

CONTENTS

Preface xi • Acknowledgments xv

Introduction xvii

PART I INTRODUCTION TO PHYSICAL ACTIVITY EPIDEMIOLOGY 1

1	Origins of Physical Activity Epidemiology	3
	Ancient History of Physical Activity and Health	4
	Modern History of Physical Activity and Health	6
	Physical Activity for Health Promotion in the United States and the World	10
	Summary	12
	Bibliography	14
2	Concepts and Methods in Physical Activity Epidemiology	17
	Epidemiologic Measures	18
	Crude, Specific, and Standardized Rates	19
	Research Design in Epidemiologic Studies	20
	Evaluating Associations in Epidemiologic Studies	25
	Models in Physical Activity Epidemiology	31
	Inferring Cause in Epidemiologic Studies	33
	Criteria for Causation	36
	Summary	38
	Bibliography	39
3	Measurement and Surveillance of Physical Activity and Fitness	41
	Why Is Behavioral Epidemiology Important?	42
	What Is Physical Activity?	42
	Measures of Physical Activity	45
	What Is Sedentary Behavior?	55
	What Is Physical Fitness?	56
	Surveys and Surveillance of Physical Activity	62
	Summary	72
	Bibliography	73

PART II PHYSICAL ACTIVITY AND DISEASE MORTALITY

79

4	All-Cause Mortality	81
	Life Expectancy at Birth	81
	Major Causes of Mortality	81
	Physical Activity and All-Cause Mortality	84
	Leisure-Time Physical Activity and All-Cause Mortality: Exemplar Cohort Studies	85
	Resistance (Strengthening) Exercise and All-Cause Mortality	88
	Device-Measured Physical Activity	88
	Sedentary Behavior and All-Cause Mortality	89
	Physical Fitness and All-Cause Mortality	91
	Changes in Physical Activity or Fitness and All-Cause Mortality	93
	Are the Associations Real?	95
	Strength of the Evidence	96
	How Much Physical Activity Is Needed to Decrease Risk of Premature Mortality?	97
	Summary	98
	Bibliography	99
5	Coronary Heart Disease	103
	History and Magnitude of the Problem	103
	Coronary Heart Disease Risk Factors	104
	Coronary Heart Disease Etiology	104
	Physical Activity and Coronary Heart Disease	108
	Sedentary Behavior and Coronary Heart Disease Risk	114
	Physical Fitness and Coronary Heart Disease Risk	115
	Individuals With Other Risk Factors or Existing Coronary Heart Disease	116
	Physical Inactivity Compared With Other Risk Factors	117
	Are the Associations Real?	117
	Strength of the Evidence	118
	How Much Physical Activity Is Needed to Decrease Coronary Heart Disease Risk?	122
	Summary	124
	Bibliography	125
6	Cerebrovascular Disease and Stroke	131
	Magnitude of the Problem	132
	Risk Factors for Stroke	134
	Etiology of Stroke	136
	Treatment of Ischemic Stroke	136
	Physical Activity and Stroke Risk: The Evidence	138
	Strength of the Evidence	146
	Summary	147
	Bibliography	147

PART III PHYSICAL ACTIVITY AND RISK FACTORS**153**

7	Physical Activity and Hypertension	155
	Magnitude of the Problem	156
	Treating Hypertension	158
	Hypertension Etiology	160
	Autonomic Nervous System	161
	Physical Activity and Reduced Hypertension Risk: The Evidence	161
	Physical Activity and Treatment of Hypertension: The Evidence	166
	Strength of the Evidence	167
	Summary	172
	Bibliography	172
8	Physical Activity and Dyslipidemia	177
	Magnitude of the Problem	179
	Drug Treatment	184
	Dyslipidemia Etiology and Physical Activity	190
	Physical Activity and Lipoprotein Levels: The Evidence	192
	Strength of the Evidence	203
	Summary	204
	Bibliography	205
9	Physical Activity and Obesity	213
	Magnitude of the Problem	216
	Treatment of Overweight and Obesity	218
	Assessing and Defining Overweight and Obesity	219
	Etiology of Overweight and Obesity: Set Point or Settling Point?	223
	Physical Activity and Fitness and the Health Risks of Obesity: The Evidence	225
	Physical Activity and Prevention of Excess Weight Gain: The Evidence	230
	Physical Activity and Weight Loss: The Evidence	235
	Physical Activity and Weight Maintenance: The Evidence	243
	Strength of the Evidence	245
	The Ultimate Goal: Weight Loss or Risk Reduction?	248
	Summary	248
	Bibliography	249

