adjustment Variables with Time Since Injury

Adjustment variable	r	p
Mood disturbance	-.12	.37
Positive affect	.08	.52
Satisfaction with life	.07	.57
Financial strain	-.11	.40
Social adjustment problems	-.09	.49
Man's occupational involvement	.04	.75
Man's psychosocial competency	.08	.54

⁶ Once again, Cohen's (1992) conventions were followed to interpret effect sizes for correlation coefficients: $r = .10$ was considered a small effect, $r = .30$ was considered a medium effect, and $r = .50$ was considered a large effect.

Many studies investigating the role of time since injury restrict data collection to the first one or two post-injury years. In order to further explore the association between time since injury and the adjustment variables, the correlational analyses presented above were repeated for subsets of cases that were within the first two post-injury years (time since injury \leq 24 months) and the first post-injury year (time since injury \leq 12 months). Given that the sample sizes for these analyses were very small ($n = 21$ and $n = 12$, respectively) the findings can be considered exploratory at best.

In terms of the cases within the first two post-injury years, none of the correlations between time since injury and the adjustment variables reached statistical significance (see Table 26), but the effect sizes ranged from small to medium. An interpretation of these effect sizes failed to suggest a clear trend toward better or worse adjustment over time: Potential positive changes included higher psychosocial competency and occupational involvement in the head-injured men, and lower financial strain in the female subjects. Potential negative changes, however, suggested less positive affect and more social adjustment problems in the female subjects. A simultaneous multivariate test of all correlations of the adjustment variables with time since injury did not reach significance ($F = 1.88$, $p = .16$).

In terms of the cases within the first post-injury year, none of the correlations between time since injury and the adjustment variables reached significance, although the effect sizes ranged from small to large (see Table 26). Once again, an interpretation of these effect sizes failed to suggest a clear trend toward better or worse adjustment over time: Potential positive changes were higher psychosocial competency in the head-injured men, as well as higher satisfaction with life and better social adjustment in the female subjects. Potential negative changes, however, were lower

occupational involvement in the head-injured men, and lower positive affect in the female subjects. A simultaneous multivariate test of all correlations of the adjustment variables with time since injury approached, but did not reach, significance ($F = 5.78, p = .055$).

Table 26

Correlations of Adjustment Variables with Time Since Injury Restricted to 24 or 12 Months

Adjustment variable	TSI ≤ 24 months (n = 21)		TSI ≤ 12 months (n = 12)	
	r	p	r	p
Mood disturbance	-.08	.72	-.06	.85
Positive affect	-.19	.41	-.12	.70
Satisfaction with life	.09	.69	.12	.71
Financial strain	-.10	.66	.07	.84
Social adjustment problems	.23	.33	-.12	.71
Man's occupational involvement	.33	.14	-.41	.18
Man's psychosocial competency	.35	.12	.56	.06

Note. 'TSI' denotes 'Time since injury'.

Although the previous analyses were based on sample sizes that were too small to substantiate the findings, they suggested a possible trend toward stronger associations between relatively shorter time since injury intervals and the adjustment variables. In order to further explore this trend, a square root transformation of the time since injury variable was performed. Table 27 presents the correlations between this variable and the adjustment variables. While some correlations reached a small effect size, none of them were statistically significant.

Table 27

Correlations of Adjustment Variables and the Square Root of Time Since Injury

Adjustment variable	r	p
Mood disturbance	-.11	.39
Positive affect	.07	.57
Satisfaction with life	.07	.62
Financial strain	-.09	.49
Social adjustment problems	-.08	.55
Man's occupational involvement	.09	.49
Man's psychosocial competency	.10	.45

The last stage of exploration of the association between time since injury and the adjustment variables was to subject the variables to principal components analysis (SPSS, varimax rotation). Table 28 presents the initial eigenvalues and percentages of variance accounted for.

Table 28

Principal Components Analysis of Time Since Injury and Adjustment Variables - Initial Statistics

Factor	Eigenvalue	% Variance accounted for	Cumulative % variance
1	3.07	38.4	38.4
2	1.19	14.9	53.4
3	1.00	12.5	65.9
4	.94	11.8	77.6
5	.72	9.0	86.6
6	.51	6.4	93.1
7	.37	4.6	97.7
8	.18	2.3	100.0

Table 29 presents the rotated factor loadings for, and variance explained by, three factors whose eigenvalues equalled or exceeded 1.00. The first factor, Poor Adjustment, reflected high mood disturbance, low satisfaction with life, high social adjustment problems, high financial strain,

and low patient psychosocial competency. The second factor, Good Adjustment, reflected primarily high positive affect, but also included low mood disturbance, low social adjustment problems and (somewhat surprisingly) low patient psychosocial competency. The last factor, Time Since Injury, included (the square root of) time since injury and a positive loading of the head-injured man's occupational involvement. Longer time-since-injury intervals were therefore associated with higher occupational levels in this analysis.

Table 29

Principal Components Analysis of Time Since Injury and Adjustment Variables - Rotated Factor Loadings and Variance Accounted For

	Factor 1	Factor 2	Factor 3
Time since injury (square root)	.04	.09	.85
Mood disturbance	.77	-.33	-.13
Positive affect	-.13	.91	.01
Satisfaction with life	-.67	.26	.16
Financial strain	.65	.02	-.09
Social adjustment problems	.76	-.48	-.02
Man's occupational involvement	-.25	-.07	.59
Man's psychosocial competency	-.78	-.39	.07
Variance accounted for	2.75	1.40	1.12

To summarize, the present study did not support the hypotheses, since it provided no evidence for systematic change in the adjustment of subjects and their head-injured partners over time. None of the adjustment variables was consistently and strongly associated with time since injury, and no clear trend emerged regarding better or worse adjustment over time.

III. What Predicts Family Member Subjective Well-Being?

The last objective of the present study was to explore the efficacy of three families of predictor variables to explain three independent aspects of family member Subjective Well-being (mood disturbance, positive affect and satisfaction with life). The three predictor families were Life Circumstances (financial strain, social adjustment problems), Personality Disposition (extraversion, neuroticism) and Head-injured man's Functioning (injury severity, occupational involvement, psychosocial competency). Table 5 (p. 46) displayed the design of this section.

As was mentioned in the Method section, injury severity data was missing for 26.7% of the present sample, since the method of data collection had to be changed mid-stream. The following section presents several preparatory analyses that were conducted to determine whether the injury severity variable could be utilized in the prediction of Subjective Well-being. The prediction section proper follows these preparatory analyses.

Missing Data in the Injury Severity Variable

The exploration of the impact of missing injury severity data entailed the division of the present subject sample into two subsets: the group of cases where injury severity information was available ($n = 44$) and the group of

cases where it was absent ($n = 16$). Univariate and multivariate methods were then used to describe the two subsets, and to explore whether they differed systematically in terms of factors other than the availability of injury severity data.

Table 30 presents univariate comparisons for 20 variables (including purely descriptive demographics like age) between the two subsets. The indices listed include effect sizes for group mean differences (Cohen's d using a pooled standard deviation), significance values for group mean differences (independent samples t -tests), effect sizes for variability in sample distributions (Standard Deviation Ratios) and significance values for Levene's test for heterogeneity of variance.

An examination of the effect sizes for group mean differences indicated the presence of one medium to large effect (the subset without severity data was more educated), five medium effects (the subset without severity data experienced less financial strain, was more extraverted, reported higher patient competency, reported lower patient occupational involvement at the time of the head-injury, and had shorter time since injury intervals), three small to medium effects (the sample without severity data reported higher subject occupational involvement at the time of data collection and was older in terms of both subjects and head-injured men), and four small effects (the subjects without data reported lower positive affect, higher satisfaction with life, lower neuroticism and higher educational levels for the head-injured men). No differences between the subsets were found on the remaining seven variables.

Independent samples t -tests were conducted to further explore the above-mentioned differences between the two subsets. Given that 20 comparisons were made, the Bonferroni method (as cited in Howell, 1982)

Table 30

Univariate Comparisons between Cases With and Without Injury Severity Data

Variable	d	p	SDR	p
Age	.34	.247	1.19	.535
Education	.70	.019	1.08	.517
Woman's previous occupation	-.08	.814	1.13	.548
Women's current occupation	.30	.308	1.23	.072
Years known head-injured man	-.08	.800	.77	.224
Years lived with head-injured man	-.09	.748	.73	.075
Head-injured man's age	.31	.300	.91	.724
Head-injured man's education	.20	.514	1.20	.395
Man's previous occupation	-.58	.187	2.79	.001**
Man's current occupation	-.12	.676	.96	.503
Litigation status	-.02	.937	1.02	.877
Time since injury	-.54	.070	.44	.015
Mood disturbance	.13	.654	.90	.681
Positive affect	-.28	.347	1.29	.151
Satisfaction with life	.20	.489	.92	.315
Financial strain	-.56	.061	.78	.359
Social adjustment problems	.03	.943	1.11	.783
Extraversion	.46	.119	.61	.025
Neuroticism	-.24	.407	.93	.333
Man's psychosocial competency	.49	.094	.79	.353

** significant at the $p < .0025$ level.

was applied to adjust the level of statistical significance. As can be seen in Table 30, none of the differences reached statistical significance at the resulting level of $p < .0025$.

The two subsets were also compared in terms of the variabilities of their sample distributions. Table 30 presents standard deviation ratios (where the standard deviation of the group without severity data served as the numerator, and that of the group with severity data served as the denominator) and significance values for Levene's test for homogeneity of variance. Only one comparison reached statistical significance at the $p < .0025$ level, suggesting that the group without severity data had greater variability in terms of the men's occupational involvement at the time of the head-injury (SDR = 2.79). In this case, the t-test of group mean differences (see above) was based on values appropriate for samples with heterogeneous variances.

