

Contents

	Foreword	<i>XVII</i>
	Preface	<i>XIX</i>
	List of Contributors	<i>XXI</i>
	A Multifaceted View of Stress	<i>1</i>
1	Modern Fatigue: A Historical Perspective	<i>3</i>
	<i>Karin Johannisson</i>	
1.1	Introduction	<i>3</i>
1.2	Overstrain and Modern Society in 1900	<i>4</i>
1.3	The “Fatigue Problem”	<i>5</i>
1.4	Neurasthenia	<i>9</i>
1.5	Between Nervous Fatigue and Chronic Fatigue: Stress	<i>11</i>
1.6	Chronic Fatigue Syndrome	<i>12</i>
1.7	Burnout and Modern Society in 2000	<i>14</i>
1.8	Conclusion	<i>17</i>
	References	<i>19</i>
2	Evolutionary Aspects of Stress	<i>20</i>
	<i>Björn Folkow</i>	
2.1	Introduction	<i>20</i>
2.2	Man’s Situation in a Phylogenetic Perspective	<i>22</i>
2.3	From Intuitive Insight to Experimental Documentation	<i>25</i>
2.4	Organization of Stress-Induced Response Patterns	<i>28</i>
2.4.1	General Aspects	<i>28</i>
2.4.2	The Four Triads of Response	<i>30</i>
2.4.2.1	The Vigilance (Freezing) Reaction (VR)	<i>31</i>
2.4.2.2	The Playing Dead (Inhibitory) Reaction (PR)	<i>33</i>
2.4.2.3	The Defense (Alarm) Reaction (DeR)	<i>34</i>
2.4.2.4	The Defeat Reaction (DfR)	<i>37</i>
2.4.3	DeR and DfR Involvements in Animal Models of Human Society	<i>39</i>
2.5	Implications Concerning Man in Modern Society	<i>40</i>

2.6	Concluding Remarks	42
	References	44
3	Stress – It Is All in the Brain	46
	<i>Hege Randi Eriksen and Holger Ursin</i>	
3.1	Background	46
3.2	Introduction	47
3.3	The Starting Point: Consensus Statements	47
3.4	The Alarm: When and Why Does this Alarm Occur?	48
3.5	CATS: From Words to Formal Logics and Theory	49
3.6	Expectancies: What Do Brains Really Do?	50
3.7	Expectancies: Priorities, Probabilities, and Values	51
3.8	Variance in Stress Responses: Stimulus Expectancy	51
3.9	Variance in the Stress Responses. Coping: Positive Response Outcome Expectancies	52
3.10	Variance in the Stress Responses. Lacking or Negative Response Outcome Expectancies: Helplessness and Hopelessness	53
3.11	The Variance in Coping Concepts	54
3.12	Covert Coping	55
3.13	Outcome Evaluations, Fear, Anxiety and Alarm	56
3.14	Access to the Alarm System	57
3.15	Stress as an Alarm System: Adaptive or Maladaptive?	57
3.16	Allostatic Load – Repeated Strong Arousals – Training or Straining?	59
3.17	Sustained Activation	60
3.18	Stress and Disease: Coping and Health	61
3.19	Sustained Activation, Sustained Attention and Sensitization	62
3.20	Rumination and Sustained Activation	63
3.21	Too Much Coping – Being Too Good: the Dangers of Narcissism	64
3.22	Social Inequality in Health and in Response Outcome Expectancies	65
3.23	Brain Mechanisms	66
3.24	Conclusions	67
	References	68
	Stress at the Societal and Organizational Level	69
4	Collective Traumatic Stress: Crisis and Catastrophes	71
	<i>Lars Weisæth</i>	
4.1	Introduction: The Individual as a Citizen	71
4.2	Society’s Denial of Psychic Trauma and its Consequences to Health	72
4.3	Central Concepts and Models	73
4.3.1	Disasters: Incidents and Types	73
4.3.2	Communication Disasters	75

