

**ASSESSING AND MANAGING RISK OF OCCUPATIONAL STRESS IN
MALE AUTOMOTIVE ASSEMBLY WORKERS IN MALAYSIA**

by

EDIMANSYAH BIN ABDIN

**Thesis submitted in fulfillment of the requirements
for the Degree of
Doctor of Philosophy**

December 2008

ACKNOWLEDGEMENTS

Bismillah Ar-Rahman Ar-Rahim

Praise be to ALLAH S.W.T., the Most Compassionate and Most Merciful, whose blessings have helped me throughout my life.

Firstly, I would like to acknowledge and express my sincere appreciation to my supervisor, Professor Dr Rusli Bin Nordin, Professor of Public Health, School of Medicine and Health Sciences, Monash University Malaysia [formerly Professor of Community Medicine and Deputy Dean of School of Dental Sciences, Universiti Sains Malaysia], for his strong guidance, support and encouragement throughout the study. I would also like to thank my co-supervisor, Dr Lin Naing @ Mohd Ayub Sadiq, Senior Lecturer of Biostatistics, Institute of Medicine, Universiti Brunei Darussalam [former Senior Lecturer of Biostatistics, School of Dental Sciences, Universiti Sains Malaysia], for his useful suggestions and statistical guidance.

I would like to gratefully acknowledge Prof. Robert Karasek and Professor Peter F. Lovibond for their permissions to use the JCQ and DASS, respectively. I would like to thank all NORMS (National Occupational Risk Management Study Programme) group members who are involved in this study, especially Assoc. Prof Dr Mohamed Rusli Abdullah, Assoc. Prof Dr Tengku Ariff, the late Assoc. Prof Dr Razlan Musa, Prof Wan Abdul Manan Wan Muda, Dr Rohana Jalil, Dr Aziah Daud, Dr Mohamed Nazhari, Dr Mohamad Nazri, Dr Than Winn, Dr Ahmad Syaarani Yasin, Dr Nik Khairol Reza Md Yazin, Azwan Aziz, Kamarudin Hussin, Nurul Ainun Hamzah, Fazli, Fazlina, Zura and Kartini Daud.

I would also like to thank all my colleagues and respected researchers and lecturers—Madam Puti Norani Radin Tahir, Miss Haizan Hassan, Suhaila, Nurul Firdaus, Sulaiman Ngah, Syafawati, En Hakim, Dr Zainul Ahmad Rajion, Dr Aziah Daud, Dr Kamarul, Dr Fazli, Dr Wihaskoro; colleagues of PhD and Master students especially Atif, Hilmi, Mazalisah Matsah, Norazura Ismail, Dr Azmi Hasan, Dr Yahya, Dr Jalal, Dr Aqil, Dr Maen and all staffs in School of Dental Sciences and Department of Community Medicine, School of Medical Sciences.

I would like to express my deepest appreciation and gratitude to all managers and assembly workers involved in this study from both Selangor automotive and Pahang automotive factories.

This research would not have been possible without financial assistance from the Intensification of Research in Priority Areas (IRPA) research grant of the Ministry of Science, Technology and Innovation (MOSTI) (project no: 06-02-05-2079-PR0061/09-03) in the Eighth Malaysia Plan (8-MP) budget.

A special thank you goes to my loving wife [Noorhafezah Mohamed Ekbal Shah], loving mother [Sumarni Husin], caring father [Abdin Hj Amanan], sisters [Fatmawati and Rita Iryati], and brother-in-law [Putra Arifait] and all loving family members who have terribly missed me during my stay in Kelantan and have been steadfast in their prayers for my success.

Thank you to all of you.

Edimansyah Abdin
USM, Kota Bharu, Kelantan

TABLE OF CONTENTS

	Page
Acknowledgement	ii
Table of Contents	iii
List of Tables	x
List of Figures	xv
List of Appendices	xvii
List of Abbreviations	xviii
Abstract	xx
Abstrak	xxiii
CHAPTER ONE - INTRODUCTION	
1.1 Background	2
1.2 Research Problem	3
1.3 Rationale of the Study	8
1.4 General Objective	8
1.5 Specific Objectives	8
1.6 Research Hypotheses	9
1.7 Operational Definitions	10
CHAPTER TWO - LITERATURE REVIEW	
2.1 Definition of Stress	15
2.2 Historical Background of Stress	16
2.3 General Adaptation Syndrome (GAS)	19
2.4 Definition of Occupational Stress	21

2.5	Occupational Stress Model	21
2.6	The Job Demand-Control-Support (JDCS) Model	22
2.7	Occupational Stress and Health	29
2.8	Economic Impact of Occupational Stress	31
2.9	Occupational Stress in Malaysia	34
2.10	Occupational Stress in the Automotive Industry	39
2.11	The Nature of Depression	44
	2.11.1 Work-related Depression	45
2.12	The Nature of Anxiety	50
	2.12.1 Work-related Anxiety	51
2.13	The Nature of Quality of Life	53
	2.13.1 Work-related Quality of Life	54
2.14	Managing Occupational Stress	56
	2.14.1 Occupational Stress Intervention Study	57
 CHAPTER THREE - METHODOLOGY		
3.1	Part One	65
	3.1.1 Study Design	65
	3.1.2 Population and Sample	65
	3.1.3 Sample Size Estimation	66
	3.1.4 Data Collection	68
	3.1.5 Research Instruments	68
	3.1.5.1 A validated Malay version of the Job Content Questionnaire (JCQ)	68
	3.1.5.2 A validated Malay version of the Depression Anxiety Stress Scales (DASS-42)	74
	3.1.5.3 A validated Malay version of the Brief World Health Organization Quality of Life (WHOQOL-BREF)	78

3.1.6	Validation Studies	80
3.1.6.1	A Validation Study of the Malay version of the Job Content Questionnaire (JCQ)	80
3.1.6.2	A Validation Study of the Malay version of the Depression Anxiety Stress Scales (DASS-42)	81
3.1.7	Statistical Analysis	83
3.2	Part Two	86
3.2.1	Study Design	86
3.2.2	Population and Sample	86
3.2.3	Sample Size	87
3.2.4	Stress Management Training Program	88
3.2.5	Research Instrument	90
3.1.5.1	A validated Malay version of the Short Form Depression Anxiety Stress Scales (DASS-21)	90
3.2.6	A Validation Study	92
3.2.7	Statistical Analysis	94
3.3	Ethical Approval	94
 CHAPTER FOUR – RESULTS AND DISCUSSION		
4.1.	Reliability and Validity of the Malay version of the Job Content Questionnaire (JCQ), Depression Anxiety Stress Scales (DASS-42) and Short-form Depression Anxiety Stress Scales (DASS-21)	97
4.1.1	Job Content Questionnaire (JCQ)	97
4.1.1.1	Socio-demographic Characteristics	97
4.1.1.2	Reliability (Internal Consistency)	98
4.1.1.3	Construct Validity	99
4.1.1.4	Discussion	100
4.1.2	Depression Anxiety Stress Scales (DASS-42)	101
4.1.2.1	Socio-demographic Characteristics	101

4.1.2.2	Reliability (Internal Consistency)	101
4.1.2.3	Construct Validity	103
4.1.2.4	Discussion	105
4.1.3	Short-form Depression Anxiety Stress Scales (DASS-21)	108
4.1.3.1	Socio-demographic Characteristics	108
4.1.3.2	Reliability (Internal Consistency)	109
4.1.3.3	Construct Validity	109
4.1.3.4	Discussion	111
4.2	Prevalence of Self-Perceived Depression, Anxiety, Stress and Their Associated Psychosocial Job Factors	114
4.2.1	Descriptive Statistics	114
4.2.2	Descriptive Statistics of Job Content in Male Automotive Assembly workers	115
4.2.3	Prevalence of Self-Perceived Depression, Anxiety and Stress	115
4.2.4	Association between Psychosocial Job Factors and DASS-Depression	119
4.2.5	Association between Psychosocial Job Factors and DASS-Anxiety	121
4.2.6	Association between Psychosocial Job Factors and DASS-Stress	123
4.2.7	Discussion	125
	4.2.7.1 Prevalence of Self-Perceived Depression, Anxiety and Stress	125
	4.2.7.2 Association between Psychosocial Job Factors and Depression, Anxiety and Stress	127
4.2.8	Study Limitations	130
4.3	Prevalence of Self-perceived Quality Of Life (QOL) and Their Associated Psychosocial Job Factors	131
4.3.1	Descriptive Statistics of the Four Domains of Self-perceived QOL	131

