Advances in Studies of Aging and Health 3
Series Editors: Danan Gu · Qiushi Feng

Li Zhang

Living Longer and Healthier at Older Ages

A Longitudinal Analysis of Chinese Oldest Old's Health and Its Determinants

Springer

Advances in Studies of Aging and Health

Volume 3

Series Editors
Danan Gu, Population Division, Headquarters of United Nations Population Division, New York, NY, USA
Qiushi Feng, Sociology, AS1 04-30, National University of Singapore Sociology, AS1 04-30, Singapore, Singapore

This book series is a theme-driven compilation, publishing the latest international research findings by key topics upon roles of social, behavioral, psychological, and contextual factors in associating or determining health and wellbeing of older people, with biomedical components taken into consideration. It applies an internationally comparative perspective and a biopsychosocial framework to understand healthy, active, productive, and successful aging, in order to build up a comprehensive and practical source of knowledge for researchers and practitioners in the field of aging and health.

This book series publishes original studies and tracks new research progresses by the major topics in the field of aging and health; systematically reviews recent research advancements of new concepts, frameworks, and methodology; and frameworks; explores the aging issues through an interdisciplinary perspective, and provides fresh empirical findings and theoretical insights in an internationally comparative manner. The goal is to effectively disseminate new policies and intervention practices on aging, in order for the improvement of quality of life of older persons.

The major themes of this book series include but are not limited to disability, cognitive function, chronic diseases and conditions, happiness and psychological wellbeing, self-rated health, frailty, mortality, living arrangements and intergenerational transfers, retirement and pension reforms, financial health and poverty, elderly abuse and human rights, ageism, long-term care, end-of-life care, aging in place, environmental health, age-friendly cities/communities, social participation, centenarian studies, big data in aging research, resilience and vulnerability, health life expectancies, active aging, successful aging, and healthy longevity.

Li Zhang

Living Longer and Healthier at Older Ages

A Longitudinal Analysis of Chinese Oldest Old's Health and Its Determinants

Springer

Li Zhang
School of Sociology
China University of Political Science and Law
Beijing, China

ISSN 2522-5146 ISSN 2522-5154 (electronic)
Advances in Studies of Aging and Health
ISBN 978-3-031-69772-2 ISBN 978-3-031-69773-9 (eBook)
https://doi.org/10.1007/978-3-031-69773-9

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2024

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

If disposing of this product, please recycle the paper.

To my grandmother, parents, and children,
Guilian Liu, Jianguo Zhang, Yanqing Shi
Xiying Lu (Candice) and Xiyuan Lu (Emily)

Preface

Fertility decline has caused rapid population aging worldwide. With no exception, the Chinese population is also aging quickly. According to the seventh Chinese census conducted in November 2020, population aged 0–14 (253 million) and 15–59 (894 million) were about 18.0% and 63.4% of the total population, respectively. There were 264 million people who were 60 and over, which is about 18.7% of the total Chinese population. Among them, 190 million were 65 and over, which is about 13.5% of the total population. As compared to the sixth census conducted in 2010, population aged 0–14, 60 and over, and 65 and over increased by 1.4%, 5.4%, and 4.6%, respectively. Whereas the working age population aged 15–59 decreased by 6.8%. With such a trend, China will eventually face a shortage of working age population and a great deal of challenges due to population aging, including old age support, pension policy reform, family care, medical costs, and others.

One of the effective ways to alleviate challenges caused by population aging is to promote healthy aging in older ages. Under such a proceeding, demographers and sociologists are urged to elucidate factors that may influence population health in older ages and prolong human life span. This book tries to use the newly developed age-period-cohort (APC) approach to explore how a variety of demographic, socioeconomic, and behaviral factors have impacted Chinese oldest old's physical and mental health. It also aims to detect how period and birth cohort have played a role in shaping the oldest old's health outcomes. The manuscript has demonstrated, when a variety of social factors are controlled, how oldest old's health status has changed over time and across birth cohorts. The manuscript makes contributions to the fields of demography, sociology, geriatrics, and so forth.