Following this broad screening, the focus of further analysis was restricted to the nine "key" variables that were to be used in the prediction of Subjective Well-being. Table 31 presents the correlation matrices of these variables for the subsets of cases with and without injury severity information. These correlation coefficients were transformed into Fisher's Z (1921, as cited in Howell, 1982) statistics in order to conduct significance testing of independent correlations. Appendix G presents the original correlation matrix ($n = 60$) for the nine "key" variables, and the Z transformations, z scores and significance values for the comparisons between subsets. Given that 36 correlations were compared, the Bonferroni method was again used to adjust the level of statistical significance. As can be seen in Appendix G, none of the comparisons reached statistical significance at the resulting level of $p < .0014$, thus indicating that there was no notable difference between the two subsets' correlation matrices.

Table 31

Correlation Matrices For Cases With and Without Severity Data

Group with severity data (n = 44)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC
TMD	1.00								
PAF	-.28	1.00							
SWL	-.48	.23	1.00						
FIN	.51	-.28	-.24	1.00					
SOC	.81	-.30	-.63	.36	1.00				
EXT	-.02	.10	.07	.01	-.13	1.00			
NEU	.65	-.17	-.31	.32	.68	-.19	1.00		
OCC	-.22	-.04	.30	-.23	-.13	-.15	-.06	1.00	
PSC	-.45	-.19	.32	-.33	-.43	.10	-.17	.16	1.00

Group without severity data (n = 16)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC
TMD	1.00								
PAF	-.40	1.00							
SWL	-.55	.37	1.00						
FIN	.19	-.10	-.49	1.00					
SOC	.65	-.73	-.50	.31	1.00				
EXT	.25	-.11	-.68	.56	.13	1.00			
NEU	.44	.03	-.26	.16	.16	.35	1.00		
OCC	-.30	.11	.24	.12	-.16	.39	.19	1.00	
PSC	-.42	.09	.46	-.68	-.51	-.32	-.23	.09	1.00

A last step in comparing the two subsets involved multivariate analysis. First, an all-possible-subsets regression analysis (BMDP 9R, see program description below) was conducted. The predictors were the nine key variables to be used in the prediction of Subjective Well-being (mood disturbance, positive affect, satisfaction with life, financial strain, social adjustment problems, extraversion, neuroticism, head-injured man's occupational involvement and head-injured man's psychosocial competency) and the outcome variable was "group membership" (coded as 1 = severity data available and 2 = no severity data available). This analysis suggested that a five-variable regression composite (consisting of mood disturbance, financial strain, extraversion, neuroticism and head-injured man's psychosocial competence) was able to predict a significant portion of the variance ($F = 2.39$, $p = .050$) in "group membership". The effect size (Cohen's d) for this regression composite was 1.10.

To summarize, the preceding preparatory analyses were conducted to examine systematic differences between the subsets of cases with or without injury severity data. Taken together, these analyses suggested that the two subsets did not differ dramatically, and that the injury severity variable could thus be retained for future analysis. Nevertheless, findings involving this variable need to be interpreted within the context of the differences that did emerge.

Introductory Comments - Prediction of Subjective Well-Being

Two-step prediction process. The prediction of each aspect of Subjective Well-being (mood disturbance, positive affect, satisfaction with life) consisted of a two-step process. First, the importance of each predictor family (Life Circumstances, Personality Disposition, Head-injured Man's Functioning)

was explored for each aspect of Subjective Well-being (e.g., Is the Head-injured Man's Functioning important in predicting subjects' mood disturbance?). This step also involved the identification of the best predictor within a given family for a given aspect of Subjective Well-being (e.g., Among the three variables addressing the Head-injured Man's Functioning, which best predicts subjects' mood disturbance?). Second, the family groupings were abandoned and all predictors were entered into the analysis at once (e.g., Of all predictor variables, which ones best predict mood disturbance?).

Program description and "best subset" selection. All-possible-subsets regression analysis (BMDP 9R) was used for this section. BMDP 9R examines all possible predictor combinations, and reports up to ten "best subsets" at each size (e.g., the best ten single-predictor subsets, the best ten 2-predictor subsets, etc.).

Although BMDP 9R was instructed to select "best subsets" according to the maximization of the multiple correlation coefficient R^2 , the 'adjusted R^2 ' (R^2_{adj}) is the index that is presented and interpreted throughout the present study. R^2_{adj} represents a multiple correlation coefficient (R^2) that has been corrected for the number of predictor variables and the number of cases used in the analysis. In principle, R^2_{adj} is an estimate of the true population multiple correlation coefficient, and indicates what proportion of the variance could be predicted if the true regression weights (or regression weights from an extremely large sample) were used. Significance values (p) that accompany R^2_{adj} refer to the corresponding test of the null hypothesis of the multiple correlation coefficient R^2 .

Best predictor selection. Once the "best subsets" were selected by BMDP 9R, those variables that were most important in the prediction of Subjective Well-being were identified. The following criteria were used for

this purpose: 1) Variables that accounted for the most variance (i.e., optimized R^2_{adj}) in the outcome were considered important, 2) variables that appeared most frequently in the "best subsets" selected by BMDP 9R were considered important, and 3) variables that appeared most frequently in the top 50% of the "best subsets" at each size were considered important. In terms of the latter criterion, for example, if ten three-predictor subsets were presented, the predictors that appeared most often in the best five subsets were considered important.

The following sections present the prediction of the three aspects of family member Subjective Well-being (mood disturbance, positive affect, satisfaction with life) with factors related to Life Circumstances, Personality Disposition, and the Head-injured Man's Functioning. For each regression analysis, a summary table presents the variance accounted for (R^2_{adj}) by up to ten subsets at each size. Moreover, in each case the variables that form these subsets are identified.

Prediction of Mood Disturbance

Life Circumstances. The family of Life Circumstances, which included subjects' financial strain (FIN) and social adjustment problems (SOC), accounted for 59.6% of the variance, which was statistically significant ($F = 44.47$, $p = .0001$). As can be seen in Table 32, this was mostly due to the importance of social adjustment problems, which accounted for 57.1% of the variance when entered by itself ($F = 79.54$, $p = .0001$). Although financial strain accounted for 16% of the variance when entered by itself ($F = 12.26$, $p = .0009$), its relative contribution was therefore minor.

Table 32

Prediction of Mood Disturbance with Life Circumstances Factors

R ² adj	FIN	SOC
<hr/>		
<u>2 predictors</u>		
.5957	X	X
<u>1 predictor</u>		
.5710		X
.1602	X	

Personality Disposition. This family, which included extraversion (EXT) and neuroticism (NEU), accounted for 33.7% of the variance, which was statistically significant (F = 15.98, p = .0001). Table 33 illustrates that this was entirely due to the importance of Neuroticism, which accounted for the same amount of variance when entered by itself (F = 31.03, p = .0001).

Table 33

Prediction of Mood Disturbance with Personality Factors

R ² adj	EXT	NEU
<hr/>		
<u>2 predictors</u>		
.3368	X	X
<u>1 predictor</u>		
.3373		X
-.0161	X	

Head-injured Man's Functioning. This family of variables included injury severity (SEV), the head-injured man's occupational involvement (OCC), and female subjects' ratings of the head-injured man's psychosocial competency (PSC). Given that injury severity was only available for 44 cases (73.3%), this analysis was restricted to that subset of the present sample. As Table 34a illustrates, this family accounted for 24.8% of the variance, which was statistically significant ($F = 5.72, p = .0024$). This was mostly due to the contribution of psychosocial competency, which explained 18.7% of the variance when entered by itself.

Table 34

Prediction of Mood Disturbance with Factors Related to the Head-Injured Man's Functioning

Table 34a) Including injury severity variable

R^2_{adj}	OCC	PSC	SEV
<u>3 predictors</u>			
.2477	X	X	X
<u>2 predictors</u>			
.2183		X	X
.1915	X	X	
.0383	X		X
<u>1 predictor</u>			
.1870		X	
.0264	X		
-.0097			X

Given that injury severity did not contribute notably to the prediction of mood disturbance, the analysis was repeated without this variable, which raised the sample size to 60. As Table 34b indicates, the two-variable composite consisting of occupational involvement and psychosocial competency accounted for 18.6% of the variance, which was statistically significant ($F = 7.76, p = .001$). Psychosocial competency again emerged as the best single predictor of mood disturbance, and accounted for 16.3% ($F = 12.51, p = .0008$) of the variance when entered by itself.

Table 34b) Excluding injury severity variable

R^2_{adj}	OCC	PSC
<u>2 predictors</u>		
.1864	X	X
<u>1 predictor</u>		
.1632		X
.0426	X	

Summary. Although each predictor family accounted for significant amounts of the variance in mood disturbance, this could be explained by the presence of one powerful predictor in each case. These predictors were the subjects' social adjustment problems, the subjects' levels of neuroticism, and the head-injured men's psychosocial competency.

All predictors. Table 35 summarizes the prediction of mood disturbance using all six predictors. The variance accounted for ranged from

0% to 64.7%. The best single predictor was social adjustment problems (SOC), and the second best predictor was neuroticism (NEU). Predictors that were less central, but still featured in the prediction of mood disturbance, were financial strain (FIN) and the head-injured man's psychosocial competency (PSC).

