

SOCIETY WITHIN THE BRAIN

Society within the Brain presents scientific research linking social connection with brain and cognitive aging through state-of-the-art research. This involves comprehensive social network analysis, social neuroscience, neuropsychology, psychoneuroimmunology, and sociogenomics. This book provides a scientific discourse on how a society, community, or friends and family interact with individuals' cognitive aging. Issues concerning social isolation, as well as controversy around the origins of individual differences in social brain and behavior, are discussed. An integrative framework is introduced to explicate how social networks alleviate the effects of aging in brain health and reduce dementia risks. This book is of interest and useful to a wide readership: from gerontologists, psychologists, clinical neuroscientists, and sociologists; to those involved in developing community-based interventions or public health policy for brain health; to people interested in how social life influences brain aging or in the prevention of dementia.

JEANYUNG CHEY is the current president of the Korean Psychological Association and the director of the Clinical Neuroscience Lab at Seoul National University, where she has led numerous projects on cognitive aging and protective and risk factors for dementia, such as education, social connection, and stress, using a multidisciplinary approach and longitudinal data. A founding leader of the Korean Society for Neuropsychological Research, she opened South Korea's first hospital clinical neuropsychology lab and has developed many neuropsychological tools, including the first dementia test in the country. She was awarded the South Korean government's National Prize for Contribution in Overcoming Dementia in 2022.

SOCIETY WITHIN THE BRAIN

*How Social Networks Interact with Our Brain, Behavior,
and Health as We Age*

EDITED BY
JEANYUNG CHEY
Seoul National University



Cambridge University Press & Assessment
 978-1-108-83829-0 — Society within the Brain
 Jeanyung Chey
 Frontmatter
[More Information](#)



CAMBRIDGE
 UNIVERSITY PRESS

Shaftesbury Road, Cambridge CB2 8EA, United Kingdom
 One Liberty Plaza, 20th Floor, New York, NY 10006, USA
 477 Williamstown Road, Port Melbourne, VIC 3207, Australia
 314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India
 103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment,
 a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of
 education, learning and research at the highest international levels of excellence.

www.cambridge.org
 Information on this title: www.cambridge.org/9781108838290
 DOI: 10.1017/9781108974325

© Cambridge University Press & Assessment 2023

This publication is in copyright. Subject to statutory exception and to the provisions
 of relevant collective licensing agreements, no reproduction of any part may take
 place without the written permission of Cambridge University Press & Assessment.

First published 2023

A catalogue record for this publication is available from the British Library.

Library of Congress Cataloging-in-Publication Data

NAMES: Chey, Jeanyung, editor.

TITLE: Society within the brain : how social networks interact with our brain, behavior and
 health as we age / edited by Jeanyung Chey.

DESCRIPTION: Cambridge ; New York : Cambridge University Press, 2023. | Includes
 bibliographical references and index.

IDENTIFIERS: LCCN 2022056932 | ISBN 9781108838290 (hardback) | ISBN 9781108974325 (epub)

SUBJECTS: LCSH: Cognition in old age. | Older people—Social networks. | Brain—Aging. | Social
 perception in old age. | Social interaction. | Geriatric psychiatry.

CLASSIFICATION: LCC BF724.85.C64 S63 2023 | DDC 155.67—dc23/eng/20230217
 LC record available at <https://lcn.loc.gov/2022056932>

ISBN 978-1-108-83829-0 Hardback

Cambridge University Press & Assessment has no responsibility for the persistence
 or accuracy of URLs for external or third-party internet websites referred to in this
 publication and does not guarantee that any content on such websites is, or will
 remain, accurate or appropriate.