4.3.2	Prevalence of Self-perceived QOL and General Health Status	132
4.3.3	Association between Psychosocial Job Factors and Physical Health Domain of QOL	133
4.3.4	Association between Psychosocial Job Factors and Psychological Domain of QOL	135
4.3.5	Association between Psychosocial Job Factors and Social Relationship Domain of QOL	137
4.3.6	Association between Psychosocial Job Factors and Environment Domain of QOL	139
4.3.7	Discussion	140
4.3.8	Limitations of the Study	146
4.4	Modeling the Relationship between Working Conditions, Self-perceived Stress, Anxiety, Depression and Quality Of Life (QOL)	147
4.4.1	Correlation Coefficients	147
4.4.2	Final Model	150
4.4.3	Significant Relationship between Observed Variables	152
4.4.4	Mediating Factors	153
4.4.5	Discussion	155
	4.4.5.1 Working Conditions and Self-perceived QOL	155
	4.4.5.2 Working Conditions and Self-perceived Stress, Anxiety and Depression	157
	4.4.5.3 Self-perceived Stress, Anxiety, Depression and QOL	158
	4.4.5.4 Mediating Factors	159
4.4.6	Limitations of the Study	160
4.5	Immediate Effects of Stress Management Training Program on Self-Perceived Depression, Anxiety and Stress	163
4.5.1	Socio-demographic Characteristics	163
4.5.2	Immediate Effects of Stress Management Training Program on Self-perceived Depression, Anxiety and Stress	165

4.5.3	Immediate Effects of Stress Management Training Program on Self-perceived Depression, Anxiety and Stress Subscales Scores	167
4.5.4	Discussion	169
4.5.5	Limitations of the Study	172
CHAPTER FIVE - CONCLUSIONS AND RECOMMENDATIONS		
5.1	Conclusions	174
5.2	Recommendations	178
REFERENCES		179
LIST OF PUBLICATION		200
APPENDICES		203

LIST OF TABLES

		Page
Table 2.1	Stress prevalence and prevalence rate ratio	38
Table 3.1	Results of sample size calculation by using the single proportion formula	67
Table 3.2	Items of the validated English and Malay Version of the Job Content Questionnaire (JCQ)	70
Table 3.3	Formulae for job content instrument scale construction	73
Table 3.4	General guidelines for the DASS severity ratings	75
Table 3.5	Items of the validated English and Malay version of the Depression Anxiety Stress Scales	76
Table 3.6	Items of the validated Malay Version of the Brief World Health Organization Quality of Life	79
Table 3.7	Sample size calculation using the two means formula of PS Software (Dupont & Plummer, 1997)	87
Table 3.8	Items of the validated Malay Version of the Short-form Depression Anxiety Stress Scales (DASS-21)	92
Table 4.1	Socio-demographic characteristics of 50 automotive assembly plant workers	97
Table 4.2	Item-total correlations and Cronbach's alpha coefficients for the JCQ scales	98
Table 4.3	Exploratory factor analysis of 21-items of the JCQ principal component extraction with varimax rotation	99
Table 4.4	Socio-demographic characteristics	101
Table 4.5	Item-total correlations and Cronbach's Alpha coefficients for the Malay version of DASS-42	102
Table 4.6	Factor loadings for the Malay version of DASS-42	104
Table 4.7	Demographic characteristics of 88 automotive assembly Workers	108

Table 4.8	Correlation between age, duration of work, salary, year of education and DASS-Depression, DASS-Anxiety and DASS-Stress scales	108
Table 4.9	Item-total correlations and Cronbach's alpha coefficients for the Malay version of the DASS-21	109
Table 4.10	Factor loadings for the Malay version of DASS-21	110
Table 4.11	Socio-demographic and work characteristics of 728 male automotive assembly plant workers	114
Table 4.12	Means and standard deviations of Karasek's Job Content Questionnaire (JCQ) scales	115
Table 4.13	Means, standard deviations and prevalence for the DASS-42 Questionnaire Scales	115
Table 4.14	Association between Psychosocial, Work, Demographic Factors of DASS-Depression in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	120
Table 4.15	Association between Psychosocial, Work, Demographic Factors of DASS-Depression in 728 male Automotive Assembly workers: Multiple Linear Regression Analysis	120
Table 4.16	Association between Psychosocial, Work, Demographic Factors of DASS-Anxiety in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	122
Table 4.17	Association between Psychosocial, Work, Demographic Factors of DASS-Anxiety in 728 male Automotive Assembly workers: Multiple Linear Regression Analysis	122
Table 4.18	Association between Psychosocial, Work, Demographic Factors of DASS-Stress in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	124
Table 4.19	Association between Psychosocial, Work, Demographic Factors of DASS-Stress in 728 male Automotive Assembly workers: Multiple Linear Regression Analysis	124
Table 4.20	Means and standard deviations of the DASS scales scores of self-perceived depression, anxiety and stress in current in current and other studies	126
Table 4.21	Summary statistics of the four domains of the QOL in 728 male automotive assembly workers	131

Table 4.22	Association between Psychosocial, Work, Demographic Factors and Physical Health Domain of QOL in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	134
Table 4.23	Association between Psychosocial, Work, Demographic Factors and Physical Health Domain of QOL in 728 male Automotive Assembly workers: Multiple Linear Regression Analysis	134
Table 4.24	Association between Psychosocial, Work, Demographic Factors and Psychological Domain of QOL in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	136
Table 4.25	Association between Psychosocial, Work, Demographic Factors and Psychological Domain of QOL in 728 male Automotive Assembly workers: Multiple Linear Regression Analysis	136
Table 4.26	Association between Psychosocial, Work, Demographic Factors and Social Relationship Domain of QOL in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	138
Table 4.27	Association between Psychosocial, Work, Demographic Factors and Social Relationship Domain of QOL in 728 male Automotive Assembly workers: Multiple Linear Regression	138
Table 4.28	Association between Psychosocial, Work, Demographic Factors and Environment Domain of QOL in 728 male Automotive Assembly workers: Simple Linear Regression Analysis	139
Table 4.29	Association between Psychosocial, Work, Demographic Factors and Environment Domain of QOL in 728 male Automotive Assembly workers: Multiple Linear Regression Analysis	140
Table 4.30	Pearson correlation coefficient matrix of the measured variables	149
Table 4.31	Relationship between Independent and Dependent Variables	153
Table 4.32	Total, direct and indirect effects of independent variables on dependent variables	154

Table 4.33	Socio-demographic characteristics of 60 (experimental group) and 58 (control group) automotive workers	164
Table 4.34	Comparison of the pre-post DASS-Depression, DASS-Anxiety and DASS-Stress scores between the experimental and control group	165
Table 4.35	Comparison of pattern of DASS-Depression, DASS-Anxiety and DASS-Stress Subscales between Two Study Groups	168