Table 35

Prediction of Mood Disturbance Using all Factors

R ² adj	OCC	PSC	FIN	SOC	EXT	NEU
6 predictors						
.6463	X	X	X	X	X	X
5 predictors						
.6470	X		X	X	X	X
.6447	X	X		X	X	X
.6419	X	X	X	X		X
.6319		X	X	X	X	X
.5988	X	X	X	X	X	
.4655	X	X	X		X	X
4 predictors						
.6440	X		X	X		X
.6385	X	X		X		X
.6384	X			X	X	X
.6320			X	X	X	X
.6281		X		X	X	X
.6263		X	X	X		X
.6033	X		X	X	X	
.5998	X	X	X	X		
.5913		X	X	X	X	
.5870	X	X		X	X	
3 predictors						
.6338	X			X		X
.6279			X	X		X
.6201		X		X		X
.6195				X	X	X
.6048	X		X	X		
.5953			X	X	X	
.5912		X	X	X		
.5864	X	X		X		
.5838	X			X	X	
.5774		X		X	X	

Table 35 (cont'd)

R ² adj	OCC	PSC	FIN	SOC	EXT	NEU
<u>2 predictors</u>						
.6133				X		X
.5957			X	X		
.5841	X			X		
.5752		X		X		
.5720				X	X	
.4249		X				X
.3903			X			X
.3875	X					X
.3368					X	X
.2206		X	X			
<u>1 predictor</u>						
.5710				X		
.3373						X
.1632		X				
.1602			X			
.0426	X					
-.0161					X	

Prediction of Positive Affect

Life Circumstances. The family of Life Circumstances, which included subjects' financial strain (FIN) and social adjustment problems (SOC), accounted for 17% of the variance, which was statistically significant ($F = 7.03, p = .0019$). As can be seen in Table 36, this was mainly due to social adjustment problems, which accounted for 18.2% of the variance when entered by itself ($F = 14.14, p = .0004$).

Table 36

Prediction of Positive Affect with Life Circumstances Factors

R ² adj	FIN	SOC
<hr/>		
<u>2 predictors</u>		
.1698	X	X
<u>1 predictor</u>		
.1821		X
.0186	X	

Personality Disposition. The family of personality variables, which included extraversion (EXT) and neuroticism (NEU), failed to account for a significant portion of the variance in positive affect ($F = .27, p = .77$). As Table 37 indicates, neither extraversion nor neuroticism were important predictors of this outcome.

Table 37

Prediction of Positive Affect with Personality Factors

R ² adj	EXT	NEU
<hr/>		
<u>2 predictors</u>		
-.0255	X	X
<u>1 predictor</u>		
.0081		X
-.0165	X	

Head-injured Man's Functioning. This family, which included injury severity (SEV), the head-injured man's occupational involvement (OCC), and female subjects' ratings of the head-injured man's psychosocial competency (PSC), failed to account for a significant portion of the variance in positive affect ($F = .52, p = .67$). As can be seen in Table 38a, none of the three predictor variables showed a notable association to positive affect. Once again, this analysis was limited to the 44 cases where injury severity data was available.

Table 38

Prediction of Positive Affect with Factors Related to the Head-Injured Man's Functioning

Table 38a) Including injury severity variable

R ² adj	OCC	PSC	SEV
<hr/>			
<u>3 predictors</u>			
-.0349	X	X	X
<u>2 predictors</u>			
-.0097		X	X
-.0106	X	X	
-.0431	X		X
<u>1 predictor</u>			
.0134		X	
-.0186			X
-.0224	X		

A similar picture emerged when this analysis was repeated without the injury severity variable. As Table 38b indicates, the two-variable composite consisting of occupational involvement and psychosocial competency also failed to account for a significant amount of variance ($F = .59, p = .56$).

Table 38b) Excluding injury severity variable

R^2_{adj}	OCC	PSC
<u>2 predictors</u>		
-.0142	X	X
<u>1 predictor</u>		
.0023		X
-.0171	X	

Summary. The only variable family that predicted a significant portion of the variance in positive affect was Life Circumstances. This was, however, primarily due to the importance of social adjustment problems.

All predictors. Table 39 summarizes the prediction of positive affect using all predictors. The variance accounted for ranged from 0% to 36.1%. The best single predictor was social adjustment problems, which was the only variable that was significantly associated with positive affect. Other variables that featured in the prediction of positive affect in terms of their frequent appearance in "best subsets" were neuroticism, financial strain and the head-injured man's psychosocial competency.

Table 39

Prediction of Positive Affect Using all Factors

R ² adj	OCC	PSC	FIN	SOC	EXT	NEU
<u>6 predictors</u>						
.3429	X	X	X	X	X	X
<u>5 predictors</u>						
.3524	X	X	X	X		X
.3521		X	X	X	X	X
.3027	X	X		X	X	X
.3003	X	X	X	X	X	
.1628	X		X	X	X	X
.0163	X	X	X		X	X
<u>4 predictors</u>						
.3609		X	X	X		X
.3146	X	X		X		X
.3142		X		X	X	X
.3124	X	X	X	X		
.3120		X	X	X	X	
.2792	X	X		X	X	
.1779	X		X	X	X	
.1729			X	X	X	X
.1712	X			X	X	X
.1424	X		X	X	X	
<u>3 predictors</u>						
.3255		X		X		X
.3235		X	X	X		
.2919	X	X		X		
.2917		X		X	X	
.1874			X	X		X
.1860	X			X		X
.1821				X	X	X
.1577	X		X	X		
.1552	X			X	X	
.1549			X	X	X	

Table 39 (cont'd)

R ² adj	OCC	PSC	FIN	SOC	EXT	NEU
<u>2 predictors</u>						
.3039		X		X		
.1963				X		X
.1700	X			X		
.1698			X	X		
.1678				X	X	
.0615		X	X			
.0030			X			X
.0026			X		X	
.0015	X		X			
.0010		X				X
<u>1 predictor</u>						
.1821				X		
.0186			X			
.0023		X				
-.0081						X
-.0165					X	
-.0170	X					

Prediction of Satisfaction With Life

Life Circumstances. This family, which included financial strain (FIN) and social adjustment problems (SOC), accounted for 33.7% of the variance, which was statistically significant ($F = 16.01, p = .0001$). As can be seen in Table 40, this was mainly due to the importance of social adjustment problems, which accounted for the same amount of variance when entered by itself ($F = 30.96, p = .0001$). Although financial strain accounted for 7.2% of the variance when entered by itself ($F = 5.60, p = .021$), its relative contribution was therefore minor.

Table 40

Prediction of Satisfaction With Life with Life Circumstances Factors

R ² adj	FIN	SOC
<u>2 predictors</u>		
.3372	X	X
<u>1 predictor</u>		
.3368		X
.0723	X	

Personality Disposition. This family, which included extraversion (EXT) and neuroticism (NEU), accounted for 6.6% of the variance, which approached statistical significance ($F = 3.07, p = .054$). As can be seen in Table 41, neuroticism accounted for 7.7% of the variance, which reached statistical significance ($F = 5.91, p = .018$) when entered by itself.

Head-injured Man's Functioning. This family included injury severity (SEV), the head-injured man's occupational involvement (OCC), and female subjects' ratings of the head-injured man's psychosocial competency (PSC). This analysis was restricted to the 44 cases where injury severity information was available. As can be seen in Table 42a, this family accounted for 11.7% of the variance, which was statistically significant ($F = 2.90, p = .047$). The best single predictor was the head-injured man's psychosocial competency, which accounted for 8.1% of the variance when entered by itself. The second best single predictor was occupational involvement, which accounted for 7% of the variance.

Table 41

Prediction of Satisfaction With Life with Personality Factors

R ² adj	EXT	NEU	
<hr/>			
<u>2 predictors</u>			
.0656	X	X	
<u>1 predictor</u>			
.0768		X	
-.0161	X		

Given that injury severity did not contribute notably to the prediction of satisfaction with life, this analysis was repeated without this variable. As can be seen in Table 42b, the two-variable composite consisting of occupational involvement and psychosocial competency accounted for 15.5% of the variance, which was statistically significant ($F = 6.41, p = .0031$). Once again, psychosocial competency emerged as the best single predictor, and accounted for 11.2% of the variance when entered by itself ($F = 8.47, p = .0051$). Occupational involvement accounted for 6.2% of the variance ($F = 24.93, p = .030$) when entered by itself.

Table 42

Prediction of Satisfaction With Life with Factors Related to the Head-injured Man's Functioning

Table 42a) Including injury severity variable

R ² adj	OCC	PSC	SEV
--------------------	-----	-----	-----

3 predictors

.1172	X	X	X
-------	---	---	---

2 predictors

.1272	X	X	
.0873		X	X
.0718	X		X

1 predictor

.0813		X	
.0697	X		
.0304			X

Table 42b) Excluding injury severity variable

R ² adj	OCC	PSC
--------------------	-----	-----

2 predictors

.1549	X	X
-------	---	---

1 predictor

.1123		X
.0624	X	

Summary. The families of variables related to subjects' Life Circumstances and the Head-injured Man's Functioning significantly predicted satisfaction with life. In both cases, however, this was attributable to one predictor (social adjustment problems and the head-injured man's psychosocial competency). In the case of personality variables, the two-variable regression composite failed to reach significance. An inspection of the individual predictor variables, however, revealed that neuroticism was associated with life satisfaction, while extraversion was not.

All predictors. Table 43 summarizes the prediction of satisfaction with life using all predictors. The variance accounted for ranged from 0% to 36.7%. The best single predictor was social adjustment problems, and the second best predictor was the head-injured man's psychosocial competency. Neuroticism, financial strain and the head-injured man's occupational involvement were less central variables that featured in the prediction of satisfaction with life.

Summary

Table 44 provides a summary of the regression analyses conducted to predict Subjective Well-being. This Table presents the variance accounted for by the predictor combination that optimized R^2_{adj} , the significance value of this multiple correlation, and the best predictor(s) for that analysis. It should be noted that, for hypothesis testing purposes, the R^2_{adj} values reported in this Table were selected purely on the basis of being the largest. They may therefore not represent the most "economical" regression composites in terms of excluding predictors with negligible contributions. Given that injury severity did not add to predictive accuracy in any of the outcome variables, those analyses that excluded this variable are reported.