Looking at the monographs that have been published during the past 15 or so years, most books studying Chinese population aging are policy oriented. This can perhaps be explained by an extremely powerful status of the Chinese government. Among those, a few books published by Springer Publisher have dealt with aging in China in particular. These books are such as *Healthy Longevity in China-Demographic, Socioeconomic, and Psychological Dimensions* edited by Zeng Yi, Dudley L. Poston Jr., Denese Ashbaugh Vlosky, and Danan Gu, Springer Publisher, 2008; *Aging in China: Implications to Social Policy of a Changing Economic State* edited by Sheying Chen & Jason L. Powell, Springer Publisher, 2012; *The Development of Security and Whole Care System for the Aged in China*, edited by

Yanzhong Wang, Springer Publisher, 2018. The book edited by Zeng Yi and associates examined aging issues and health longevity in China from demographic, socioeconomic and psychological dimensions. The book answered questions critical to the aging population worldwide. That is, is the period of disability compressing or expanding with increasing life expectancy and what factors are associated with these trends in the recent decades? Is it possible to realize morbidity compression with a prolongation of the life span in the future? This book is obviously a very important piece that enhances our understanding of several longitudinal survey datasets, including the Chinese Longitudinal Healthy Longevity Survey (CLHLS), as well as healthy longevity in China. The book edited by Sheying Chen discussed topics of bio-medicalization, aging policies, housing, community care, institutional elder care, family care, pensions, and mental health in China. The majority of the chapters addressed how social policies and economic reforms have impacted old age care in China. The book edited by Yanzhong Wang devoted more attention to the development of a pension security and comprehensive care system for elders in China. The book provided a large number of comparative analyses of security systems for the aged in China and in more developed Western countries. In addition, the book analyzed the reforms of Chinese pension security system over the past years. Similar to the book edited by Sheying Chen and colleagues, this book is also largely policy oriented.

This current manuscript differentiates it from the above books in the following aspects: First, in contrast to other existing books which are largely policy oriented, this study focuses on studying Chinese oldest old's health and its determinants at the individual level. It is one of the few books that examine Chinese oldest old's health-related factors. Second, the study goes beyond analyses of cross-sectional datasets to a longitudinal scope when exploring the multivariate relationships between health and a number of factors. The study examines how a variety of covariates have affected Chinese oldest old's health status. More importantly, the research reveals the compound effects of age, period and cohort in the associations between the oldest old's health and diverse demographic, socioeconomic, behavioral, and lifestyle covariates.

The book commences with a review of the existing literature on older adults' health determinants. The study then introduces the age-period-cohort approach and the strengths of using this method to study older adults' health. The book introduces several important surveys that contain longitudinal information of Chinese older adults' health, including the Chinese Longitudinal Healthy Longevity Survey (CLHLS), the one that is used to conduct the analyses in this monograph. The following chapters conduct empirical analyses and present regression results, which show how a variety of demographic, socioeconomic, social, behavioral, and lifestyle factors influence Chinese oldest old's physical and mental status. In addition, the research elucidates how period and birth cohort effects play a role in the associations between Chinese oldest old's health and its determinants. The book offers important implications in terms of how to improve older adults' health status and help them to live longer and healthier at older ages.

Since this book studies aging issues and has important policy implications, the book will be of interest to a range of readers. Scholars of gerontology and geriatrics may find this research cutting edge because this is one of the few frontier studies that systematically examine Chinese oldest old's health from a longitudinal scope. This book can also be used as a textbook in graduate and upper-division undergraduate sociology and demography core courses. Beyond the classroom, the book would also be of significant interest to a general audience, including policy makers who are interested in the topics of old age care, healthy aging, and population policy making.

Beijing, China
April 25, 2024

Li Zhang

Acknowledgments

This book represents several years of my research on health and gerontology at China University of Political Science and Law (CUPL). A number of people have offered their insights, assistance, and support while I worked on this manuscript. Special thanks are owed first to my students Rongxing Gu, Gen Zhang, Simiao Wang, Wanni Yang, Pei Wang, and Xingrui Gao. Rongxing helped me on the methodology and data analyses. Gen Zhang assisted me with literature review. The other four students assisted me with literature search. The book would not have been possible without their help. My heartfelt thanks also go to my family, especially my grandmother, parents, and daughters, for their understanding of my absence and providing support and love throughout my time working on this manuscript. This book is as much theirs as it is mine. Special thanks also go to Drs. Danan Gu and Qiushi Feng, the two editors of the book series *Advances in Studies of Aging and Health*, who provided extremely helpful suggestions to improve the manuscript. Lastly, I want to express my deepest appreciation to Evelien Bakker, Manonmani Pradeepkumar, Arun Santhosh Kannanand, and other editors and personnel of Springer, who have been understanding all the time and helped me along the way and have been a great pleasure to work with.