*To my mother and aunts.
And to all the aurushin who have participated in our studies
since 1996
J. C.*

Contents

<i>List of Figures</i>	<i>page</i> ix
<i>List of Tables</i>	xi
<i>List of Contributors</i>	xii
<i>Preface</i>	xiii
 Introduction <i>Jeanyung Chey</i>	 I
 PART I APPROACHES TO SOCIETY WITHIN THE BRAIN	
1 A Case of a Rapidly Aging Society and Its Dementia Population <i>Jeanyung Chey</i>	II
2 Social Network Positions and Health Status in Older Adults <i>Yeosik Youm and Junsol Kim</i>	50
3 The Social Brain and How It Links Social Intelligence and Well-Being <i>Sunhae Sul and Isu Cho</i>	69
4 The Genomics of Cognitive Aging in Social Isolation <i>Sung-Ha Lee and Seyul Kwak</i>	105
 PART II SOCIETY INTERACTING WITH BRAIN, COGNITION, AND HEALTH IN LATE LIFE	
5 The Life Course Approach to Cognitive Aging and Dementia <i>Jeanyung Chey and Seyul Kwak</i>	119
6 Enriched Social Connectedness and Brain Function <i>Seyul Kwak, Jeanyung Chey, and Yeosik Youm</i>	141

viii	<i>Contents</i>	
7	Psychoneuroimmunology Linking Social Isolation with Cognitive Aging <i>Sung-Ha Lee</i>	162
8	Loneliness and Psychological Health in Late Life <i>Hairin Kim and Jeanyung Chey</i>	175
PART III AN INDIVIDUAL’S COGNITIVE AGING WITH OTHERS: KEY FINDINGS, ISSUES, AND IMPLICATIONS		
9	Social Relationships and Cognitive Function in Older Adults <i>Hoyoung Kim</i>	195
10	Social Network and the Brain <i>Yoosik Youm and Junsol Kim</i>	217
11	Origins of Individual Differences in Social Behavior and the Social Brain <i>Isu Cho and Sunhae Sul</i>	231
12	Preventing Dementia with Social Connection <i>Jeanyung Chey, Isu Cho, Hairin Kim, Hoyoung Kim, Seyul Kwak, Sunhae Sul, Sung-Ha Lee, and Yoosik Youm</i>	269
	<i>Index</i>	297

Figures

1.1a	A family picture taken in Iksan, a small town in Jeollabuk Province, by photographer Joo Myung Duck (1971)	<i>page</i> 13
1.1b	A young family walking country lane in Gapyeong, a rural region in Gyeonggi Province, photographed by Joo Myung Duck (1972)	14
1.1c	A coal-briquette deliverer in Seoul, 1973	15
1.2a	Years of education of Koreans in age brackets	20
1.2b	Years of education for Korean women and men over 65 years old	21
1.3	Conceptual errors on the Clock Drawing Test	30
2.1	Ego-centric social networks and complete social networks	51
2.2	Closure position (<i>k</i> -core score): A hypothetical network graph of ten people	53
2.3	Example of a brokerage position	55
2.4	Village-level complete social networks from the KSHAP	62
3.1	Brain regions involved in social behavior	81
5.1	Representation of the cognitive reserve hypothesis	125
5.2	Comparison of the brain metabolism and network characteristics of the low and high education groups of women, utilizing graph theoretical analysis	128
5.3	A schematic model of how social connection interacts with neural resource undergoing aging to modulate the manifestation of clinical dementia	132
6.1	Brain regional correlates of social connectedness and their corresponding social brain system	145
6.2	Possible pathways of how social connectedness and brain characteristics influence one another	153

x	<i>List of Figures</i>	
8.1	Path model of the proximal and distal characteristics of the social network	180
10.1	Regions of interest in the amygdala network	219
10.2	Regions of interest in the mentalizing network	221
11.1	The influence of genetic and environmental factors on human social behavior and the social brain	232