4.3.3	Confrontational Support	75
4.3.4	Myths	76
4.3.5	Disaster Stressors	77
4.3.6	Time Phase and Geographical Zone Models	78
4.3.7	Individual Versus Collective Trauma	79
4.3.8	Four Types of Danger	82
4.3.9	Shock Trauma	83
4.3.10	Longlasting Danger and Threat	84
4.3.11	Silent Trauma	85
4.3.12	Disaster Behavior	86
4.3.13	Collective Stress: Causal Mechanisms Psychopathology	87
4.3.14	Psychological Epidemics	88
4.3.15	Toxic Disasters	88
	References	90
5	Stress – Why Managers Should Care	91
	<i>Bengt B. Arnetz</i>	
5.1	Introduction	91
5.2	Stress – An Organizational Perspective	91
5.3	Organization – A Biological Entity	93
5.4	Drivers of Constant Needs of Organizational Changes	94
5.5	Organizational Stressors' Impact on the Bottom Line	94
5.6	Optimal Organizational Stress and Slack	95
5.7	Organizational Stress Models – Concepts and Definitions	96
5.8	Organizational Inefficiency and Organizational Stress	99
5.9	Ingredients for Healthy and Productive Work Environments	101
5.10	Work, Stress and Productivity	101
5.11	Organizational Effectiveness and Perceived Stress	102
5.12	Stress Intervention and Implications for Organizational Health and Productivity	104
5.13	QWC – Theory, Model and Applicability	107
5.13.1	Introduction to QWC	107
5.13.2	Theoretical Model	107
5.13.3	QWC Development	108
5.13.4	Application of QWC in Organizational Stress and Productivity Studies	110
5.13.4.1	Organizational and Employee Health Intervention in a Bank	110
5.13.4.2	Organizational and Employee Health During Organizational Changes	111
5.13.4.3	Organizational Health, Biological Markers and Productivity	113
5.14	Multiorganizational Assessments of Organizational and Employee Well-Being	116
5.15	Leadership and Employee Job Satisfaction and Organizational Performance	117

5.16	Implementation of Productive and Healthy Work Practices	119
	References	120
6	The Empowered Organization and Personnel Health	122
	<i>Töres Theorell</i>	
6.1	Introduction	122
6.2	A Historical Perspective	122
6.3	Concepts Related to Work Control	126
6.4	How to Evaluate Decision Latitude?	129
6.5	Questionnaires	130
6.6	Relationship Between Decision Latitude and Health	131
6.7	Decision Latitude and Physiological Reactions	134
6.8	What Can Be Done for the Improvement of Decision Latitude?	136
	References	139
7	Can Health be Subject to Management Control? Suggestions and Experiences	141
	<i>Ulf Johanson and Andreas Backlund</i>	
7.1	Introduction	141
7.2	Health and Profitability	142
7.3	Health in the Balance Sheet	144
7.3.1	Idea	144
7.3.2	Experiences	145
7.3.3	Possible Development	145
7.4	Health in the Profit and Loss Account	145
7.4.1	Idea	145
7.4.2	Experiences	146
7.4.3	Possible Development	147
7.5	HR Costings	147
7.5.1	Idea	147
7.5.2	Experiences	148
7.5.3	Possible Development	149
7.6	Recent Management Control Methods	149
7.6.1	Idea	149
7.6.2	Experiences	152
7.6.3	Possible Development	153
7.7	Health Statements	153
7.7.1	Idea	153
7.7.2	Experiences	154
7.7.3	Possible Development	156
7.8	Health and Management Control in the Swedbank: A Case Study	156
7.9	Conclusion and Dilemmas	159
	References	161

	Stress and Brain Plasticity	163
8	The Neonatal and Pubertal Ontogeny of the Stress Response: Implications for Adult Physiology and Behavior	164
	<i>Russell D. Romeo and Bruce S. McEwen</i>	
8.1	Introduction	164
8.2	Stress, Homeostasis, Allostasis, and Allostatic Load	165
8.3	The Hypothalamic–Pituitary–Adrenal Axis	168
8.4	Neonatal Development of the HPA Axis	169
8.5	Early Life Events and the Shaping of the HPA Axis	170
8.6	Pubertal Development of the HPA Axis	173
8.7	Puberty as a Period of Intervention	175
8.8	Implications for Human Health and Development	176
8.9	Conclusions and Future Directions	177
	References	178
9	Neurobiological and Behavioral Consequences of Exposure to Childhood Traumatic Stress	180
	<i>Martin H. Teicher, Jacqueline A. Samson, Akemi Tomoda, Majed Ashy, and Susan L. Andersen</i>	
9.1	Introduction	180
9.2	Exposure to Stress in Early Life and Stress Response Systems	181
9.3	Gene Expression, Myelination, Neural Morphology, Neurogenesis and Synaptogenesis	181
9.4	Differential Sensitivity to the Effects of Stress in Various Brain Regions	182
9.4.1	Hippocampus	183
9.4.2	Corpus Callosum	184
9.4.3	Cerebral Cortex	185
9.4.4	Cerebellar Vermis	186
9.5	Neuropsychiatric Consequences and Psychopathology	187
9.5.1	Depression	188
9.5.2	Posttraumatic Stress Disorder	188
9.5.3	Attention-Deficit/Hyperactivity Disorder	190
9.5.4	Borderline Personality Disorder	190
9.5.5	Dissociative Identity Disorder	191
9.5.6	Substance Abuse	191
9.6	Perspectives	192
	Acknowledgements	193
	References	194
10	The Brain in Stress – Influence of Environment and Lifestyle on Stress-Related Disorders	196
	<i>Rolf Ekman and Bengt B. Arnetz</i>	
10.1	Background	196