LIST OF FIGURES

	Page	
Figure 2.1	Principle of Yerkes-Dodson in relation to stress and productivity	18
Figure 2.2	General adaptation syndrome	20
Figure 2.3	The Job Demand-Control Model	23
Figure 2.4	The Job Demand-Control-Support Model	25
Figure 2.5	The occupational distribution of psychological demands and decision latitudes	26
Figure 2.6	The Environment, the worker, and illness: Dynamic associations linking environmental strain and learning to evolution of personality	28
Figure 2.7	Three stages of car manufacturing process	40
Figure 2.8	Vehicle flow in a “Generic” factory	42
Figure 2.9	Conceptual framework of risk management of occupational stress	63
Figure 3.1	Study protocol in part one	82
Figure 3.2	Study protocol in part two	95
Figure 4.1	Severity levels of self-perceived depression [DASS-Depression] in 728 male automotive assembly workers	116
Figure 4.2	Severity levels of self-perceived anxiety [DASS-Anxiety] in 728 male automotive assembly workers	117
Figure 4.3	Severity levels of self-perceived stress [DASS-Stress] in 728 male automotive assembly workers	118
Figure 4.4	Self-perceived QOL in 728 male automotive assembly Workers	132
Figure 4.5	Self-perceived overall general health status in 728 male automotive assembly workers	133

Figure 4.6	Significant pathways of the final model and goodness of fit indices	151
Figure 4.7	Comparison of the pre-post self-perceived DASS-Depression scores (mean \pm SD) between the experimental and control group	166
Figure 4.8	Comparison of the pre-post self-perceived DASS-Anxiety scores (mean \pm SD) between the experimental and control group	166
Figure 4.9	Comparison of the pre-post self-perceived DASS-Stress scores (mean \pm SD) between the experimental and control group	167

LIST OF APPENDICES

Appendix

1. Major Depressive Disorders According to DSM IV and ICD-10
2. Consent Form
3. Full Set Questionnaire
4. DASS 42 Answer Template
5. Ethical Approval Letters
6. Photos of Automotive Assembly Plants
7. Photos of Data Collection
8. Intervention Program Package
 - Photos of aerobic exercise
 - Pamphlets
 - Poster Exhibition
 - Manual book entitled “Pencegahan dan Pengawalan Stres Pekerjaan Di Malaysia”
 - CD Lecture on Stress Management
 - Q and A session
 - Video CD entitled “Pengawalan dan Perlindungan Stres Pekerjaan Dalam Industri Automotif di Malaysia”

LIST OF ABBREVIATIONS

AGFI	Adjusted-Goodness-of-Fit
AMOS	Analysis of Moment Structures
CFI	Comparative-Fit-Index
DASS-42	Depression Anxiety Stress Scales (42 items)
DASS-21	Short-form of the Depression Anxiety Stress Scales (21-items)
DSM IV	Diagnostic and Statistical Manual of Mental Disorders Fourth Edition
GAS	General Adaptation Syndrome
GFI	Goodness-of-Fit Index
ICD-10	International Classification of Diseases-Tenth Edition
JDC	Job Demand-Control Model
JDCS	Job Demand-Control-Support Model
JCQ	Job Content Questionnaire
MLR	Multiple Linear Regression
NIOSH	National Institute for Occupational Safety and Health
PRATIO	Parsimony Ratio
QOL	Quality of Life
RM	Ringgit Malaysia
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
SLR	Simple Linear Regression
SMT	Stress Management Training

SPSS	Statistical Package for Social Sciences
WHO	World Health Organization
WHOQOL-BREF	World Health Organization Quality of Life Brief Questionnaire (26 items)
WHOQOL Group	World Health Organization Quality of Life Research Group

**PENILAIAN DAN PENGURUSAN RISIKO STRES PEKERJAAN DI
KALANGAN PEKERJA LELAKI PEMBUATAN AUTOMOTIF DI
MALAYSIA**

ABSTRAK

Stres pekerjaan merupakan masalah kesihatan pekerjaan yang penting di kebanyakan industri. Pekerja industri pembuatan automotif adalah di antara kumpulan pekerjaan yang sering dilaporkan mengalami stres pekerjaan. Tujuan utama kajian ini adalah untuk mengkaji penilaian dan pengurusan risiko stres pekerjaan di kalangan pekerja lelaki industri pembuatan automotif di Malaysia. Objektif khusus kajian merangkumi perkara-perkara berikut: menilai kesahan dan kebolehpercayaan instrumen Soalselidik Kandungan Kerja (JCQ) dan Skala Kemurungan Kebimbangan Stres (DASS) 21-item dan 42-item dalam versi Bahasa Malaysia; menentukan prevalens dan faktor-faktor persekitaran pekerjaan yang berkaitan dengan persepsi responden terhadap kemurungan, kebimbangan, stress dan kualiti hidup (*quality of life*) (QOL); permodelan hubungkait di antara tuntutan kerja, kawalan kerja dan sokongan sosial dengan persepsi responden terhadap kemurungan, kebimbangan, stress dan QOL; dan menilai kesan 4-jam latihan pengurusan stres kepada perubahan persepsi responden terhadap kemurungan, kebimbangan dan stres di kalangan pekerja lelaki pembuatan automotif. Kajian-kajian hirisan lintang dan *ujian-kuasi* intervensi yang telah dijalankan ini adalah sebahagian daripada reka bentuk penyelidikan jangka panjang di antara bulan November 2004 dan Oktober 2007. Sejumlah 728 pekerja daripada industri pembuatan automotif telah terlibat dalam kajian ini. Kami mendapati instrumen JCQ, DASS 21-item dan DASS 42-item dalam versi Melayu boleh dipercayai dan sah digunakan untuk mengukur kandungan kerja, kemurungan,

keimbangan dan stres di kalangan pekerja pembuatan automotif. Prevalens persepsi responden terhadap kemurungan, keseimbangan dan stres dalam kajian ini adalah masing-masing sebanyak 35.4%, 47.2% dan 31.1%. Analisis Regresi Linear Berganda (*Multiple Linear Regression*) (MLR) mendapati beban psikologi, kerja tanpa jaminan dan keadaan kerja yang merbahaya mempunyai hubungan langsung dengan *DASS-Kemurungan*, *DASS-Kegelisahan* dan *DASS-Stres*. Sebanyak 64.9% dan 53.7% melaporkan baik ataupun sangat baik keseluruhan persepsi kualiti hidup dan status kesihatan secara umumnya. Analisis MLR menunjukkan pengembangan kemahiran mempunyai hubungan langsung dengan faktor kesihatan fizikal dan psikologi QOL; manakala, kebebasan kemahiran mempunyai hubungan langsung dengan faktor hubungan sosial dan persekitaran QOL. Sokongan sosial mempunyai hubungan langsung dengan faktor kesihatan fizikal dan persekitaran QOL; manakala, sokongan rakan sekerja mempunyai hubungan langsung dengan faktor psikologi dan hubungan sosial QOL. Kerja tanpa jaminan dan keadaan kerja yang merbahaya mempunyai hubungan songsang dengan semua faktor QOL, manakala psikologi beban kerja mempunyai hubungan songsang dengan faktor persekitaran QOL. Dalam analisis Pemodelan Pengiraan Berstruktur (*Structural Equation Modelling*) (SEM), model kajian menunjukkan bahawa sokongan sosial di tempat kerja mempunyai hubungan langsung dengan semua faktor QOL (kesihatan fizikal, status psikologi, hubungan sosial dan keadaan persekitaran) tetapi songsang dengan persepsi kemurungan dan stres. Beban psikologi kerja mempunyai hubungan langsung dengan persepsi stres and secara songsang dengan faktor persekitaran QOL. Kawalan kerja mempunyai hubungan langsung dengan faktor hubungan sosial QOL. Persepsi stres, keseimbangan dan kemurungan didapati mempunyai peranan penting sebagai faktor perantara dalam hubungkait antara beban psikologi kerja dan sokongan sosial dan

faktor-faktor QOL. Manakala dalam kajian separa ujikaji (*quasy experimental*), kajian mendapati latihan pengurusan stres dapat mengurangkan persepsi kemurungan dan kebimbangan secara signifikan di kalangan kumpulan eksperimen berbanding kumpulan kawalan. Kajian mencadangkan pengurangan beban psikologi kerja, kerja tanpa jaminan dan keadaan kerja yang merbahaya manakala sokongan baik daripada rakan sekerja dan penyelia akan dapat mengurangkan persepsi kemurungan, kebimbangan dan stres responden. Di peringkat individu, kajian mencadangkan supaya latihan pengurusan stres adalah sangat efektif dalam mengurangkan kemurungan dan kebimbangan responden.