Contents

Part I Introduction

1 Introduction and Overview 3
1.1 Aging and Health Related Issues Worldwide. 4
1.2 Aging and Health Issues in China 5
1.3 Existing Studies of Older Adults' Health. 6
1.4 Prior Research on the Oldest Old. 9
1.5 Objectives and Structure of the Book 11
References. 12

2 Review of Literature 19
2.1 Studies of Older Adults' Health from Multiple Disciplines 19
2.2 Demographic and Social Determinants of Older Adults' Health 20
2.3 Studies of Older Adults' Health from a Longitudinal Scope. 25
2.4 Research on the Oldest Old's Health 27
2.5 Summary and an Evaluation of Prior Literature 29
References. 29

3 Data and Methods 39
3.1 Data 39
3.1.1 The Chinese Longitudinal Healthy Longevity Survey (CLHLS) 40
3.1.2 The China Family Panel Studies (CFPS). 41
3.1.3 The Chinese General Social Survey (CGSS). 41
3.1.4 The China Health and Retirement Longitudinal Study (CHARLS). 42
3.1.5 The China Longitudinal Aging Social Survey (CLASS). . . . 43
3.1.6 The China Health and Nutrition Survey (CHNS) 44
3.2 Statistical Methods. 45
3.2.1 Descriptive Analysis 45
3.2.2 Regression Methods. 46
3.3 Summary 49
References. 50

Part II Chinese Oldest Old's Health Status and Its Determinants

4 Changing Patterns of the Oldest Old's Health by Period and across Birth Cohort 55
4.1 Data, Health Measures and Methods 55
4.1.1 Data 55
4.1.2 Health Measures 56
4.1.3 Methods 57
4.2 Descriptive Results 58
4.2.1 Basic Statistics of Variables 58
4.2.2 Period and Cohort Variations in Health Outcomes 60
4.3 Regression Results Based on APC Analyses 65
4.4 Conclusion and Discussion 73
References 74

5 Demographic Characteristics and the Oldest Old's Health 75
5.1 The Association Between Demographic Characteristics and Older Adults' Health 75
5.2 Data, Measures and Methods 77
5.2.1 Data 77
5.2.2 Measures 77
5.2.3 Methods 78
5.3 Results 79
5.3.1 Descriptive Statistics 79
5.3.2 Regression Results Based on APC Analyses 82
5.4 Conclusion and Discussion 102
References 103

6 Socioeconomic Status and the Oldest Old's Health 107
6.1 Previous Literature on Socioeconomic Characteristics and Older Adults' Health 107
6.2 Data, Measures and Methods 108
6.2.1 Data 108
6.2.2 Measures 109
6.2.3 Methods 110
6.3 Results 111
6.3.1 Descriptive Statistics 111
6.3.2 Regression Results Based on APC Analyses 114
6.4 Conclusion and Discussion 128
References 129

7 Physical Activities and the Oldest Old's Health 133
7.1 Empirical Research on Physical Activities and Older Adults' Health 133
7.1.1 Cross-sectional Studies 133
7.1.2 Longitudinal Studies 134

7.2 Data, Measures and Methods . . . 135
7.2.1 Data . . . 135
7.2.2 Measures . . . 136
7.2.3 Methods . . . 136
7.3 Results . . . 138
7.3.1 Descriptive Statistics . . . 138
7.3.2 Regression Results Based on APC Analyses . . . 138
7.4 Conclusion and Discussion . . . 145
References . . . 147

8 Leisure Activities and the Oldest Old's Health . . . 151
8.1 Empirical Research on Leisure Activities and Older Adults' Health . . . 151
8.1.1 Cross-sectional Studies . . . 151
8.1.2 Longitudinal Studies . . . 153
8.2 Data, Measures and Methods . . . 154
8.2.1 Data . . . 154
8.2.2 Measures . . . 155
8.2.3 Methods . . . 155
8.3 Results . . . 157
8.3.1 Descriptive Statistics . . . 157
8.3.2 Regression Results Based on APC Analyses . . . 157
8.4 Conclusion and Discussion . . . 163
References . . . 164

9 Smoking, Alcohol Consumption and the Oldest Old's Health . . . 167
9.1 Theories Linking Drinking, Smoking and Individual Health . . . 167
9.2 Empirical Research on Smoking and Older Adults' Health . . . 169
9.2.1 Cross-sectional Studies . . . 169
9.2.2 Longitudinal Studies . . . 170
9.3 Empirical Research on Alcohol Consumption and Older Adults' Health . . . 171
9.3.1 Cross-sectional Studies . . . 171
9.3.2 Longitudinal Studies . . . 171
9.4 Data, Measures and Methods . . . 172
9.4.1 Data . . . 172
9.4.2 Measures . . . 173
9.4.3 Methods . . . 173
9.5 Results . . . 175
9.5.1 Descriptive Statistics . . . 175
9.5.2 Regression Results Based on APC Analyses . . . 176
9.6 Conclusion and Discussion . . . 184
References . . . 186