x | Contents

10.2	Introduction	197
10.2.1	The Dynamic Brain	198
10.2.2	The Hypothalamic–Pituitary–Adrenal Axis	198
10.2.3	Cytokines and Neuroendocrine–Immune Interactions	200
10.2.4	Psychoneuroimmunology	201
10.2.5	Is the Stress Response Comparable to an Inflammatory Reaction?	203
10.3	Relationship Between Chronic Stress and Stress-Related Disorders	204
10.4	The HPA Axis Out of Balance – a Link to Depression?	206
10.4.1	Cytokines and Depression	207
10.4.2	Neuronal Atrophy and Loss in Response to Stress	208
10.5	Stress-Related Mental Disorders and Neurodegenerative Diseases	209
10.6	Unhealthy Environments; a Link to PTSD?	210
10.7	Conclusions and Future Prospects	211
	References	212
11	The Healthy Cortisol Response	214
	<i>Tommy Olsson and Robert Sapolsky</i>	
11.1	Introduction	214
11.2	The Hippocampus as a GC Target	215
11.3	Glucocorticoids, Stress and Synaptic Plasticity in the Hippocampus	216
11.4	Glucocorticoids, Stress and Hippocampal-Dependent Cognition	217
11.5	Glucocorticoids, Stress and Neurogenesis	218
11.6	Glucocorticoids, Stress and Atrophy of Dendritic Processes	218
11.7	Glucocorticoids, Stress and Neurotoxicity	219
11.8	Glucocorticoids, Stress and the Endangerment of Hippocampal Neurons	219
11.8.1	Disruption of Neuronal Energetics	220
11.8.2	Endangering GC Actions that are Independent of Energetic Effects	221
11.8.3	Disruption of Cellular Defenses	221
11.8.4	Glucocorticoid Endangerment and Apoptosis	221
11.8.5	Glucocorticoid Endangerment and Inflammation	222
11.9	Clinical Implications	222
11.10	Main Points	224
11.11	Future	224
	References	225
12	Antistress, Well-Being, Empathy and Social Support	226
	<i>Kerstin Uvnäs Moberg and Maria Petersson</i>	
12.1	Introduction	226
12.2	Brief Overview of the Fight–Flight or Stress and Defense Mechanisms	227
12.3	Deduction of Physiology of the Antistress Pattern from the Physiology of Breastfeeding	228
12.4	The Chemistry of Oxytocin	229
12.5	Effects of Oxytocin	230

12.5.1	Behavior and Social Interaction	230
12.5.2	Physiological Effects	231
12.5.3	Long-Term Effects in Response to Repeatedly Given Oxytocin	232
12.5.4	Mechanisms Involved in the Long-Term Effects of Oxytocin	232
12.6	Release of Oxytocin in Response to Touch	235
12.6.1	Sensory Nerves	235
12.6.2	Mother and Child Interaction	236
12.6.3	The Same System is Activated in Connection with Sexual Activity	238
12.6.4	Oxytocin Is Not Only Released by Stimulation of Sensory Nerves	238
12.6.5	Conditioned Oxytocin Release	239
12.6.6	Activation of Oxytocin Release via Psychological Mechanisms	239
12.7	Health and Social Interaction	240
12.7.1	How Does Closeness and Support Improve Health?	240
12.7.2	Social Relationships	240
12.7.3	Lifestyle Without Closeness	241
12.7.4	Touch Therapies	241
	References	242
13	Stress, Sleep and Restitution	243
	<i>Torbjörn Åkerstedt</i>	
13.1	Introduction	243
13.2	The Physiological Description of Sleep	243
13.3	The Effects of Stress on Sleep	245
13.3.1	Human Studies	245
13.3.2	Animal Studies on Stress	246
13.4	Physiological Processes During Sleep	247
13.5	Sleep and Stress Markers	248
13.6	Sleep Loss	248
13.7	Sleep Loss and Disease	249
13.8	Sleep Regulation	249
13.9	Final Comment	250
	References	250
	Stress and the Individual	251
14	Brain Mechanisms In Stress and Negative Affect	253
	<i>Mats Fredrikson and Tomas Furmark</i>	
14.1	Introduction	253
14.2	Brain-Imaging Techniques and Paradigms	253
14.3	Theories of Emotion and Neuroimaging Applications	255
14.4	Dismantling Fear from Disgust: a Theory Test	256
14.5	Emotional Activation versus Emotional Control: Activating, Controlling and Modulating Brain Circuits	256
14.6	Imaging Stress	257
14.6.1	Studies of Anxiety Disorders	257