ASSESSING AND MANAGING RISK OF OCCUPATIONAL STRESS IN MALE AUTOMOTIVE ASSEMBLY WORKERS IN MALAYSIA

ABSTRACT

Occupational stress is a major occupational health problem in many industries. Automotive assembly industry workers are among the occupational groups reportedly experiencing disproportionately high levels of occupational stress. The main purpose of this study was investigated the assessment and management of risk of occupational stress in male automotive assembly workers in Malaysia. The specific objectives include the following: validated the Malay version of the Job Content Questionnaire (JCQ) and Depression Anxiety Stress Scales (DASS) 21- and 42-item; determining the prevalence and associated factors of self-perceived depression, anxiety, stress, and quality of life (QOL); modelling the relationship between job demand, job control, and social support in relation to the self-perceived depression, anxiety and stress, and QOL; and evaluating the immediate effects of a 4-hour stress management training on the self-perceived depression, anxiety and stress in male automotive assembly workers. As part of longitudinal research design between November 2004 and October 2007, cross sectional studies and quasi-experimental intervention were carried out. We recruited 728 workers from two automotive assembly plants in Selangor and Pahang. We found that the Malay version of the JCQ, DASS 21-item and 42-items were reliable and valid for assessing job content, self-perceived depression, anxiety and stress. The prevalence of self-perceived depression, anxiety and stress was 35.4%, 47.2% and 31.1%, respectively. Multiple Linear Regression (MLR) analyses revealed that psychological job demand, job insecurity and hazardous conditions were positively associated with the DASS-

Depression, DASS-Anxiety and DASS-Stress; supervisor support was inversely associated with DASS-Depression and DASS-Stress. The prevalence of reported good or very good overall self-perceived QOL and general health status was 64.9% and 53.7%, respectively. MLR analyses indicated that created skill was positively associated with physical health and psychological domains of QOL; whilst, skill discretion was positively associated with the social relationship and environment domains of QOL. Social support was positively associated with the physical health and environment domains of QOL; whilst, co-worker support was positively associated with the psychological and social relationship domains of QOL. Job insecurity and hazardous condition were negatively associated with all domains of QOL, whilst psychological job demand was negatively associated with the environment domain of QOL. In the structural equation modeling analysis, our final model shows that social support in the workplace was directly related to all 4 domains of QOL (physical health, psychological wellbeing, social relationships and environmental conditions) and inversely related to self-perceived depression and stress. Job demand was directly related to self-perceived stress and inversely related to the environment domain of QOL. Job control was directly related to the social relationships domain of QOL. Surprisingly, self-perceived stress, anxiety and depression were also found to be important mediating factors in the relationships between job demand and social support and the 4 domains of QOL. Meanwhile, in the quasy-experimental study, we found that the stress management training significantly improve self-perceived depression and anxiety in the experimental group as compared to the control group. We suggest that reducing psychological job demand, job insecurity and hazardous condition factors and promoting good support from co-workers and supervisors may improve the self-perceived depression,

anxiety, stress and worker's QOL in the automotive assembly plant. At the individual level, our findings suggest that the stress management training is effective in reducing the self-perceived depression and anxiety.

CHAPTER ONE

INTRODUCTION

1.1 Background

Over the last four decades of the 20th century, the nature of work has changed dramatically for some people. The 1960s and 1970s saw the introduction of new technology, particularly the use of computers, into the workplace. This was followed in the 1980s by a huge shift towards globalization, with many organizations undergoing mergers, acquisitions, strategic alliances and privatizations. This entrepreneurial period resulted in increased economic competitiveness in international markets for those countries that embraced it (Cooper & Jackson, 1997).

In the 1990s, a major restructuring of work started to take place. Organizations in countries hit by recession were downsizing in an effort to survive. During the last decade, this trend for restructuring and downsizing has continued in many organizations, together with an increase in sub-contracting and outsourcing, in order to compete successfully in the increasingly competitive global market. There has been a rise in short-term contracts, as a result, possibly, of the deregulation of long-term contracts and the limited requirements on permanent employment in many countries (OECD, 1999). Other changes include new patterns of working, such as tele-working, self-regulated work and team work, an increased reliance on computerized technology and a move towards a more flexible workforce, both in number of employees and in their skills and functions (Cox *et al.*, 2000).

In response to these adjustments by industry, the conditions of work and employment have changed significantly. The demand for skilled or multi-skilled workers has increased in tandem with the growth of information technology and leaner, flexible manufacturing processes that require workers to perform multiple tasks. Supervisory conditions have changed with the introduction of teamwork, the evaporation of middle management, and the trend towards flexible place of “at

home” work arrangements. Job has become less stable and secure. Also, the number of hours worked per week continues to increase for all occupations. These types of changes in the work environment have brought “work organization” to the forefront of concern in occupational health especially in North America and Europe. Coincident with recent organizational changes in the work environment, occupational stress and related disorders have mushroomed (Sauter *et al.*, 1999).

Occupational stress is a widespread problem in most industrialized countries; however, there are few reports from less-developed areas. Especially in countries that are currently undergoing rapid industrialization, workers usually face multiple health risks in the workplace, from lingering physical and chemical hazards to emerging psychosocial strain associated with modern work arrangements and intensive market competition (Cheng *et al.*, 2001).

1.2 Research Problem

Occupational stress is a major occupational health problem in many sectors of industry and automotive assembly industry workers are one of several occupational groups who report disproportionately high levels of occupational stress (Oleske *et al.*, 2004; Kvarnström, 1997). Studies have shown that occupational stress was a significant problem in automotive assembly line workers (Oleske *et al.*, 2004; Lottridge, 2004; Kumlin *et al.*, 2001; Hanse & Forsman, 2001; Karasek *et al.*, 1981). Karasek *et al.*, (1981) highlighted high strain work (high demand and low control) among machine-paced operative assemblers.

Lottridge (2004) reported that assembly line workers in the automotive industry exemplify optimized jobs: the industry dictates the right way to do the job (low job control); parts supplied as fast as they can process them (high job demand);

and they are isolated in their work (lack of social support). Heaney *et al.*, (1994) indicated that high job insecurity acts as a chronic stressor whose effects become more potent as the time of exposure increases.

An assembly line in the automotive assembly plant is usually configured as three successive shops in which the body part is constructed (Body Shop), painted (Paint Shop), and then assembled with other components into a complete vehicle (Assembly Shop). Kvarnström (1997) reported that an automotive assembly-line work is often performed in a workplace environment with physical problems, such as noise, vibrations and dangerous machines that can be important stress factors. The feeling that supervisors do not care about creating a good work environment is another important factor for stress. Furthermore, technical development in assembly-line work, especially in large companies, has often resulted in more complicated tasks for the workers who may have difficulty in over-viewing all the steps in production; this can easily build up a fear of the unknown and, consequently, more stress.

Due to rapid development and strong track record for economic growth and stability, the automotive industry has become one of the important contributors to the manufacturing sector in Malaysia. In 2004, Malaysia was the largest producer of passenger cars in the Association of Southeast Asian Nations (ASEAN) countries, accounting for 24.4% of the total ASEAN motor vehicle production. For commercial vehicles, Malaysia was the third largest producer, accounting for 11.0% of the total ASEAN production (Prime Minister's Department, 2005).