Table 43

Prediction of Satisfaction With Life Using all Factors

R ² adj	OCC	PSC	FIN	SOC	EXT	NEU
6 predictors						
.3396	X	X	X	X	X	X
5 predictors						
.3518	X	X	X	X	X	
.3490	X	X		X	X	X
.3471	X	X	X	X		X
.3447	X		X	X	X	X
.3150		X	X	X	X	X
.1848	X	X	X		X	X
4 predictors						
.3606	X	X		X	X	
.3590	X	X	X	X		
.3566	X		X	X	X	
.3554	X	X		X		X
.3529	X		X	X		X
.3490	X			X	X	X
.3272		X	X	X	X	
.3224		X		X	X	X
.3213		X	X	X		X
.3190			X	X	X	X
3 predictors						
.3668	X	X		X		
.3643	X		X	X		
.3605	X			X	X	
.3561	X			X		X
.3345		X		X	X	
.3329		X	X	X		
.3306			X	X	X	
.3273		X		X		X
.3263			X	X		X
.3194				X		X

Table 43 (cont'd)

R^2_{adj}	OCC	PSC	FIN	SOC	EXT	NEU
<u>2 predictors</u>						
.3674	X		X			
.3390		X		X		
.3372			X	X		
.3313				X	X	
.3253				X		X
.1553		X				X
.1423	X					X
.1234		X	X			
.3368					X	X
.1165	X		X			
<u>1 predictor</u>						
.3368				X		
.1123		X				
.0768						X
.0723			X			
.0624	X					
-.0161					X	

In terms of the ability of the three variable families to predict Subjective Well-being, the hypotheses were partially supported. The family of Life Circumstances variables was important in the prediction of all three aspects of Subjective Well-being, which was mainly due to the strong association of social adjustment problems with the outcome variables. The family of Personality Disposition variables was important in the prediction of mood disturbance and satisfaction with life, which was entirely due to the association of neuroticism with these aspects of Subjective Well-being. The variables related to the Head-Injured Man's Functioning were important in the prediction of mood disturbance and satisfaction with life, which was due

Table 44

Summary of Prediction of Subjective Well-Being

	Life Circumstances	Personality	HI Man's Funct.	All Predictor
Mood disturbance	R ² adj = .60 p = .0001 SOC	R ² adj = .34 p = .0001 NEU	R ² adj = .19 p = .001 PSC	R ² adj = .65 p = .0001 SOC, NEU
Positive affect	R ² adj = .18 p = .0004 SOC	R ² adj = .01 p = .47 NEU (n.s.)	R ² adj = .002 p = .29 PSC (n.s.)	R ² adj = .36 p = .0001 SOC
Satisfaction with life	R ² adj = .34 p = .0001 SOC	R ² adj = .08 p = .018 NEU	R ² adj = .15 p = .0031 PSC	R ² adj = .37 p = .0001 SOC, PSC

to the association of the head-injured man's psychosocial competency with these aspects of Subjective Well-being. Both Personality Disposition and factors related to the Head-injured Man's Functioning showed a weak relationship to positive affect.

In terms of individual predictors, the hypotheses were fully supported. Social adjustment problems, neuroticism, and the head-injured man's psychosocial functioning emerged as the most powerful predictors of Subjective Well-being. It should be noted that social adjustment problems was by far the best predictor of every aspect of Subjective Well-being.

CHAPTER IV

DISCUSSION

The present study grew out of an exciting new shift toward a more ecologically valid and applied focus in clinical neuropsychology (Boll, 1985; Chelune & Moehle, 1986; Lezak, 1983; Rourke, 1982). Specifically, recent interest has centered around behavioral description rather than the replication of medical-diagnostic findings (Crockett, Clark & Klonoff, 1981), has emphasized the whole individual rather than just the damaged brain (Lezak, 1983), and has attended more closely to daily functioning following cerebral neurological insult. This has also led to a more systematic investigation of the impact of brain damage on survivors' family members and caregivers. The groundwork for this area was laid by the Glasgow researchers (Brooks & Aughton, 1979a; McKinlay et al., 1981; Brooks & McKinlay, 1983; Brooks et al., 1986; Brooks et al., 1987), who investigated the relationship between the head-injured person's functioning and family member subjective burden. More recent "second generation" research built on this foundation by focusing on specific subsets of family members, postulating more complex and ecologically valid outcome criteria, and exploring a greater variety of predictors (Linn et al., 1994; Peters et al., 1990; Tarter, 1990).

The present study focused on the adjustment of female partners of traumatically head-injured men, and was designed to meet three objectives: to add to a growing base of information about this population's adjustment, to investigate the role of time since injury as a mediator of family member and survivor adjustment, and to evaluate the relative efficacy of a number of factors to predict family member adjustment. In terms of the latter objective, this study fit into the category of "second generation" research, in that it

focused on a specific class of family members (i.e., female partners of male survivors), conceptualized family member functioning as a multifaceted construct (i.e., three aspects of Subjective Well-being), and used predictors that included, but were not restricted to, the head-injured man's post-injury functioning.

The modal research participant was recruited from either the Workers' Compensation Board of British Columbia or a neuropsychologist in private practice, was a high-school-educated woman in her early 40s, and was employed part-time at the time of her partner's injury and at the time of data collection. She was living with her head-injured partner at the time of data collection and had known him for many years. Her head-injured partner was a high-school-educated man in his mid-40s, who had worked full-time at the time of his injury, and was unemployed at the time of data collection. His injury occurred two to five years ago, in a motor vehicle accident, likely at work, and was severe enough to have included two criteria of serious head-injury (unconsciousness, hospitalization, brain surgery). It should be noted that three head-injured men (6.8% of the sample) did not meet any of the injury severity criteria. Although it is conceivable that these men did not sustain head-injuries at all, their female partners were included in this study in order to maintain a wide injury severity range, and to prevent a reduction in sample size.

The following sections summarize findings in terms of the three objectives described above, and present a summary of clinical implications and future research suggestions.

How are They Doing? Descriptive Analysis of Subjects' Adjustment and their Head-Injured Partners' Functioning

The Present Sample versus Normal Adults or Pre-Injury Conditions

As hypothesized, the present sample reported general impairment in the areas of Subjective Well-being, Life Circumstances and the Head-injured Man's Functioning. Specifically, compared to normal adult samples (described in the existing literature) or pre-injury circumstances, the present sample experienced higher mood disturbance, lower positive affect, lower satisfaction with life, higher financial strain, and higher social adjustment problems. Moreover, the women reported psychosocial impairment and a reduction in occupational involvement in their head-injured partners.

Given that the measures of mood disturbance (Profile of Mood States) and social adjustment problems (Social Adjustment Scale - SR) were multidimensional, they allowed for a more fine-grained analysis of the present samples' adjustment on those dimensions. In terms of mood disturbance, the present sample reported substantially more anger, more fatigue, more depression, less vigor, and slightly more anxiety than normal adult women. This is in accordance with existing research that documents multifaceted and long-lasting post-injury emotional distress in family members (e.g., Karpman et al., 1986; Lezak, 1988; Liss & Willer, 1990; Livingston et al., 1985a,b; Mauss-Clum & Ryan, 1981).

In terms of social adjustment problems, the present sample reported more difficulties in all areas involving family relationships. This included marital functioning, parental functioning, nuclear family functioning and extended family functioning. The present sample also reported slightly more difficulties in the area of social functioning. This parallels the findings of a

series of studies that assessed family member adjustment within the first post-injury year and also used the Social Adjustment Scale - SR (Livingston et al., 1985a,b). While these studies found overall problems in social adjustment, the most severe difficulties were noted in the domains of marital and nuclear family functioning. Given that the present study and Livingston et al.'s research used subjects that differed from the normal population in terms of their partner's functional status, it is not surprising that social adjustment difficulties were most prevalent in areas that directly involved this person.

The Case of Personality

Since variables measuring Personality Disposition were conceptualized as being relatively resistant to environmental stressors (Eysenck & Eysenck, 1968), it was hypothesized that the present sample would not differ from normal adults in terms of its levels of extraversion and neuroticism. This prediction was supported in the case of extraversion, where the present sample obtained slightly lower levels than normal adults, but where there was no reason to conclude that there were substantial differences. The hypothesis was not supported, however, in the case of neuroticism, where the present sample clearly obtained higher levels than normal adults.

Several post-hoc explanations exist for this finding. First, it is possible that the women who participated in the present study over-reported difficulties, including personality-based sources of distress, in order to draw attention to their plight. This possibility needs to be given special consideration since one third (36.7%) of the women reported that their head-injured partners were involved in court, insurance or litigation cases at the time of data collection. Involvement in financial settlements could

conceivably foster a high sensitivity to ongoing problem areas. In order to explore the impact of litigation status on family member adjustment and (family member perception of) survivor adjustment, the analyses that were conducted in the comparison of cases with and without injury severity data (see pp. 97 to 102) were repeated for this variable. As can be seen in Appendix H, no substantial differences were found on 20 univariate comparisons between cases in litigation and cases not in litigation (significance was defined as $p < .0025$ in this analysis). Moreover, there were no significant differences between the two subsets' correlation matrices for ten key variables (significance was defined as $p < .0011$ in this analysis). Finally, all-possible subsets regression analysis was used to examine whether any combinations of key variables were able to predict litigation status. The best subset of key variables accounted for only 7.4% of the variance, which was not statistically significant ($F = 2.17, p = .084$). The effect size (Cohen's d) for this regression composite was .81. Taken together, these analyses thus ruled out litigation status as a mediator of family members' perceptions of their own and their head-injured partners' adjustment.

Other potential explanations for the unexpectedly high levels of neuroticism found in the present study center around data collection issues. In terms of participation criteria, for example, it is possible that more neurotic women were more willing to remain in unsatisfactory relationships than less neurotic women, who might have chosen to separate from their head-injured partners. While the former were thus eligible for participation in the present study, the latter were not. In terms of the low return rate, it is possible that more neurotic women had a greater need to express their distress, therefore feeling more motivated to participate in the present study.