PART IV PHYSICAL ACTIVITY AND CHRONIC DISEASES 259

10 Physical Activity and Diabetes 261

Magnitude of the Problem	262
Demographics of Diabetes	263
Clinical Features	264
Health Burden of Diabetes	266
Risk Factors	267
Insulin and Glucose Transport	267
Etiology of Type 2 Diabetes	269
Effects of Physical Activity on Diabetes Risk: The Evidence	274
Strength of the Evidence	284
Summary	288
Bibliography	288

11 Physical Activity and Osteoporosis 297

Magnitude of the Problem	298
Fractures and Mortality	300
Etiology of Osteopenia and Osteoporosis	301
Bone Measurement Techniques	306
Risk Factors and Prevention	307
Pharmacotherapy for Osteoporosis	310
Physical Activity and Osteoporosis: The Evidence	311
Strength of the Evidence	319
Summary	323
Bibliography	324

PART V PHYSICAL ACTIVITY, CANCER, AND IMMUNITY 333

12 Physical Activity and Cancer 335

Magnitude of the Problem	336
Etiology of Cancer	337
Risk Factors	340
The Evidence for Physical Activity: Specificity of Protection?	341
Colon and Rectal Cancer	346
Breast Cancer	352
Lung Cancer	364
Endometrial Cancer	369
Physical Activity and Cancer Survivors	372
Summary	373
Bibliography	374

13	Physical Activity and the Immune System	381
	An Abridged History of Immunology	383
	HIV and AIDS	383
	The Immune System	385
	Immunomodulation by the Nervous and Endocrine Systems	396
	Immunotherapy in Cancer	398
	Physical Activity and Immunity: The Evidence	399
	Mechanisms of Alterations in Monocytes, Granulocytes, and Natural Killer Cells	
	After Acute Exercise	410
	Exercise and Cytokines	410
	Summary	413
	Bibliography	414

PART VI	PHYSICAL ACTIVITY AND SPECIAL CONCERNS	421
----------------	---	------------

14	Physical Activity and Mental Health	423
	Depression	428
	Anxiety Disorders	456
	Cognitive Function and Dementia	468
	Summary	476
	Bibliography	477

15	Physical Activity and Special Populations.	493
	Physical Activity Among Diverse Racial–Ethnic Populations	494
	Physical Activity and Disability	501
	Inactivity and Aging	508
	Physical Activity and Long-Term Health Among People With Disabilities	509
	Role of Physical Activity in the Promotion of Health	512
	Summary	514
	Bibliography	515

16	Adverse Events and Hazards of Physical Activity	525
	Magnitude of the Problem	526
	Evaluating Risk	533
	Methods of Research	543
	Myocardial Infarction and Sudden Death	545
	Joint and Muscle Injury	547
	Injury Features	550
	Risk of Physical Activity Injuries: The Evidence	550
	Other Medical Hazards	551
	Psychological Hazards	552
	Summary	555
	Bibliography	555

17 Adopting and Maintaining a Physically Active Lifestyle 563

Individual Barriers to Physical Activity	567
How Do People Decide to Be Active?	570
Environmental Barriers to Physical Activity.....	574
Genetics of Physical Activity	582
Environmental Intervention and Self-Regulation	584
Effectiveness of Physical Activity Interventions	588
Types of Interventions to Increase Physical Activity	590
Mediators and Moderators of Physical Activity Change and Interventions	602
Features of Physical Activity That Promote Adoption and Maintenance	605
Summary.....	608
Bibliography.....	609

Glossary 621 • Index 631 • About the Authors 645