Perusahaan Otomobil Nasional (Proton) was the first government-linked company that was accorded flagship status followed by *Perusahaan Otomobil Kedua* (Perodua). A number of privately-owned automotive companies have also succeeded

in penetrating the domestic market for motor-vehicles. Thus, the demand for highly skilled workforce has created a sort of competition between rival automotive companies in order to meet both local and international demands.

Depression, anxiety and stress have been recognized as important mental outcome measures in stressful working setting (Bennett *et al.*, 2004; Newbury-Birch & Kamali, 2001; Caplan, 1994). There are many studies exploring the relationship between psychosocial job factors and depression, anxiety and stress (Plaisier *et al.*, 2007; Niedhammer *et al.*, 2006; Sanne *et al.*, 2005; Pikhart *et al.*, 2004; Wang & Patten, 2001; Kawakami *et al.*, 1996; Karasek, 1979).

Karasek *et al.* (1979) have shown that workers with jobs simultaneously low in job control and high in job demand reported exhaustion, nervousness, anxiety, and insomnia or disturbed sleep. Sanne *et al.* (2005) have also shown that job demand, job control and social support were independently associated with anxiety and depression. Meanwhile, Plaisier *et al.* (2006) reported that job demand predicts the incidence of depressive and anxiety disorders in both men and women workers, but not for decision latitude and interaction between psychological demands and decision latitude.

Despite the fact that various studies have demonstrated the relationship between psychosocial job factors and depression, anxiety and stress (Plaisier *et al.*, 2006; Sanne *et al.*, 2005; Pikhart *et al.*, 2004; Wang & Patten, 2001; Stansfeld *et al.*, 1999), awareness of the importance of QOL is also increasingly being recognized as an important relevant endpoint of outcome measure in diverse health populations including workers in stressful working conditions. Basically, QOL can be defined as an individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives and in relation to his/her goals, expectations,

standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological status, social relationships, and his/her environment (WHOQOL Group, 1995).

There have been increasing studies exploring the relationships between working conditions and worker's QOL (Kudielka *et al.*, 2005; Nasermoaddeli *et al.*, 2003; Stansfeld *et al.*, 1998; Lerner *et al.*, 1994). For example, Nasermoaddeli *et al.*, (2003) have shown that job demand was positively related to physical health, psychological status, and social relationship domains, and negatively related to the physical health domain of QOL. Meanwhile, Kudielka *et al.*, (2005) suggested that high job demand, low job control and lack of social support at work exert a significant impact on self-reported QOL.

Among psychosocial job factors, three dimension of the Job Demand-Control-Support (JDCS) (Karasek, 1979) model of job stress such as psychological job demand, job control and social support are being widely used in the relationships between depression, anxiety, stress and QOL. However, insufficient attention has been given to the other psychosocial job factors such as job insecurity, physical exertion, hazardous condition and toxic exposures. In Malaysia, no study has documented the prevalence of self-perceived depression, anxiety, stress and QOL and their relationship with psychosocial job factors in automotive assembly workers. This is a serious omission because the automotive industry is a key player in the manufacturing sector and high income generating industry in Malaysia.

The increasing awareness of the adverse impact of occupational stress on workers health has fostered a growing interest in stress management interventions in the last two decades (Palmer *et al.* 2001; Van der Klink *et al.* 2001; Ganster & Murphy 2000; Kompier *et al.* 1998; Bunce 1997; Murphy 1996; Wilson *et al.* 1996; Pelletier 1991;

McLeroy *et al.* 1984). As a result of prolonged occupational stress, workers may suffer from various health complaints, such as depressive symptoms, anxiety, physical symptoms and distress, malaise or burnout (Cooper *et al.* 2001).

Several stress intervention programs have been developed over the years to counter the health problems. According to Van der Klink and colleagues (2001), interventions designed to reduce job stress and its health effects can be categorized according to their focus, content, method, and duration. Regarding focus, intervention can be categorized into two basic approaches: a) Individual-focused approach, which aims to increase an individual's psychological resources and responses such as coping; and b) Organization-focused intervention, which aims to improve stressful work environments through organizational development and job redesign. The present study is concerned about the basis of the individual-focused intervention.

There are various techniques in the individual-focused approach such as exercise, stress management training, relaxation training, physical fitness, cognitive-behavioural training, meditation, biofeedback, hypnosis, yoga, interpersonal skills and others. A recent meta-analysis reported that stress management intervention studies that focus on the individual are effective in reducing the worker's stress-related complaints (van der Klink *et al.*, 2001).

Among stress management interventions in individual-oriented approach, exercise and stress management training are among the strategies found significantly reduce the long-term effects of health outcomes (Selkowitz *et al.*, 2006; Blumenthal *et al.*, 2005; Rhenen *et al.*, 2005; Shimazu *et al.*, 2003; van der Klink *et al.*, 2001; Blumenthal *et al.*, 1997; Kagan *et al.*, 1995; Reynolds and Shapiro, 1991). However, no study has tested the effects of a shorter, easy-to-implement stress management

training that could reduce depression, anxiety and stress problems in an occupational setting such as those in the automotive assembly industry.

1.3 Rationale of the Study

Our choice of the automotive assembly industry in Malaysia as the research setting was based not only on practicality but also on empirical findings that suggest this setting to be a very stressful working condition (Oleske *et al.*, 2004; Lottridge, 2004; Kumlin *et al.*, 2001; Hanse & Forsman, 2001; Karasek *et al.*, 1981). There are two rationale of this study:

1. Data on the prevalence of self-perceived depression, anxiety, stress and quality of life (QOL) and their association with psychosocial job factors in automotive assembly workers could be used to plan an intervention program to reduce worker's stress, anxiety, and depression and improve quality of life.
2. The effectiveness of the intervention program could be used to reduce worker's stress, anxiety and depression and improve their quality of life.

1.4 General Objective

To study the assessment and management of risk of occupational stress in male automotive assembly workers in Malaysia

1.5 Specific Objectives

1. To determine the reliability and validity of the Job Content Questionnaire (JCQ)
2. To determine the reliability and validity of the Depression Anxiety Stress Scales 42-item (DASS-42) and the Depression Anxiety Stress Scales 21-item (DASS-21)

3. To determine the prevalence and associated factors of self-perceived depression, anxiety and stress
4. To determine the prevalence and associated factors of self-perceived quality of life
5. To model the relationship between three dimensions of the Job Demand-Control-Support model of occupational stress (job demand, job control and social support), self-perceived depression, anxiety and stress, and self-perception of the quality of life
6. To evaluate the immediate effects of a 4-hour stress management training on self-perceived depression, anxiety and stress in male automotive assembly workers

1.6 Research Hypotheses

1. Poor working conditions (high job demand, low job control and low social support) are not directly associated with lower perceptions of quality of life domains (physical health, psychological status, social relationships and environment)
2. Poor working conditions (high job demand, low job control and low social support) are not associated with higher self-perceived stress, anxiety, and depression
3. Higher self-perceived stress, anxiety and depression levels are not associated with lower perceptions of the QOL domains (physical health, psychological status, social relationships and environment)
4. Self-perceived stress, anxiety and depression do not mediate the relationship between working conditions and the 4 domains of self-perceived QOL (physical health, psychological status, social relationships and environment)

5. There is no significant difference of self-perceived depression, anxiety, stress and their sub-domain responses before and after the Stress Management Training (SMT) between the intervention and control group.

1.7 Operational Definitions

Risk Management

Risk management can be defined as “a range of related activities for coping with risk, including how risks are identified and assessed and how social interventions to deal with risk are monitored and evaluated.” The basic steps in this process are: identifying hazards; evaluating risk; determining appropriate controls; implementing controls; evaluating the effectiveness of the controls (Hood and Jones, 1996).