A last, and most plausible explanation, however, suggests that the high levels of neuroticism observed in the present sample reflect a post-injury phenomenon, and illustrate that a traumatic event can have a deep and pervasive effect on family member functioning. It is not difficult to imagine, for example, that exposure to the day-to-day stressors of living with a head-injured partner can contribute to pervasive emotional overreactivity, worrying, pessimism and irritability -- the very features of neuroticism (Eysenck & Eysenck, 1968).

It is therefore possible that, while dispositional variables tend to be relatively stable over time under normal circumstances, they are affected by sudden and unexpected traumatic events. Moreover, it is possible that the impact of traumatic events on the stability of dispositional style varies as a function of the degree to which family members exhibited the style prior to the event. In other words, family members with different pre-injury levels of neuroticism may vary in terms of their susceptibility to post-injury personality change.

Regardless of the origins of the elevated level of neuroticism observed in the present sample, this personality style is likely to have implications for the women's post-injury adjustment, and therefore for the present study. High neuroticism may be associated with a vicious cycle of escalating distress, where an anxious and pessimistic outlook interferes with effective coping, where the person is therefore less able to shield herself from full-blown distress, and where worrying and emotional overreactivity are therefore continually reinforced. McKinlay and Brooks (1984) speculated that highly neurotic family members might take "a more gloomy view" of the post-injury situation, and found that neuroticism correlated positively with reported family member stress and perceived patient impairment. Novack et

al. (1991) reported that high trait anxiety was associated with ongoing high state anxiety in primary caregivers of head-injured persons.

An inspection of the correlations between neuroticism and other variables in the present study suggested that higher neuroticism was associated with higher mood disturbance ($r = .59, p = .001$), lower satisfaction with life ($r = -.31, p = .018$), higher financial strain ($r = .31, p = .019$), and higher social adjustment problems ($r = .53, p = .001$). Moreover, a small non-significant correlation suggested that higher neuroticism was associated with lower reported psychosocial competency in the head-injured man ($r = -.20, p = .13$). Somewhat paradoxically, high neuroticism was also associated with low injury severity ($r = .37, p = .016$).

While the present study can therefore not comment on the source of the higher levels of neuroticism observed in the present sample, it can support the notion that elevations on this dispositional variable are associated with perceptions of higher post-injury distress.

The Present Sample Versus Clinical Samples

In the cases of mood disturbance, social adjustment problems and personality variables, the present sample was also compared to samples of psychiatric patients (taken from the existing literature). These comparisons were highly consistent in indicating that the present sample was better adjusted than the clinical samples. In terms of mood disturbance, the present sample reported less anxiety, less depression, less confusion and more vigor than female psychiatric outpatients. Interestingly, the present sample resembled the clinical sample in terms of its elevated levels of anger and fatigue. In terms of social adjustment problems, the present sample reported less impairment than a sample of acutely depressed women in all domains

sampled. In terms of Personality Disposition variables, the present sample reported slightly higher levels of extraversion, and slightly lower levels of neuroticism, than a group of mixed neurotics.

These comparisons provide valuable information on two levels. First, they help put the degree of maladjustment reported by the present sample into context. Specifically, whereas the comparisons to normal adults provide a lower limit for the "confidence interval" of pathology that contains the present sample, the comparisons to psychiatric patients provide an upper limit. It can thus be stated that the present sample falls in between normal adults and psychiatric patients in terms of its degree of maladjustment. Second, the comparisons of the present sample to psychiatric patients shed light on the appropriateness of using measures normed on clinical samples in research and clinical work involving family members of the head-injured. The findings of the present study suggest that family members of the head-injured clearly differ from psychiatric patients, and that measures designed for the latter may lack the sensitivity to accurately describe the maladjustment reported by the former. The use of scales designed for psychiatric patients with family members of the head-injured is therefore methodologically and conceptually problematic, and should be generally discouraged in this research area.

The Present Sample Versus other Samples of Family Members of the Head-Injured

Two direct comparisons (social adjustment problems, head-injured man's psychosocial competency) were made between the present sample and other samples of family members of traumatically head-injured persons in the literature. In both cases, the present sample reported more impaired

adjustment. In terms of social adjustment, the present sample endorsed more problems than family members assessed by Livingston et al. (1985b) one year post-injury. This was the case for marital functioning, parental functioning, nuclear family functioning, extended family functioning, and work. The only area where the two samples resembled each other was social functioning. In terms of family member ratings of the head-injured man's psychosocial competency, the present sample reported more impairment than a sample of family members of severely head-injured persons assessed at least 3.5 years post-injury (Douglas, 1994). Given that these comparisons involved the use of the same measures (i.e., the Social Adjustment Scale - SR and Patient Competency Rating Scale), these differences likely reflect variations in subject sample composition. Specifically, while the present study evaluated post-injury adjustment in a select population (i.e., female partners of head-injured men), Livingston et al. (1985a,b) and Douglas (1994) included a variety of family members (e.g., wives, mothers, daughters). Moreover, while the present study restricted participation to *female* partners of head-injured *men*, Douglas (1994) allowed for different gender combinations. The present study's requirements for subjects to be female and in an intimate relationship with the head-injured man may have produced a sample that is at higher risk for psychological distress than other samples of family members (see Introduction for a review of the special challenges that head-injury poses for wives).

Does the Adjustment of Subjects and their Head-Injured Partners Change as a function of Time Since Injury?

Contrary to expectation, the present study did not provide convincing evidence that the adjustment of family members or head-injured persons changes systematically as a function of time. None of the adjustment variables showed a consistent and strong sensitivity to time, and no clear trend emerged regarding better or worse adjustment over time. Although the correlation between adjustment and time was stronger for shorter time-since-injury intervals (i.e., cases within the first one or two post-injury years), this finding was based on sample sizes that were too small to be considered meaningful.

The lack of support for the role of time since injury as a mediator of family member and survivor adjustment needs to be addressed on two levels. First, the present study may have suffered from methodological flaws that obscured patterns of temporal change that really exist. Second, the present study may have effectively demonstrated that time since injury is not a key factor in determining family member and survivor adjustment. Prior to addressing each of these possibilities, it is important to review the hypothetical scenarios that exist regarding the association of time since injury and adjustment. First, it is possible that time and adjustment are related in a straightforward linear manner. Specifically, adjustment may improve or deteriorate over time. Second, it is possible that the association between time and adjustment is more complex. For example, the relationship between these concepts may be better summarized by a non-linear (e.g., bimodal or U-shaped) curve. Alternatively, the relationship may vary as a function of underlying confounding variables. It is possible, for example, that

the course of adjustment over time differs for family members of the mildly injured versus the severely injured, the young versus the old, or the pre-morbidly well-adjusted versus the poorly-adjusted. As was mentioned previously, dispositional variables such as family member neuroticism constitute another class of potential confounds in this regard. Third, it is possible that there is no systematic relationship between time and adjustment. Post-injury distress may, for example, fail to abate and remain chronically high (Linn et al., 1994; Wortman & Cohen Silver, 1989). Alternatively, individual differences (e.g., neuroticism) may not only obscure temporal patterns of post-injury adjustment, but may fully account for variations in coping. A last possibility, which combines a number of the issues raised in this section, is that there is no relationship between adjustment and *time per se*, but that family members still progress through an orderly sequence of relatively predictable patterns (e.g., those proposed by Lezak, 1986, or Spanbock, 1987).

On one hand, the present study included certain design features that were favourable to the detection of an association between time and adjustment. These included the wide range of time-since-injury intervals, the exclusion of cases where the man had suffered previous head-injuries, and the inclusion of a variety of different adjustment indicators (e.g., emotional, situational, injury-related, etc.). On the other hand, the present study also included methodological limitations that reduced its efficacy as a test of the role of time. Most notable in this regard was the cross-sectional design, which allowed for the potential detection of simple and uniform linear associations between time and adjustment (e.g., general improvement or deterioration over time), but made it difficult to evaluate other relational models. Visual inspection of the scatter plots depicting adjustment-time associations allowed

for the elimination of the possibility that there were systematic non-linear (e.g., bimodal or U-shaped) relationships. However, the present study was not able to rule out any of the remaining hypothetical scenarios. For example, the sample size did not allow for subgroupings according to potential confounds (e.g., injury severity, level of family member neuroticism). Moreover, the absence of repeated measures (i.e., multiple assessments of the same family members over time) prohibited an analysis of temporal changes while individual differences were held constant. The present study also did not allow for the identification of predictable sequences of family member adjustment that may not covary directly with specific points in time. For example, while it is possible that family member anxiety and depression increase and then plateau, this may occur at different post-injury intervals for different cases.

A last potential drawback in terms of the present study's efficacy to test the role of time in family member adjustment stems from the subject sample composition. As was mentioned previously (see Results section), studies of still-married couples with a head-injured partner contain inherent biases, and may not provide typical and generalizable accounts of post-injury family member adjustment. The women who remain in relationships with head-injured men may, for example, have especially resilient coping resources that shield them from post-injury crises or emotional fluctuations. Conversely, these women may lack healthy coping resources, thus remaining in unrewarding relationships and experiencing ongoing high distress. In other words, the specificity of the present sample may have produced an equally specific picture of the course of family member adjustment following head-injury.

In spite of these methodological limitations, which prevented a clear test of certain models of adjustment-time association, it is important to consider the possibility that the present study provides evidence that time since injury is not an important mediator of family member adjustment. A recent study by Linn et al. (1994), which closely resembled the present study in that it focused on the post-injury adjustment of 60 spouses of severely head-injured persons, also found that time was an unimportant factor in family member functioning. These authors acknowledged similar methodological limitations as those discussed above (e.g., a cross-sectional design), but also speculated that family member affective symptoms simply failed to decline over time. Similarly, in a study of coping after the death of a family member, Lehman et al. (1987) noted that "the sudden and unexpected loss of a spouse or child is associated with long-term distress" (p. 227). This study, and a later review of the literature of post-traumatic coping in a variety of family member populations, led Wortman and her colleagues to question the validity of time-bound stage models of coping altogether (Lehman et al., 1987; Wortman & Cohen Silver, 1989).