10 Conclusion 191
10.1 Summary of Findings. 193
10.1.1 Changing Patterns of Chinese Oldest Old's Health Outcomes by Period and Birth Cohort 193
10.1.2 Significant Period and Cohort Effects in the Associations of the Oldest Old's Health and a Variety of Factors 196
10.2 Implications 198
10.3 Future Prospects. 201
References. 202

Index. 207

List of Figures

Fig. 4.1 Percentage of respondents who rated their health as "very good" by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 60
Fig. 4.2 Average number of reported chronic diseases by Time Period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 61
Fig. 4.3 Average cognitive function score of respondents by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 61
Fig. 4.4 Average positive feeling score of respondents by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 62
Fig. 4.5 Average negative feeling score of respondents by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 62
Fig. 4.6a Predicted SRH over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 67
Fig. 4.6b Predicted SRH over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 67
Fig. 4.7a Predicted number of chronic diseases over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 68
Fig. 4.7b Predicted number of chronic diseases over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 68
Fig. 4.8a Predicted cognitive function score over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 69
Fig. 4.8b Predicted cognitive function score over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 69

Fig. 4.9a Predicted positive feeling score over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 70
Fig. 4.9b Predicted positive feeling score over birth cohort. Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 70
Fig. 4.10a Predicted negative feeling score over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 71
Fig. 4.10b Predicted negative feeling score over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 71

Fig. 5.1 Percentage of Males by Time Period and across Birth Cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 80
Fig. 5.2 Percentage of Urban Respondents by Time Period and across Birth Cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 81
Fig. 5.3 Percentage of Married Respondents by Time Period and across Birth Cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 81
Fig. 5.4a Predicted self-rated health by Sex from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 87
Fig. 5.4b Predicted self-rated health by Sex from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 87
Fig. 5.5a Predicted number of chronic diseases by Sex from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 88
Fig. 5.5b Predicted number of chronic diseases by Sex from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 88
Fig. 5.6a Predicted cognitive function score by sex from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 89
Fig. 5.6b Predicted cognitive function score by sex from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 90
Fig. 5.7 Predicted positive feeling score by sex from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 90
Fig. 5.8 Predicted negative feeling score by sex from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 91

Fig. 5.9a Predicted self-rated health by residence from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 92
Fig. 5.9b Predicted self-rated health by residence from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 92
Fig. 5.10a Predicted cognitive function score by residence from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 94
Fig. 5.10b Predicted cognitive function score by residence from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 94
Fig. 5.11a Predicted cognitive function score by residence from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 95
Fig. 5.11b Predicted cognitive function score by residence from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 95
Fig. 5.12 Predicted positive feeling score by residence from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 96
Fig. 5.13 Predicted negative feeling score by residence from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 96
Fig. 5.14 Predicted Self-Rated Health by Marital Status from CCREMs over Time Period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 97
Fig. 5.15a Predicted number of chronic diseases by marital status from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 98
Fig. 5.15b Predicted number of chronic diseases by marital status from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 98
Fig. 5.16a Predicted cognitive function score by marital status from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 99
Fig. 5.16b Predicted cognitive function score by marital status from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 100
Fig. 5.17 Predicted positive feeling score by marital status from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 100
Fig. 5.18a Predicted negative feeling score by marital status from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 101

Fig. 5.18b Predicted negative feeling score by marital status from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 101
Fig. 6.1a Percentage of respondents with elementary school education or less by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 112
Fig. 6.1b Percentage of respondents with middle school education by time period and across birth cohorts. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 113
Fig. 6.1c Percentage of respondents with high school education or above by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 113
Fig. 6.2 Percentage of respondents who frequently went to bed hungry by time period and across birth cohorts (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 114
Fig. 6.3a Predicted self-rated health by educational attainment from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 119
Fig. 6.3b Predicted self-rated health by educational attainment from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 120
Fig. 6.4a Predicted number of chronic diseases by educational attainment from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 120
Fig. 6.4b Predicted number of chronic diseases by educational attainment from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 121
Fig. 6.5 Predicted cognitive function Score by educational attainment from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 122
Fig. 6.6a Predicted positive feeling Score by educational attainment from CCREMs over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 122
Fig. 6.6b Predicted positive feeling Score by educational attainment from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 123
Fig. 6.7a Predicted negative feeling Score by educational attainment from CCREMs over Time Period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 124
Fig. 6.7b Predicted negative feeling Score by educational attainment from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 124