In this study, risk management can be defined as a range of related activities for the management of the risk of occupational stress. It involves several steps:

- a) Determining the reliability and validity of the instruments measuring stress, risk factors, and other mental outcomes such as depression, anxiety and quality of life.
- b) Determining the prevalence outcomes such as self-perceived stress, depression, anxiety, and self-perceived QOL.
- c) Determining the stress factors from the job conditions.
- d) Managing the risk of stress by conducting the short-term stress management training at the individual level, and
- e) Evaluating the immediate effectiveness of the 4 hours stress management training in reducing the perceived depression, anxiety and stress at workplaces.

Depression

Depression is defined as a lowering of mood from normal (Morrison, 1995). In this study, depression was defined as self-perception of an abnormal emotional state characterized by dysphoria, hopelessness, devaluation of life, self-deprecation, and lack of interest/involvement, anhedonia and inertia according to the depression component of the Depression Anxiety Stress Scales (DASS).

Anxiety

According to Lovibond and Lovibond (1995), anxiety is a state of emotional arousal characterised by both somatic and autonomic response and anticipation of negative events which typically, but not exclusively, are psychological in character. In this study, anxiety is operationally defined as self-perceived autonomic arousal, skeletal musculature effects, situational anxiety, and subjective experience of anxious affect according to the anxiety component of the Depression Anxiety Stress Scales (DASS).

Stress

Selye (1956) defined stress as the non-specific response of the body to any demand made upon it. Stress can be expressed emotionally, cognitively, and behaviourally, and one's responses to stress tend to be typical reaction in similar situations determined by one's personality structure, previous experience, and coping mechanisms (Kagan *et al.*, 1995). In this study, stress is defined as the self-perceived difficulty in relaxing, nervous arousal, easily upset/agitated, irritable/over-reactive and impatience according to the stress component of the Depression Anxiety Stress Scales (DASS) (Lovibond and Lovibond, 1995).

Occupational Stress

Occupational stress is a pattern of reactions that occurs when workers are presented with work demands not matched to their knowledge, skills or abilities and which challenge their ability to cope and there is a perceived imbalance between demands and environmental or personal resources. The reactions may include physiological responses, emotional responses, cognitive responses and behavioural reactions (Houtman *et al.*, 2007). In this study, occupational stress is defined as the combination of increased psychological job demand, decreased job control and low social support according to Karasek's job demand-control-social support model (Karasek, 1979).

Quality of life

In this study, quality of life defined as the individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives and in relation to his/her goals, expectations, standards and concerns. It is a broad ranging concept that is influenced, in a complex way, by the person's physical health, psychological state, social relationships, and the environment (WHOQOL Group, 1998)

Psychosocial Job factors

A psychosocial job factor may be defined as a measurement that potentially relates psychological phenomena to the social environment and pathophysiological changes. Psychosocial job factors (stressors) are aspects of the work environment that are thought to have the potential to affect negatively the well-being of employees. Their negative effects are often referred to as 'strain'. A great many aspects of the work environment have potential to cause strain, such as job demands, the nature of relationships with co-workers, and the amount of control employees have over work processes (Rick *et al.*, 2001). The present study defines psychosocial job factors according to the Job Content Questionnaire such as skill discretion, created skill, decision authority, skill utilization, job insecurity, co-worker support, supervisor support, toxic exposures and hazardous conditions (Karasek, 1979).

Stress Management Training

In the present study, the stress management training defined as multiple strategies of stress intervention training that focused to help male automotive workers coping with stress and building the knowledge and attitude for healthy work. The strategies used in the intervention study included aerobic exercise (60 minutes), reviewing a stress management manual (30 minutes), video session (10 minutes), interactive lecture (60 minutes), question and answer session (30 minutes), and interactive pamphlet and poster presentation (50 minutes). All the sessions conducted continuously.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition of Stress

According to the American Heritage Dictionary (1993), the word *stress* is derived from middle English *stresse* (hardship, distress), from Old French *estresse* (narrowness), from Vulgar Latin *strictia*, from latin *strictus* (tight, narrow), and from the past principle of *stringere* (to draw tight, to tighten). Taber's Cyclopedia Medical Dictionary defines stress as “the result produced when a structure, system or organism is acted upon by forces that disrupt equilibrium or produce strain” (Kenny *et al.*, 2000).

Nowadays, stress has been defined in different ways by academicians and researchers in various fields of studies (psychological, medical, biomedical, management, and social sciences). The term stress may have different meanings for each individual, and even scientists have developed widely varying definitions. Selye (1956) defined stress as the non-specific response of the body to any demand made upon it. It is expressed emotionally, cognitively, and behaviourally, and one's responses to stress tend to be typical reaction in similar situations determined by one's personality structure, previous experience, and coping mechanisms (Kagan *et al.*, 1995). Schuler (1980) defined stress as a dynamic condition, in which an individual is confronted with an opportunity, constraint, or demand on being, having, and or doing what he or she desires. Toates (1995) defined stress as a more chronic state that arises only when defence mechanisms are either being chronically stretched or actually failing.

In the present study, the definition of stress falls within the definition proposed by Lovibond and Lovibond (1995) —that stress is a persistent state of over arousal which reflects continuing difficulty in meeting taxing life demands. In this study, stress is measured according to the difficulty relaxing, nervous arousal, easily

upset/agitated, irritable/over-reactive and impatient according to the stress component of the Depression Anxiety Stress Scale (DASS).

2.2 Historical Background of Stress

The conceptual roots of stress can be traced to the early animal research of Hans Selye (1956) and Walter Cannon's (1929) work on the physiological concomitants of emotion. Cannon (1935) had earlier laid the scientific groundwork for an understanding of how various emotional states affect physiological functions and disease states by describing the "fight or flight" response. This response, evoked by potentially dangerous situations, included elevated heart rate and blood pressure, a redistribution of blood flow to the brain and major muscle groups and away from distal body parts, and decrease in vegetative functions.

Cannon (1935) pioneered the concept of physiological homeostasis and developed the use of an engineering concept of stress and strain in a physiological context. In particular, Cannon (1935) proposed the notion of critical stress levels which were capable of producing strain in the homeostatic mechanisms. Although he used the term somewhat casually, it is clear that Cannon's conception of stress involves physical as well as emotional stimuli (Mason, 1975).

The work of Hans Selye in the 1930s and 1940s marks the beginning of the stress concept after discovering a wide variety of noxious stimuli (which he later referred to as stressors), such as exposure to temperature extremes, physical injury, and physiological changes in his laboratory animals. In each case, the cortex of the adrenal gland became enlarged, the thymus and other lymphatic structures became involuted and deep bleeding ulcers developed in the stomach and intestines. These effects were "non-specific" in that they occurred regardless of the nature of the insult

and were superimposed upon any specific effects associated with the individual agents.

In 1936, Selye introduced the notion of stress-related illness in terms of the general adaptation syndrome (GAS), suggesting that stress is a non-specific response of the body to any demand made upon it (Selye, 1956). Selye mentioned “nervous stimuli” among the “stressor” agents that are capable of eliciting the GAS and had an energizing effect on those working in the field of psychosomatic medicine (Murphy and Schoenborn, 1987).

Although the word *stress* usually has negative connotations, Selye (1976) also emphasized that stress reactions are not automatically bad and that they cannot be avoided because being alive is synonymous with responding to stress. In fact, a certain level of stress is necessary for motivation, growth, development, and change and has been referred to as *eustress*. However, unwanted, unmanageable stressor situations are damaging and can lead to *distress*, or *strain* (Cooper *et al.*, 2001).

Figure 2.1 depicts the relationship between stress and health/performance. As stress increases, so does health/performance (eustress). At the optimal stress level, performance has reached its maximum level. If stress continues to increase into the “distress” region, performance quickly declines. Should stress level remains excessive, health will begin to erode as well (Everly and Lating, 2002).