What Predicts Family Member Subjective Well-Being?

The last aim of the present study was to investigate the association between family member adjustment and a variety of factors that either emerged as important predictors in previous research, or that were identified as deserving more empirical attention. The first level of analysis focused on the question of what *type* of variables were most strongly associated with family member adjustment. Variables were thus grouped into three predictor families, which represented dispositional/internal family member

characteristics (Personality Disposition), situational/external family member characteristics (Life Circumstances), and patient- or injury-related characteristics (Head-injured Man's Functioning). Personality Disposition was expected to emerge as the most important predictor family, followed by Life Circumstances and then by the Head-injured Man's Functioning.

The findings did not conform entirely to these predictions: Life Circumstances emerged as the most important predictor family, since it was able to account for significant portions of the variance in all three aspects of Subjective Well-being. Personality Disposition and the Head-injured Man's functioning were equal, since they were associated with only two aspects of Subjective Well-being (mood disturbance and satisfaction with life).

An inspection of the contributions of the individual variables within each predictor family indicated the presence of one important variable in each case. As hypothesized, these key predictors were family member neuroticism, family member social adjustment problems, and (family member ratings of) the head-injured man's psychosocial functioning. The following sections provide a more detailed discussion about the association between these factors and family member Subjective Well-being.

The Importance of Social Adjustment

By far the most important predictor of Subjective Well-being was social adjustment. Not only did this variable render financial strain, the other variable in the Life Circumstances family, relatively unimportant, but it also correlated highly with all three aspects of Subjective Well-being (for mood disturbance, $r = .76$; for positive affect, $r = -.46$; for satisfaction with life, $r = -.59$). It was therefore the only predictor that showed a meaningful association to positive affect.

This variable measured family members' impressions of their performance of, and satisfaction with, a variety of social roles they were fulfilling at the time of data collection. It therefore constituted a subjective assessment (rather than a factual one), which renders it subject to the influence of personality styles such as neuroticism and extraversion. In the present study, a relationship was in fact observed between neuroticism and family member's ratings of social adjustment problems ($r = .53$). No such relationship was observed in the case of extraversion ($r = -.07$).

Given that the existing literature concerned with post-injury family member adjustment has not paid a great deal of attention to family member situational factors, it fails to offer a context within which to interpret the importance of social adjustment observed in the present study. The social support literature, however, abounds with evidence that the availability of a rewarding and meaningful social support network provides a buffer against the impact of stressful life events on physical and mental health (for literature reviews of the buffering-hypothesis, see Cohen & Wills, 1985; Ganster & Victor, 1988; Heitzmann & Kaplan, 1988; House, Umberson & Landis, 1988).

The Importance of Family Member Neuroticism

Although less crucial than social adjustment, family member neuroticism also emerged as an important predictor of family member Subjective Well-being. The present study thus replicated the finding that neuroticism is associated with post-injury family member distress, whereas extraversion is not (Brooks, 1991; McKinlay & Brooks, 1984). Given that extraversion and neuroticism have been shown to be orthogonal dimensions, which serve as the dispositional underpinnings of positive and negative

affect, respectively, this finding is consonant with predictions made by current personality theorists (Diener et al., 1985; Pavot et al., 1991; Watson & Clark, 1984; Watson et al., 1988). Interestingly, the parallel situation, which would have involved the demonstration of a relationship between positive affect and extraversion but not neuroticism, was only partially observed. Specifically, the present study confirmed this prediction in terms of the observed lack of association between positive affect and neuroticism, but failed to confirm it in terms of the proposed association between positive affect and extraversion. Given that the existing literature has typically operationalized family member adjustment in negative terms (e.g., burden or distress), it offers no information about "good" outcome and the factors associated with it. Interestingly, satisfaction with life, which was selected as a cognitively-based, positively-keyed third aspect of Subjective Well-being, performed similarly to the mood disturbance aspect in the present study. Specifically, it also showed a close association to the dispositional underpinning of neuroticism, and a lack of association to extraversion.

The Importance of the Head-injured Man's Psychosocial Functioning

Another variable that was important in the prediction of Subjective Well-being was the head-injured man's psychosocial functioning. The characteristics that family members reported as most problematic included temper control, accepting criticism, handling arguments, keeping from being depressed, staying involved in activities when bored or tired, and adjusting to unexpected changes (see Appendix F).

The strong relationship between psychosocial functioning and family member adjustment found in the present study rendered the other two variables in this predictor family (the head-injured man's occupational

involvement and initial injury severity) relatively unimportant. It must be noted that the measurement of injury severity in the present study was somewhat problematic. Not only was this variable measured by means of a relatively crude index, but it was also missing for a substantial portion of the sample. The present study may therefore not have provided an entirely fair test of the importance of this variable.

The finding that survivor psychosocial functioning is a key predictor of family member adjustment, however, has been widely documented (e.g., Florian et al., 1989; O'Brien & Costa, 1987; Peters et al., 1990). Moreover, the suggestion that psychosocial functioning is more closely associated with family member adjustment than injury-related factors or lower-level functioning (e.g., physical, motor) is a key theme that emerged from the "first generation" predictive studies carried out by the Glasgow researchers (see Table 1).

To summarize, the present study therefore suggested that better adjusted family members (in terms of low mood disturbance and high satisfaction with life) reported fewer social adjustment problems, lower levels of neuroticism, and less psychosocial impairment in their head-injured partners.

Clinical Implications

The findings of the present study suggest that the level of maladjustment experienced by female partners of head-injured men falls between that of normal adults and psychiatric patients. On the positive side, these women have thus been able to maintain a level of mental health that clearly differentiates them from psychiatric patients. On the negative side,

however, they report enough impairment to warrant the attention of mental health professionals. They might therefore benefit from attending family member support groups, individual counselling or group therapy.

Support groups and/or therapy can help family members on several levels. First, they can provide education about recovery from head-injury, typical family member reactions, and the course of long-term adjustment (Mauss-Clum & Ryan, 1981). In terms of the latter issue, family members need to eventually hear that time does not necessarily heal all wounds. Physicians, rehabilitation workers and therapists should therefore avoid making predictions that refer to specific points in time (e.g., "he will have recovered within one year" or "your life will be back to normal once he can walk"). Not only do such professional opinions create false expectations, but when proven wrong, they also cause family members to question the expertise and credibility of medical or mental health personnel (Lezak, 1996). Although the present study did not find systematic variations in adjustment over time, the notion of conceptually-bound (rather than temporally-bound) sequences of post-injury coping may serve as a useful educational and therapeutic heuristic. Family members might be familiarized with the patterns that have been observed, and be encouraged to compare these against their own experiences. This might remove some of the fear that is associated with the apparent lack of predictability of the recovery process.

Second, support groups and therapy can provide normalization and validation of unexpected reactions and socially undesirable feelings (e.g., resentment toward the survivor). Family members often feel guilty or unentitled to complain about their difficulties in the face of the head-injured person's overwhelming needs (Mauss-Clum & Ryan, 1981; Novack et al., 1991).

Third, support groups and therapy can help family members broaden their social network, thus protecting them from the isolation and loneliness that are commonly reported following the head-injury of a loved one (Kozloff, 1987; Lezak, 1978, 1986; Liss & Willer, 1990; Mauss-Clum & Ryan, 1981; Novack et al., 1991; Rosenbaum & Najenson, 1976). It might be especially beneficial for family members to meet other caregivers, whose lives were similarly affected by traumatic head-injury, and who could therefore provide a forum of understanding and support.

Fourth, support groups and therapy can teach family members coping and problem-solving skills to enhance the quality of their adjustment (Mauss-Clum & Ryan, 1981; Willer, Arrigali & Liss, 1989, as cited in Liss & Willer, 1990). The present study suggested that family members who viewed themselves as functioning well in their daily roles were less emotionally distraught and more satisfied. Therapists or group facilitators are therefore strongly encouraged to actively help their clients create more fulfilling lives. This may include encouragement to get respite from caring for the head-injured person, to develop outside interests, and to maintain social contacts (Kosciulek, 1994; Mauss-Clum & Ryan, 1981; Willer et al., 1989, as cited in Liss & Willer, 1990).

Future Research Directions

In addition to yielding practical implications aimed at health care professionals who work with family members of the head-injured, the present study also provided a number of theoretical implications and recommendations for future research with this population. In terms of descriptive studies of post-injury family member functioning, more "second

generation" research is needed to document the adjustment of specific subsets of family members (e.g., wives, husbands, young offspring, adolescent offspring, siblings, etc.). Adjustment needs to be operationalized in terms of dimensions that are specific (unlike "subjective burden" or "psychopathology") and relevant to day-to-day functioning. Measures used to quantify adjustment need to be sensitive to the level of distress reported by family members, which differs from that of psychiatric patients. Demographically matched control groups need to be included in future studies that attempt fine-grained analyses of family member functioning relative to normal adults.

In terms of the pursuit of stage theories of post-injury coping, the present study suggested that the relationship between time and family member adjustment is unlikely to follow an easily identifiable and uniform linear course. If time and adjustment are in fact systematically related, this association is bound to be complex and multidimensional. Although there is some evidence that family member distress may remain high following a traumatic event like head-injury, longitudinal research is required to test certain models of time-adjustment association. For example, the relative importance of time versus individual differences needs to be evaluated by conducting repeated measures studies that include personality and other dispositional variables (e.g., habitual coping styles). Moreover, longitudinal research is needed to determine whether the notion of stage-like patterns of post-injury adjustment has validity if the focus is on sequences of *conceptual* clusters, rather than time per se. Although some authors (e.g., Lezak, 1986) have attached time frames to their stage models of post-injury adjustment, future research may demonstrate that these apply too loosely to be of use, or that they vary according to underlying dimensions that need to be identified. Future research should therefore also include sufficiently large sample sizes

that subsets of family members (e.g., partners of mildly versus severely injured) can be compared.