Tables

1.1 Dementia prevalence in developed and developing countries	<i>page</i> 23
1.2 Prevalence of dementia in Korean men and women	26
2.1 Ego-centric network measures by selected variables in the KSHAP and the NSHAP	57
2.2 The hazard ratios of loneliness, social disengagement, and group-level segregation from Cox proportional hazard regression models and Cox MSMs (n = 679)	63
3.1 Hypotheses explaining the evolution of the human social brain	75
11.1 Neurotransmitters, related function, social behavior, genes, and brain regions	233

Contributors

ISU CHO, PH.D. isucho@brandeis.edu Post-Doctoral Associate,
Department of Psychology, Brandeis University

HAIRIN KIM, PH.D. hairin.kim@gmail.com Research Fellow, Emocog
Corporation

HOYOUNG KIM, PH.D. hykimpsy@jbnu.ac.kr Associate Professor,
Department of Psychology, Jeonbuk National University

JUNSOL KIM junsolkim@gmail.com Ph.D. candidate, Department of
Sociology, University of Chicago

SEYUL KWAK, PH.D. seyul88@gmail.com Assistant Professor, Department
of Psychology, Pusan National University

SUNG-HA LEE, PH.D. sunghalee@gmail.com Senior researcher, Center for
Happiness Studies, Seoul National University

SUNHAE SUL, PH.D. ssul@pusan.ac.kr Associate Professor, Department of
Psychology, Pusan National University

YOOSIK YOUM, PH.D. yoosik@yonsei.ac.kr Underwood Distinguished
Professor, Full Professor of Sociology Department, Yonsei University

Preface

This book came to be from a series of collaborations with my graduate students and colleagues conducted over the past twenty-eight years. I am especially grateful to have worked with Dr. Yoosik Youm and his lab for the past decade on the Korean Social Life, Health and Aging Project (KSHAP) as well as all the colleagues of the KSHAP team, particularly Drs. Hyeon Chang Kim, Yeong-Ran Park, and Eun Lee, with whom I had the pleasure of collaborating and discussing our studies. Many chapters were contributed by previous students from the Clinical Neuroscience Lab at Seoul National University (CNS@SNU) and the Social Network Lab at Yonsei University, who have conducted studies in rural villages, metropolitan areas, and at CNS and the MRI center at SNU for many years. Unique contributions were made by social neuroscientists and psychologists Drs. Sunhae Sul and Isu Cho, and psychoneuroimmunologist Sung-Ha Lee, which allowed more elaborate discussions with regard to social impact pathways on cognition and brain aging. I am very grateful to all the authors for accepting the invitation to write the chapters and for contributing significant time and effort to finish the book together. It should be mentioned, however, that many more past and current students have contributed indirectly in valuable ways, including conducting and writing up our studies for publication and also assisting me in the editorial process. I owe Jihyeon Jo and Hankyung Lee much gratitude for their dedication for the latter.

I was very fortunate to have met Steve Acerra from Cambridge University Press at the 2019 Annual International Neuropsychological Society Meeting in New York. He kindly suggested that I write a book on my research on the cognitive and brain aging of older Koreans, which might shed light on the recent sharp increase in the global incidence of dementia, especially in developing countries. He has supported me throughout the whole process, from deliberation on the book's theme to the conceptual design of its cover. I am very grateful to Steve, and also to

Rowan Groat, Anne Rufina Raymond, Robert Holden, and Mark Fox, who have been very helpful in improving the manuscript and making progress toward publication.

I thank my daughters Solho and Jinho and my husband Jae-Wook Yoon for their patience and support so that I could concentrate on writing and editing a book removed from a busy household for a good period of time. I am also grateful to my sister Kae-Ryung Chey and my dear friend Janet Levoff for their emotional support in embarking on a new adventure of organizing and writing a book with my colleagues. I confess that without any one of the supports and contributions I have received during this process, this book would not have been possible.

Lastly, this book owes incalculable debt to colleagues, scientists, and scholars in the field. I hope our contribution will be helpful and meaningful for the scientific and professional communities interested in cognitive and/or brain aging and dementia, especially during this era of increased loneliness and social isolation.