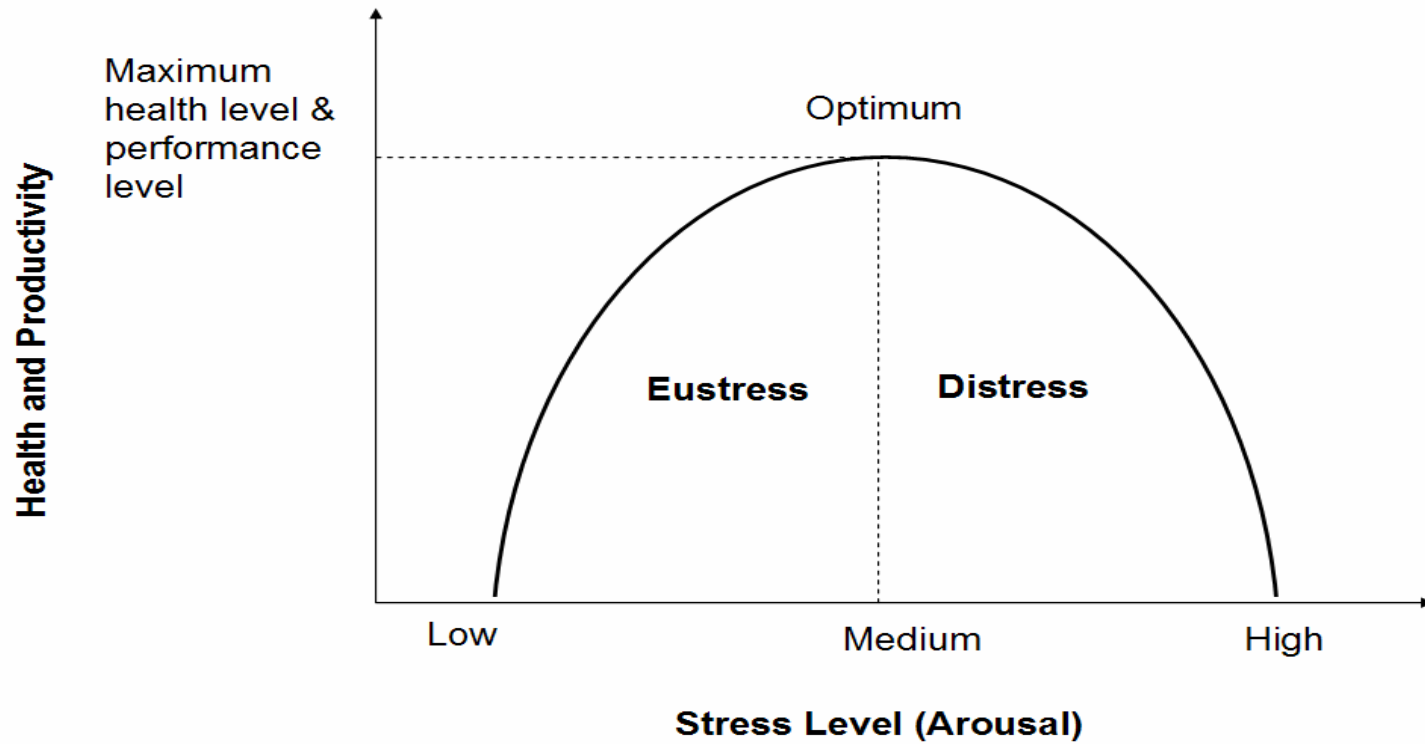


Figure 2.1 Principle of Yerkes-Dodson in relation to Stress and Productivity

2.3 General Adaptation Syndrome (GAS)

According to the Hans Selye (1983), there are three stages of the bodily response during stress as described by the General Adaptation Syndrome (GAS) (Figure 2.2). The alarm reaction is the immediate psycho-physiological response, when the initial “shock” phase of lowered resistance is followed by “counter-shock”. During that time, defence mechanisms are activated, forming the emergency reaction known as the “fight or flight” response (Cannon, 1935). Increased sympathetic activity results in the secretion of catecholamines that prepare the body physiologically for action: for example, heart rate and blood pressure increase, the spleen contracts, and blood supplies are redirected to the brain and skeletal muscles (Cooper *et al.*, 2001).

The second stage is resistance to a continued stressor, in which the adaptation response and/or return to equilibrium replaces the alarm reaction. However, resistance cannot continue indefinitely, and if the alarm reaction is elicited too intensely or too frequently over an extended period, the energy needed for adaptation becomes depleted, and the third stage (exhaustion, collapse, or death) occurs (Selye, 1983).

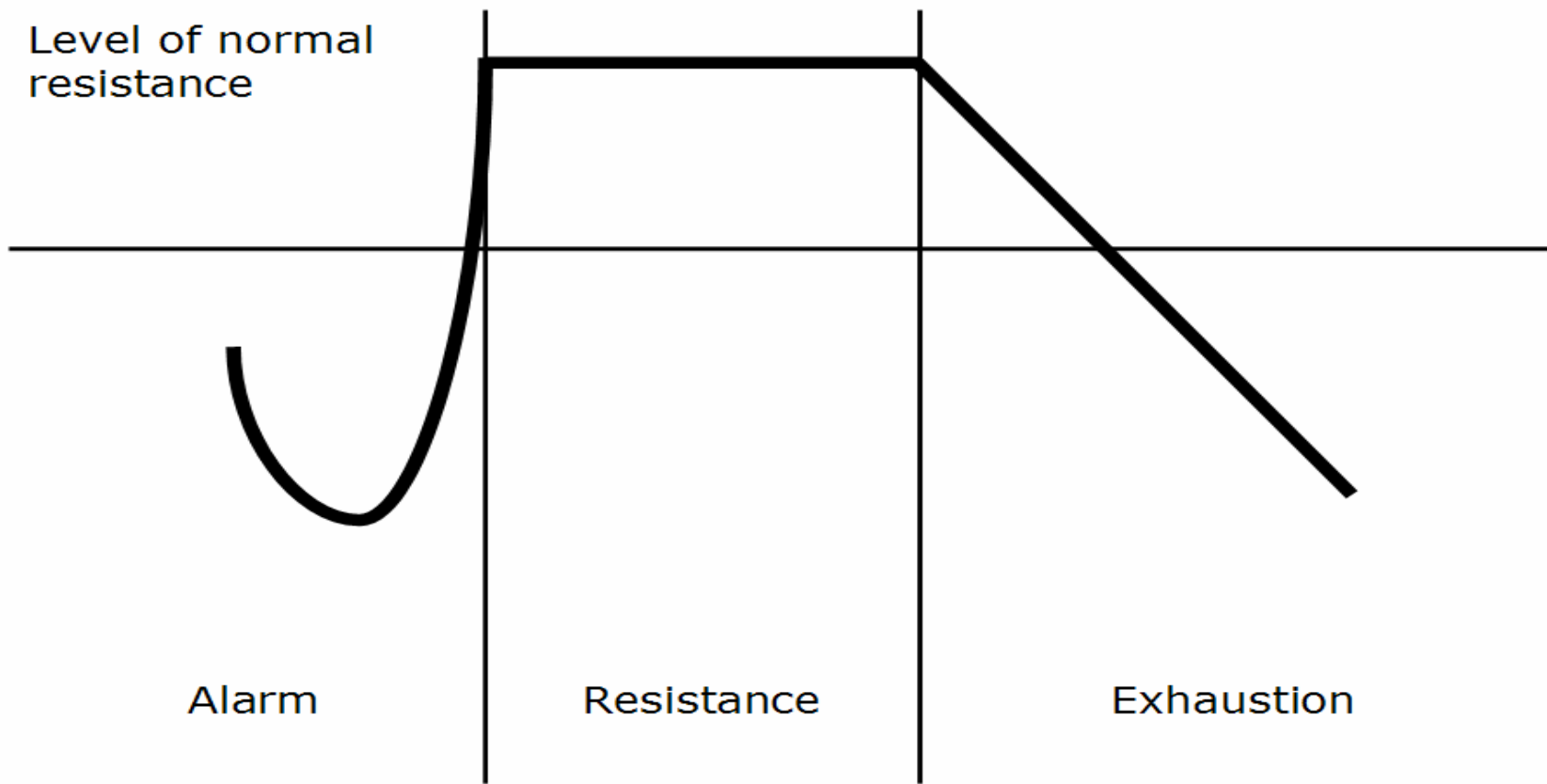


Figure 2.2 General Adaptation Syndrome (Selye, 1956)

2.4 Definition of Occupational Stress

The terms 'occupational stress', 'work stress', 'job stress' and 'work-related stress' are used interchangeably in the literature that refer to stress attributed by job factors. Occupational stress has been described as an incompatibility between the individual and his or her work environment. There are many definitions of occupational stress. Beehr and Newman (1978) define occupational stress as a condition wherein job-related factors interact with the worker to change his or her psychological or physiological condition such that she or he is forced to deviate from normal functioning.