In terms of future research into the prediction of family member adjustment following head-injury, it is essential that positive outcomes (e.g., positive affect) are studied more closely. The present study found generally weak associations between this aspect of Subjective Well-being and adjustment variables that have been traditionally linked to family member distress or burden. Moreover, given that family members' perceptions of their social adjustment played such an important role in the prediction of Subjective Well-being, more attention needs to be paid to the benefits of social support, rewarding occupational and recreational circumstances, and successful functioning within the marital unit, the nuclear family, and the extended family.

Last of all, as information regarding family member functioning after head-injury accumulates, research needs to focus on designing and evaluating treatment programs that are developed specifically for this population. After all, it is essential that the family members who dedicate their time and effort to research participation are the ultimate beneficiaries of the knowledge that is obtained.

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APPENDIX A

Stages in the Evolution of Family Reactions To a Brain-Damaged Member

Stage	Time since hospitaliz'n	Perception of patient	Expectation	Family reaction
I	0-1 to 3 months	A little difficult due to fatigue, inactivity, weakness	Full recovery by 1 year	Happy
II	1-3 to 6-9 months	Not cooperating, not motivated, self-centered	Full recovery if he'll try harder	Bewildered anxious
III	6-9 to 9-24 mos; can cont. indefinitely	Irresponsible, self-centered, irritable, lazy	Independence if know how to help him	Discouraged guilty depressed going crazy
IV	9 mos or later; can continue indefinitely	A different, difficult, child-like person	Little or no change	Depressed despairing "trapped"
V	15 mos or later; usually time-limited	A difficult, child-like dependent	Little or no change	Mourning
VI	18 to 24 mos or later	A difficult, child-like dependent	Little or no change	Reorganiz'n; emotionally if not physically disengaged

Reproduced from Lezak (1986).

APPENDIX B

Demographic Information Sheet

Instructions:

These pages ask for some information about you and the person with the head-injury (who is called the "patient"). Please answer every question.

INFORMATION ABOUT YOU

1. When were you born? ____ (day) ____ (month) ____ (year).
2. How many years of education have you completed? ____ years.
3. What was your employment situation at the time the head-injury occurred?
 - ____ Unemployed or in between jobs.
 - ____ Working as a homemaker.
 - ____ Working outside the home full-time.
 - ____ Working outside the home part-time.
 - ____ Student or in job training.
 - ____ Retired.
 - ____ Other: _____.
4. What is your employment situation now?
 - ____ Unemployed or in between jobs.
 - ____ Working as a homemaker.
 - ____ Working outside the home full-time.
 - ____ Working outside the home part-time.
 - ____ Student or in job training.
 - ____ Retired.
 - ____ Other: _____.
5. What is your relationship to the patient?
 - ____ wife/common-law partner.
 - ____ girl-friend.
 - ____ other: _____
6. How long have you known the patient? ____ years.
7. How long have you lived with the patient? ____ years.
Did you know the patient at the time of his head-injury? ____ yes. ____ no.
8. How many children (even if grown-up) are living in your home? ____.
How old are they? _____.

(Appendix B continued)

9. **Compared to before the injury**, how would you describe your family's present financial status?

(Please circle the correct number)

1 ----- 2 ----- 3 ----- 4 ----- 5 ----- 6 ----- 7

1 = A lot better now than before the injury (less money problems now).

2 = Considerably better than before the injury.

3 = Slightly better than before the injury.

4 = The same as before the injury.

5 = Slightly worse than before the injury.

6 = Considerably worse than before the injury.

7 = A lot worse than before the injury (more money problems now).

INFORMATION ABOUT THE HEAD-INJURED PATIENT

10. When was the patient born? ____ (day) ____ (month) ____ (year).

11. How many years of education has the patient completed? ____ years.

12. When did the head-injury happen? ____ (day) ____ (month) ____ (year).

13. What caused the head-injury?

____ Motor vehicle accident.

____ Assault or criminal injury.

____ Fall.

____ Hit by object.

____ Other: _____.

14. Where did the head-injury happen?

____ At work.

____ At home.

____ During leisure time activity/hobby.

____ Other: _____.

15. What was the patient's employment situation at the time the head-injury happened?

____ Unemployed or in between jobs.

____ Working as a homemaker.

____ Working outside the home full-time.

____ Working outside the home part-time.

____ Student or in job training.

____ Retired.

____ Other: _____.

(Appendix B continued)

16. What is his employment situation now?
 Unemployed or in between jobs.
 Working as a homemaker.
 Working outside the home full-time.
 Working outside the home part-time.
 Student or in job training.
 Retired.
 Other: _____.
17. As far as you know, did the patient abuse drugs or alcohol before the head-injury?
 No.
 Yes.
18. As far as you know, does the patient abuse drugs or alcohol now?
 No.
 Yes.
19. Is the patient currently involved in a court or insurance case (for example, a WCB appeal or ICBC case)?
 Yes.
 No.
20. As far as you know, was the patient ever put in hospital for a stroke or a head-injury he had before his most recent one?
 No.
 Yes.

APPENDIX C

Modifications made to the Social Adjustment Scale - SR

1. The original instructions ("We are interested in finding out how you have been doing in the last *two weeks*. We would like you to answer some questions about your work, spare time and your family life. There are no right or wrong answers to these questions. Check the answers that best describe how you have been in the last *two weeks*.") were modified to: "These questions ask about how you have been doing at work, in your spare time and in your family life. Put a check mark on the line in front of the answer that best describes you **IN THE LAST TWO WEEKS**. Choose only one option for each question and do not worry about questions that are missing (for example, numbers 45 and 46."
2. Employment status information (e.g., "unemployed"), which is collected but not coded in the Social Adjustment Self-Report Scale, was deleted since it is part of the demographic information sheet.
3. Subjects not employed outside the home are guided to the next section immediately following the title of the "Work outside the home" section, instead of after question 1.
4. Questions for "single, separated or divorced persons not living with a person of the opposite sex" were deleted.
5. "Relationship with partner; everyone answer questions 38-44" was inserted prior to question 38.
6. The questions tapping frequency of sexual intercourse (44) and problems during intercourse (45) were deleted. In question 46, the term "intercourse" was substituted with "sex with your partner"; and the

option "not applicable; we did not have sex in the last two weeks" was added.

7. The question "Have you ever been married, ever lived with a person of the opposite sex, or ever had children?" introducing the "Family Unit" section was deleted. Furthermore, the response choice "not applicable, partner and children are not living" in question 51 was deleted.
8. Question 54, probing financial satisfaction, was deleted. This variable serves as an independent predictor in the present study and is assessed in the demographic information sheet.

APPENDIX D

Profile of Mood States Factor Scores and Effect Sizes for the Present Sample, College Students and Female Psychiatric Outpatients

	TEN	DEP	ANG	VIG	FAT	CON
Present sample (n = 59)						
M:	15.27	19.64	15.36	13.58	14.41	9.73
SD	9.11	15.20	11.49	4.98	7.10	6.03
Female college students (n = 516)						
M:	13.9	14.8	9.3	15.6	10.7	11.7
SD:	7.4	11.4	7.4	6.6	6.8	5.7
Female outpatients (n = 650)						
M:	20.7	28.0	14.9	9.3	13.0	13.3
SD:	8.8	15.9	11.5	6.3	8.2	6.7

Effect sizes (Cohen's d):

Present sample vs.

college students: .19 .42 .82 -.31 .55 -.35

Present sample vs.

psychiatric outpatients: -.62 -.53 .04 .68 .17 -.53

Notes. 1. Full factor score labels are Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-inertia and Confusion-Bewilderment. 2. McNair, Lorr and Droppleman's (1971, 1992) norms were used for comparison. 3. Positive and negative effect sizes indicate that the present sample scored higher or lower than the normative sample, respectively.

APPENDIX E

Social Adjustment Scale - SR Subscale Scores and Effect Sizes for the Present Sample, Normal Adults and Clinical Samples

	WRK	SOC	EXT	MAR	PAR	FAM
<hr/>						
Present sample						
n:	58	60	55	60	32	60
M:	1.78	2.06	1.65	2.23	1.68	2.23
SD:	.45	.45	.39	.64	.49	.75
Normal adult women						
n:	272	277	274	191	175	270
M:	1.46	1.83	1.34	1.77	1.43	1.54
SD:	.50	.53	.35	.49	.43	.62
Acutely depressed women						
n:	149	155	155	93	101	140
M:	2.47	2.83	2.15	2.46	2.25	2.86
SD:	.74	.65	.69	.58	.82	.91
Women living with HI						
n:	50	50	50	50	50	50
M:	1.48	2.09	1.42	2.10	1.49	1.76
SD:	.53	.64	.48	.69	.52	.67

(Appendix E continued)

	WRK	SOC	EXT	MAR	PAR	FAM
<hr/>						
<u>Effect sizes (Cohen's d):</u>						
Present sample vs. normal adult women	.64	.43	.89	.94	.58	1.11
Present sample vs. acutely depressed:	-.93	-1.18	-.72	-.40	-.70	-.69
Present sample vs. women living with HI:	.57	-.05	.48	.19	.37	.70

Notes. 1. Full subscale labels are Work, Social functioning, Extended Family functioning, Marital functioning, Parental functioning, Nuclear Family functioning. 2. Weissman et al.'s (1978) norms for normal adult women and acutely depressed women, and Livingston et al.'s (1985b) norms for women living with head-injured persons, were used. 3. Positive and negative effect sizes indicate that the present sample scored higher or lower than the normative sample, respectively.