14.6.2	Disentangling Studies	257
14.6.3	Function and Structure in Brain-Imaging	258
14.7	Relieving Stress: Treatment Studies	259
14.8	Genetic Influences on Stress and Brain Activity	261
14.9	Psychosomatic Stress and Emotional Brain Circuits	262
	References	263
15	Is It Dangerous To Be Afraid?	266
	<i>Markus Heilig</i>	
15.1	Introduction	266
15.2	Animal Models of Fear's Behavioral Component	267
15.3	Do You Run Because You Are Scared or Are You Scared Because You Run?	268
15.4	A Sketch of the Organization of Fear	269
15.5	The Price of Being Conscious	271
15.6	Mediators of Emotions	272
15.7	To Stop in Time	274
15.8	A Sea Horse that Bolts	275
15.9	Can a Vicious Circle Be Broken?	277
	References	278
16	Fatigue and Recovery	280
	<i>Bengt B. Arnetz and Rolf Ekman</i>	
16.1	Introduction	280
16.2	Fatigue – a Distinct Entity or Part of a Syndrome?	280
16.3	Fatigue-Dominating Syndromes	281
16.4	Fatigue Among the General Population	282
16.5	Fatigue, Chronic Fatigue and Chronic Semantic Confusion	282
16.6	Assessing Fatigue	283
16.7	Stress-Related Fatigue	284
16.8	Fatigue Scale Versus Other Scales Assessing Fatigue-Related Conditions	287
16.9	Fatigue Development Over Time – Risk Factors and Protective Factors	287
	References	290
17	The Role of Stress in the Etiology of Medically Unexplained Syndromes	292
	<i>James Rubin and Simon Wessely</i>	
17.1	Medically Unexplained Syndromes	292
17.2	Evidence for an Association with Psychosocial Stress	294
17.2.1	Life Events as Risk Factors for Illness Onset	294
17.2.2	Occupational Stress and “Technostress” as Risk Factors for Illness Onset	296
17.2.3	Stress as an Exacerbating Factor in Medically Unexplained Illnesses	297

17.3	Possible Mechanisms	298
17.3.1	Negative Mood as a Mediating Variable	298
17.3.2	Symptom Amplification	298
17.3.3	Classical Conditioning	299
17.3.4	Chronic Neuroendocrine Dysfunction	300
17.3.5	Cardiovascular and Neuroendocrine Responses to Acute Stressors	301
17.4	Implications for Diagnosis	302
17.5	Implications for Treatment	302
	References	305
18	Oxidative Inflammatory Stress in Obesity and Diabetes	307
	<i>Paresh Dandona, Ahmad Aljada, Ajay Chaudhuri, and Husam Ghanim</i>	
18.1	Introduction	307
18.2	Oxidative Stress	307
18.3	Inflammatory Stress	309
18.4	Oxidative Stress in Obesity and Diabetes	309
18.5	Antioxidant and Antiinflammatory Effect of Insulin	312
18.6	Mental Stress and Inflammation	313
18.7	Atherogenesis and Insulin	314
18.8	The New Paradigm	314
18.9	Future Horizons	314
	References	315
19	The Metabolic Syndrome	317
	<i>Christian Berne and Per Björntorp[†]</i>	
19.1	Introduction	317
19.2	History	317
19.3	Metabolic Syndrome	318
19.3.1	Definition	318
19.3.2	Prevalence and Causes	319
19.3.3	Insulin Resistance	320
19.3.4	The Role of Abdominal Obesity	320
19.3.5	Adipose Tissue as an Endocrine Organ and Site of Synthesis for Inflammatory Markers	320
19.4	Hormones in Metabolic Syndrome	321
19.4.1	Cortisol	321
19.4.2	Sex Hormones and Growth Hormone	322
19.4.3	Measuring Cortisol	324
19.4.4	Circadian Variation in Cortisol Secretion	325
19.5	Hypertension	325
19.6	Stress Axes	327
19.6.1	Genetic Factors	328
19.7	Other Conditions	329
19.7.1	Depression	329
19.7.2	The “Small Baby Syndrome”	329