Occupational stress can also be defined as the emotional, mental, and behavioural reaction to vulnerability caused by elements in the job environment that are, in large part, out of the awareness of the worker. The cause of the perceived stress is usually attributed by the person to reasons that are acceptable to the person or to the person's peers (Kagan *et al.*, 1995). Kyriacou and Sutcliffe (1978) defined occupational stress as the experience of unpleasant emotions, such as tension, frustration, anxiety, anger, and depression. However, the definition of occupational stress which seems to be the most widely accepted by academics and researchers is the one proposed by the United State's National Institute of Occupational Safety and Health (1999) that defined occupational stress as 'the harmful physical and emotional responses that occurs when the requirements of the job do not match the capabilities, resources, and needs of the worker' (NIOSH, 1999).

2.5 Occupational Stress Model

Various models were used to explain how occupational stress arises and how it causes or contributes to adverse health effects—Effort-Reward Imbalance Model

(Siegrist, 1996), the Dynamic Equilibrium Theory of Stress (Hart *et al.*, 1995), NIOSH's Model of Job Stress (Hurrell & Murphy, 1992), the Person-Fit Environment Model (French *et al.*, 1992), the General Systems Model of Cox and McKay (1985), Karasek's (1979) Job Demand-Control Model, Cummings and Cooper's (1979) Cybernetic Model and McGrath's (1976) Stress Cycle Model. Despite various models of occupational stress that have been proposed, reviewers have identified a number of specific models that they believe could play important roles in developing the theoretical context for investigating occupational stress (Siegrist, 2004; Vander Doef & Maes, 1999; Caplan, 1998; Siegrist, 1996; Kristensen, 1995; Blau, 1981). These include the Person Environment Fit model, Effort-Reward Imbalance model and the Job Demand-Control/Support (JDCS) model. However, the JDCS model (Johnson & Hall, 1988) has dominated research on occupational stress in the last 20 years compared to the other models (Vander Doef and Maes, 1999; Kristensen, 1995).

2.6 The Job Demand-Control-Support (JDCS) Model

The Job Demand-Control (JDC) model (Karasek, 1979) and its expanded version, the JDCS model (Johnson and Hall, 1988) have dominated research on occupational stress in the last 20 years (Vander Doef and Maes, 1999). Basically, Karasek's JDC model also called job strain model (Figure 2.3) operates in two dimensions: job decision latitude and psychological demands. Job decision latitude (also called job control) comprises two components: a) skill discretion or skill variety that includes level of control over the worker's use of skill or time allocation and b) decision-making authority that includes the worker's authority to make decisions about his/her own job. Whereas, psychological demands (job demand) refers to the

work load, and have been operationalized mainly in terms of time pressure and role conflict (Karasek, 1989; Karasek, 1979).

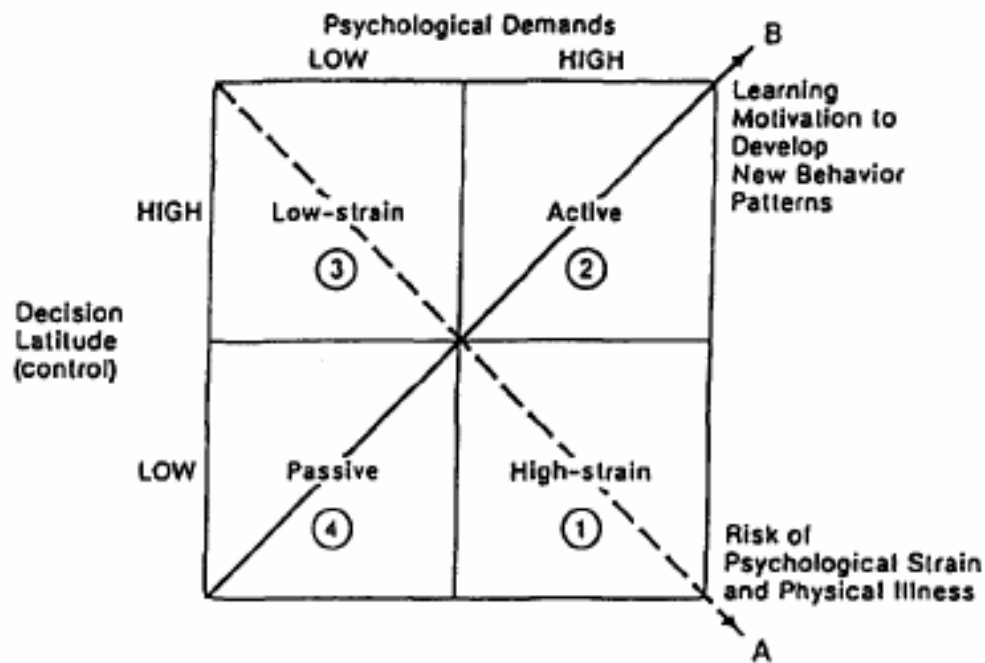


Figure 2.3 The Job Demand-Control Model (Karasek, 1979)

In 1988, the empirical work of Johnson and Hall (1988) in Swedish working population proposed the third component, social support at work, to be included as a third dimension in JDC model (Karasek and Theorell, 1990). Karasek and Theorell (1990) reconceptualized the JDC model to include social support and predict that employee strain should be highest under high work stress combined with low levels of both work control and social support. The extension of this model—the iso-strain model or job demand control support model—predicts that the most hazardous work occurs when high job strain is combined with low levels of supportive social interaction at work (Figure 2.4) (Amick *et al.*, 1998; Theorell and Karasek, 1996).

In the JDC model (Figure 2.3), jobs were classified into four categories of psychosocial job experience: *high-strain* jobs, *active* jobs, *low-strain* jobs and

passive jobs. The highest level of strain would be found in *high-strain* jobs where the demands of the job cannot be moderated by the workers. This might occur, for example, when bureaucratic rules rigidly limit worker responses. A high level of psychological demands combined with a high level of decision latitude would be found in *active jobs* that led to the "desirable stress" outcome of increased motivation and learning opportunity. Lower levels of strain would be found in *low-strain* jobs where demands are low but control is high. Intermediary levels of strain could be expected in *passive jobs* (low demands, low control) (Karasek and Theorell, 1990).

The JDC was originally developed and tested with the national survey data from Sweden and the United States by Robert Karasek (1979). The study was conducted in 1969, 1972, and 1977 in which the U.S. Quality of Employment Surveys in a sample of 3,000 men and 1,500 women using the cross-classification of four groups and reported that the *high strain jobs* include bus drivers, nurse's aides, or assembly line workers. The *low strain jobs* include natural scientists and repairmen. Karasek *et al.*, (1981) highlighted *high strain job* (high job demand and low job control) among machine-paced operative assemblers.