Fig. 6.8 Predicted SRH by frequently going to bed hungry in childhood from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 125
Fig. 6.9a Predicted number of chronic diseases by frequently going to bed hungry in childhood from CCREMs over Time Period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 126
Fig. 6.9b Predicted number of chronic diseases by frequently going to bed hungry in childhood from CCREMs over Birth Cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 126
Fig. 6.10 Predicted cognitive function score by frequently going to bed hungry in childhood from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 127
Fig. 6.11 Predicted positive feeling Score by frequently going to bed hungry in childhood from CCREMs over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 128

Fig. 7.1 Percentage of respondents who participated in physical activities both in the past and at present (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 138
Fig. 7.2a Predicted SRH by physical activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 141
Fig. 7.2b Predicted SRH by physical activity over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 141
Fig. 7.3a Predicted number of chronic diseases by physical activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 142
Fig. 7.3b Predicted number of chronic diseases by physical activity over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 142
Fig. 7.4a Predicted cognitive function score by physical activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 143
Fig. 7.4b Predicted cognitive function score by physical activity over Birth Cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 144
Fig. 7.5 Predicted Positive Feeling Score by Physical Activity over Time Period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 144

Fig. 7.6a Predicted Negative Feeling Score by Physical Activity over Time Period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 145
Fig. 7.6b Predicted Negative Feeling Score by Physical Activity over Birth Cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 146

Fig. 8.1 Percentage of respondents who participated in leisure activities both in the past and at present (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 157
Fig. 8.2 Predicted self-rated health by leisure activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 159
Fig. 8.3 Predicted number of chronic diseases by leisure activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 160
Fig. 8.4a Predicted number of cognitive function score by leisure activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 161
Fig. 8.4b Predicted number of cognitive function score by leisure activity over birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 161
Fig. 8.5 Predicted positive feeling score by leisure activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 162
Fig. 8.6 Predicted negative feeling score by leisure activity over time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 162

Fig. 9.1a Percentage of respondents who smoked both in the past and at present (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 175
Fig. 9.1b Percentage of respondents who drank alcohol both in the past and at present (Unweighted). (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 176
Fig. 9.2a Predicted self-rated health by smoking and drinking behaviors by time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 179
Fig. 9.2b Predicted self-rated health by smoking and drinking behaviors by birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 179
Fig. 9.3 Predicted number of chronic diseases by smoking and drinking behaviors by time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 180

Fig. 9.4a Predicted cognitive function score by smoking and drinking behaviors by time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 181
Fig. 9.4b Predicted cognitive function score by smoking and drinking behaviors by birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 181
Fig. 9.5 Predicted positive feeling score by smoking and drinking behaviors by time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 182
Fig. 9.6a Predicted negative feeling score by smoking and drinking behaviors by time period. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 182
Fig. 9.6b Predicted negative feeling score by smoking and drinking behaviors by birth cohort. (Sources: 1998–2018 Chinese Longitudinal Healthy Longevity Survey (CLHLS)) 183

List of Tables

Table 4.1 Descriptive statistics of variables: Chinese aged 85–105 (%) (Unweighted) 59
Table 4.2 Percentages of respondents who self-rated their health as "Very Good" by period and birth cohort: Chinese aged 85–105 (Unweighted) 63
Table 4.3 Regression results of health outcome measures on age from CCREM models: Chinese aged 85–105 66

Table 5.1 Regression results of health outcome measures on demographic and socioeconomic variables from CCREMs: Chinese Aged 85–105 83
Table 5.2 Regression results of health outcome measures from CCREMs when sex is included in level 2: Chinese aged 85–105 84
Table 5.3 Regression results of health outcome measures from CCREMs when residence is included in level 2: Chinese aged 85–105 85
Table 5.4 Regression results of health outcome measures from CCREMs when marital status is included in level 2: Chinese aged 85–105 86

Table 6.1 Regression results of health outcome measures from CCREMs when education is included in level 2: Chinese Aged 85–105 115
Table 6.2 Regression results of health outcome measures from CCREMs when frequently going to bed hungry in childhood is included in level 2: Chinese aged 85–105 117

Table 7.1 Regression results of health outcome measures on physical activity and other control variables from CCREM models: Chinese aged 85–105 140