APPENDIX F

Ranking of Patient Competency Rating Scale Items According to Reported Degree of Difficulty for Head-Injured Men

M	SD	Item #	Content
2.32	1.07	27	Controlling temper when upset
2.38	1.01	18	Accepting criticism from others
2.48	1.02	17	Handling arguments
2.52	1.00	28	Keeping from being depressed
2.53	1.02	9	Staying involved in activities when bored/tired
2.62	.98	16	Adjusting to unexpected changes
2.63	1.03	23	Recognizing own behavior/words upset others
2.67	.99	29	Keeping emotions from affecting activities
2.93	1.06	10	Remembering dinner last night
2.93	1.15	22	Participating in group activities
2.95	1.08	24	Scheduling daily activities
2.95	1.03	25	Understanding new instructions
2.97	1.30	6	Taking care of his finances
2.97	.99	13	Remembering important things to do
3.17	1.06	12	Remembering daily schedule
3.81	1.42	15	Getting help when confused
3.20	.95	11	Remembering names of people often seen
3.25	1.12	26	Consistently meeting daily responsibilities

(Appendix F continued)

M	SD	Item #	Content
3.28	1.30	8	Starting conversation in a group
3.33	1.07	21	Showing affection to people
3.37	1.37	5	Doing laundry
3.47	1.26	7	Keeping appointments on time
3.48	.98	20	Acting appropriately around friends
3.52	1.27	1	Preparing his own meals
3.78	1.50	14	Driving a car
3.82	1.16	19	Controlling crying
3.92	1.21	4	Washing dishes
4.15	.94	30	Controlling laughter
4.32	1.05	3	Taking care of personal hygiene
4.38	1.01	2	Dressing himself

APPENDIX G

Comparison of Sample Subsets With and Without Injury Severity Data

Table G1: Original Correlation Matrix for "Key" Variables (n = 60)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC
PAF	-.32							
SWL	-.49	.26						
FIN	.42	-.18	-.29					
SOC	.76	-.46	-.59	.33				
EXT	.04	.03	-.04	.04	-.07			
NEU	.59	-.11	-.31	.31	.53	-.12		
OCC	-.24	.00	.31	-.12	-.12	-.01	.05	
PSC	-.42	-.14	.36	-.42	-.43	.07	-.20	.15

Notes. 1. Full variable names are Total mood disturbance, Positive affect, Satisfaction with life, Financial strain, Social adjustment problems, Extraversion, Neuroticism, Man's occupational involvement, Psychosocial competency. 2. For each cell, the top row presents the z score, and the bottom row presents the significance value (p) of the z score. 3. Significance was defined as $p < .0014$.

Table G2: Fisher Z Transformations for Cases With and Without Injury Severity Data

Cases with severity data (n = 44)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC
PAF	-.29							
SWL	-.53	.23						
FIN	.56	-.29	-.24					
SOC	1.11	-.32	-.74	.38				
EXT	-.02	.11	.07	.01	-.13			
NEU	.78	-.17	-.32	.33	.82	-.19		
OCC	-.22	-.04	.31	-.23	-.13	-.14	-.07	
PSC	-.49	-.19	.33	-.34	-.45	.10	-.17	.16

Cases without severity data (n = 16)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC
PAF	-.42							
SWL	-.62	.38						
FIN	.19	-.10	-.53					
SOC	.78	-.94	-.55	.32				
EXT	.26	-.11	-.82	.63	.13			
NEU	.47	.03	-.26	.16	.16	.36		
OCC	-.31	.11	.24	.13	-.16	.41	.19	
PSC	-.44	.09	.49	-.83	-.56	-.33	-.24	.09

Table G3: z Scores and Significance Values for Fisher Z Transformations

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC
PAF	.43							
	.67							
SWL	.28	-.48						
	.78	.63						
FIN	1.17	-.59	.91					
	.24	.55	.36					
SOC	1.06	1.96	-.60	.18				
	.29	.05	.55	.86				
EXT	-.86	.68	-2.36	-1.94	-.81			
	.39	.50	.02	.05	.42			
NEU	.97	-.62	-.19	.54	2.07	-1.73		
	.33	.54	.85	.59	.04	.08		
OCC	.27	-.44	.22	-1.13	.11	-1.72	-.81	
	.79	.66	.82	.26	.91	.09	.42	
PSC	-.15	-.89	-.50	1.53	.34	1.32	.21	.23
	.88	.38	.62	.13	.73	.19	.83	.82

Notes. 1. Full variable names are Total mood disturbance, Positive affect, Satisfaction with life, Financial strain, Social adjustment problems, Extraversion, Neuroticism, Man's occupational involvement, Psychosocial competency. 2. For each cell, the top row presents the z score, and the bottom row presents the significance value (p) of the z score. 3. Significance was defined as $p < .0014$.

APPENDIX H

Exploration of the Effect of Litigation Status on Family Member and Survivor Functioning

Table H1: Univariate Comparisons between Cases in Litigation (n = 22) versus Cases Not in Litigation (n = 38)

Variable	d	p	SDR	p
Age	-.26	.328	.92	.591
Education	.05	.848	.68	.030
Woman's previous occupation	.40	.148	.74	.282
Women's current occupation	.10	.717	.88	.518
Years known head-injured man	-.60	.031	.54	.012
Years lived with head-injured man	-.47	.084	.62	.007
Head-injured man's age	-.22	.420	.98	.799
Head-injured man's education	-.08	.759	.70	.149
Man's previous occupation	-.04	.858	1.01	.768
Man's current occupation	.24	.381	1.15	.139
Time since injury	-.38	.159	.55	.008
Mood disturbance	.37	.176	.93	.750
Positive affect	-.04	.892	1.00	.858
Satisfaction with life	-.36	.186	.90	.264
Financial strain	.50	.069	.81	.256
Social adjustment problems	.54	.046	1.09	.696
Extraversion	-.05	.845	1.04	.929
Neuroticism	.36	.178	1.31	.111
Man's psychosocial competency	-.44	.109	.75	.144
Injury severity	-.16	.600	.97	.857

Note. $p < .0025$ was considered significant in this analysis.

Table H2: Correlation Matrices For Cases In Litigation and Not In Litigation

Cases in Litigation (n = 22, n = 16 for injury severity correlations)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC	SEV
TMD	1.00									
PAF	-.30	1.00								
SWL	-.54	.27	1.00							
FIN	.34	-.35	-.72	1.00						
SOC	.76	-.35	-.46	.44	1.00					
EXT	.35	-.38	-.21	.08	.12	1.00				
NEU	.46	-.18	-.32	.31	.44	-.08	1.00			
OCC	-.42	.16	.30	-.38	-.21	.10	.06	1.00		
PSC	-.24	.00	.34	-.47	-.40	.01	-.04	.34	1.00	
SEV	-.04	.15	.02	-.19	.00	-.10	-.33	-.14	-.52	1.00

Cases Not in Litigation (n = 38, n = 28 for injury severity correlations)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC	SEV
TMD	1.00									
PAF	-.33	1.00								
SWL	-.44	.24	1.00							
FIN	.42	-.12	-.08	1.00						
SOC	.75	-.52	-.64	.21	1.00					
EXT	-.13	.27	.05	.02	-.19	1.00				
NEU	.67	-.30	-.27	.27	.57	-.15	1.00			
OCC	-.18	-.08	.31	-.06	-.14	.16	-.08	1.00		
PSC	-.46	-.21	.33	-.37	-.40	.10	-.25	.07	1.00	
SEV	-.14	.04	-.37	-.17	-.09	.18	-.35	-.35	-.13	1.00

Table H3: Fisher Z Transformation For Cases in Litigation and Not in Litigation

Cases in Litigation (n = 22, n = 16 for injury severity)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC
PAF	-.31								
SWL	-.60	.28							
FIN	.35	-.37	-.91						
SOC	1.00	-.37	-.50	.47					
EXT	.37	-.40	-.21	.08	.12				
NEU	.50	-.18	-.33	.32	.47	-.08			
OCC	-.45	.16	.31	-.40	-.21	.10	.06		
PSC	-.25	.00	.35	-.51	-.42	.01	-.04	.35	
SEV	-.04	.15	.02	-.19	.00	-.10	-.34	-.14	-.58

Cases Not in Litigation (n = 38, n = 28 for injury severity)

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC
PAF	-.34								
SWL	-.47	.25							
FIN	.45	-.12	-.08						
SOC	.93	-.58	-.76	.21					
EXT	-.13	-.28	.05	.02	-.19				
NEU	.81	-.31	-.28	.28	.65	-.15			
OCC	-.18	-.08	.32	-.06	-.14	.16	-.08		
PSC	-.50	-.21	.34	-.39	-.42	.10	-.26	.07	
SEV	-.14	.04	-.39	-.17	-.09	.18	-.37	-.37	-.13

Table H4: z Scores and Significance Values for Fisher Z Transformations

	TMD	PAF	SWL	FIN	SOC	EXT	NEU	OCC	PSC
PAF	.11								
	.91								
SWL	-.46	.11							
	.65	.91							
FIN	-.35	-.88	2.91						
	.73	.38	.004						
SOC	.25	.74	.91	.91					
	.80	.46	.36	.36					
EXT	1.75	-.42	-.91	.21	1.09				
	.08	.67	.36	.83	.28				
NEU	-1.09	.46	-.18	.14	-.63	.25			
	.28	.50	.86	.89	.53	.80			
OCC	-.95	.84	-.04	-1.19	-.25	-.21	.49		
	.34	.40	.97	.23	.80	.83	.62		
PSC	.88	.74	.04	-.42	.00	-.32	.77	.98	
	.38	.46	.97	.67	1.00	.75	.44	.33	
SEV	.29	.32	1.20	-.06	.26	-.82	.09	.67	-1.32
	.77	.75	.23	.95	.79	.41	.92	.50	.19

Notes. 1. Full variable names are Total mood disturbance, Positive affect, Satisfaction with life, Financial strain, Social adjustment problems, Extraversion, Neuroticism, Man's occupational involvement, Psychosocial competency, Injury severity. 2. For each cell, the top row presents the z score, and the bottom row presents the significance value (p) of the z score. 3. Significance was defined as $p < .0011$.