19.7.3	Stress and Obesity	330
19.8	Prevention and Therapy	330
19.9	Summary	331
	References	332
20	Chronic Pain: the Diathesis–Stress Model	333
	<i>Yuan Bo Peng, Perry N. Fuchs, and Robert J. Gatchel</i>	
20.1	Introduction	333
20.2	A Conceptual Model of the Transition from Acute to Chronic Pain and Emotional Distress	333
20.2.1	Data Supporting the Conceptual Model	335
20.2.2	Base Rates of Psychopathology	336
20.3	The Diathesis–Stress Model	337
20.3.1	Melzack’s Neuromatrix Theory of Pain and Emotional Distress	339
20.4	Summary and Conclusions	340
	Acknowledgements	340
	References	340
21	Emotional Stress, Positive Emotions, and Psychophysiological Coherence	342
	<i>Rollin McCraty and Dana Tomasino</i>	
21.1	Introduction	342
21.2	The Emotional Basis of Stress	344
21.3	Breaking the Stress Cycle: The Power of Positive Emotions	345
21.4	Positive Emotion-Focused Tools and Techniques	347
21.4.1	Freeze-Frame: A Positive Emotion Refocusing Technique	348
21.4.1.1	The Steps of Freeze-Frame	348
21.4.2	Heart Lock-In: An Emotional Restructuring Technique	350
21.4.2.1	The Steps of Heart Lock-In	350
21.5	The Scientific Basis of the HeartMath Techniques	351
21.5.1	The Generation of Emotions: A Pattern-Matching Process	351
21.5.2	More Than a Pump: The Heart’s Key Role	353
21.5.3	The Physiology of Positive Emotions	355
21.5.4	Psychophysiological Coherence	356
21.6	Revisiting the HeartMath Techniques: A Repatterning Process	359
21.7	Heart Rhythm Coherence Feedback Training: Facilitating Coherence	361
21.8	Conclusions and Implications	362
	Acknowledgements	364
	Note	364
	References	364
22	Stress Systems in Aging – Cognitions and Dementia	366
	<i>Nicole C. Schommer and Isabella Heuser</i>	
22.1	Introduction and Overview	366

22.2	Endocrine Systems in the Healthy Elderly	367
22.2.1	Basal Activity of the HPA System	367
22.2.2	Stimulated Reactivity of the HPA System	367
22.2.3	DHEA, Estrogen, and Testosterone	373
22.2.3.1	Dehydroepiandrosterone	373
22.2.3.2	Estrogen	374
22.2.3.3	Testosterone	375
22.3	Cognitive Function in the Healthy Elderly and Impact of Endocrine Stress Reactivity	376
22.4	Stress Systems and Dementia	379
22.5	Summary and Conclusion	382
	References	382
23	Stress and Addiction	384
	<i>Bo Söderpalm and Anna Söderpalm</i>	
23.1	Introduction	384
23.2	Stress, Alcohol and Nicotine	384
23.3	What Are the Biological Underpinnings?	385
23.3.1	Animal Experimental Models	387
23.3.2	Stress and Self-Administration of Dependence-Producing Drugs in Experimental Animals	387
23.3.2.1	Drugs of Abuse and the Hypothalamic–Pituitary–Adrenocortical Axis	390
23.3.3	Neurobiological Correlates to Stress-Induced Drug Intake	390
23.3.3.1	The Mesocorticolimbic Dopamine System	390
23.3.3.2	Sensitization	390
23.3.4	Stress, Sensitization and the Mesocorticolimbic Dopamine System	394
23.4	Stress and Inhibitory Control	394
23.5	Stress-Sensitivity and Risk for Excessive Drug Self-Administration	396
23.6	Human Studies	396
23.6.1	Stress and Gender	398
23.6.2	Sensitization in Humans?	398
23.7	Summary	399
	References	400
	Index	402

