

Increased anxiety and decreased sociability induced by paternal deprivation involve the PVN-PrL OTergic pathway

Zhixiong He¹, Larry Young^{2,3}, Xin-Ming Ma^{1,4}, Qianqian Guo¹, Limin Wang¹, Yang Yang¹, Luo Luo¹, Wei Yuan¹, Laifu Li¹, Jing Zhang¹, Wenjuan Hou¹, Hui Qiao¹, Rui Jia¹, Fadao Tai^{1*}

¹Institute of Brain and Behavioral Sciences, College of Life Sciences, Shaanxi Normal University, Xi'an, China; ²Department of Psychiatry and Behavioral Sciences, Silvio O. Conte Center for Oxytocin and Social Cognition, Center for Translational Social Neuroscience, Yerkes National Primate Research Center, Emory University, Atlanta, United States; ³Center for Social Neural Networks, University of Tsukuba, Tsukuba, Japan; ⁴Department of Neuroscience, University of Connecticut Health Center, Farmington, United States

Abstract Early adverse experiences often have devastating consequences. However, whether preweaning paternal deprivation (PD) affects emotional and social behaviors and their underlying neural mechanisms remain unexplored. Using monogamous mandarin voles, we found that PD increased anxiety-like behavior and attenuated social preference in adulthood. PD also decreased the number of oxytocin (OT)-positive neurons projecting from the paraventricular nucleus (PVN) and reduced the levels of the medial prefrontal cortex OT receptor protein in females and of the OT receptor and V1a receptor proteins in males. Intra-prelimbic cortical OT injections reversed the PD-induced changes in anxiety-like behavior and social preferences. Optogenetic activation of the prelimbic cortex OT terminals from PVN OT neurons reversed the PD-induced changes in emotion and social preference behaviors, whereas optogenetic inhibition was anxiogenic and impaired social preference in naïve voles. These findings demonstrate that PD increases anxiety-like behavior and attenuates social preferences through the involvement of PVN OT neuron projections to the prelimbic cortex.

DOI: <https://doi.org/10.7554/eLife.44026.001>

*For correspondence:
taifadao@snnu.edu.cn

Competing interests: The authors declare that no competing interests exist.

Funding: See page 19

Received: 10 December 2018

Accepted: 14 April 2019

Published: 14 May 2019

Reviewing editor: Andrew J King, University of Oxford, United Kingdom

© Copyright He et al. This article is distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use and redistribution provided that the original author and source are credited.

Introduction

Social attachments can facilitate reproduction, increase survival, provide a sense of security and reduce feelings of stress and anxiety in many species (Coria-Avila et al., 2014). In humans, attachment is especially important during early development because disruption of filial attachment in children (e.g., abuse, neglect or the death of a parent) increases their vulnerability to emotional disorders at a later age (Agid et al., 1999; Reinkens et al., 1999).

By the end of 2013, it was estimated that over 61 million children in rural hometowns were missing one or both parents (more often the father) throughout China (All-China Women's Federation, 2013). Neonatal social or paternal deprivation (PD) has been proven to exert a profound and persistent influence on the physiological and behavioral development of offspring. Neonatal rodents physiologically and emotionally depend on their parents. For example, PD impairs sociability (Bambico et al., 2015; Jia et al., 2009) and social recognition (Cao et al., 2014), reduces parental

Paternal Deprivation

Henry B. Biller



Paternal Deprivation:

Paternal Deprivation; Family, School, Sexuality, and Society Henry B. Biller,1974 **Child Maltreatment and Paternal Deprivation** Henry B. Biller,Richard S. Solomon,1986 Paternal Absence and Fathers' Roles United States. Congress. House. Select Committee on Children, Youth, and Families,1984 **Estrogen Receptors—Advances in Research and Application: 2012 Edition** ,2012-12-26 Estrogen Receptors Advances in Research and Application 2012 Edition is a ScholarlyEditions eBook that delivers timely authoritative and comprehensive information about Estrogen Receptors The editors have built Estrogen Receptors Advances in Research and Application 2012 Edition on the vast information databases of ScholarlyNews You can expect the information about Estrogen Receptors in this eBook to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Estrogen Receptors Advances in Research and Application 2012 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at [http www ScholarlyEditions com](http://www.ScholarlyEditions.com)

Library of Congress Subject Headings Library of Congress,Library of Congress. Office for Subject Cataloging Policy,2003 *Library of Congress Subject Headings* Library of Congress. Cataloging Policy and Support Office,2009

A-E Library of Congress. Office for Subject Cataloging Policy,1990 **Medical and Health Related Sciences Thesaurus** National Institutes of Health (U.S.),1974 *Medical and Health Related Sciences Thesaurus* ,1985 **Library of Congress Subject Headings** Library of Congress. Office for Subject Cataloging Policy,1991 Eudised Jean Viet,Georges van Slype,2019-12-02 No detailed description available for Eudised **P-Z** Library of Congress. Office for Subject Cataloging Policy,1990 *Literature Search* National Library of Medicine (U.S.),1971 **Posterior Pituitary Hormones—Advances in Research and Application: 2013 Edition** ,2013-06-21 Posterior Pituitary Hormones Advances in Research and Application 2013 Edition is a ScholarlyEditions book that delivers timely authoritative and comprehensive information about Vasopressins The editors have built Posterior Pituitary Hormones Advances in Research and Application 2013 Edition on the vast information databases of ScholarlyNews You can expect the information about Vasopressins in this book to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Posterior Pituitary Hormones Advances in Research and Application 2013 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at [http www ScholarlyEditions com](http://www.ScholarlyEditions.com) **Dendritic Spines: from Biophysics to Neuropathology** Menahem Segal,Martine

Ammassari-Teule, Carlo Sala, 2021-03-26 **Hydroxycorticosteroids—Advances in Research and Application: 2013 Edition**, 2013-06-21 Hydroxycorticosteroids Advances in Research and Application 2013 Edition is a ScholarlyEditions book that delivers timely authoritative and comprehensive information about Pregnenolone The editors have built Hydroxycorticosteroids Advances in Research and Application 2013 Edition on the vast information databases of ScholarlyNews You can expect the information about Pregnenolone in this book to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Hydroxycorticosteroids Advances in Research and Application 2013 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at <http://www.ScholarlyEditions.com> **The Hormone Factor in Mental Health** Linda M. Rio, 2013-09-21 Endocrine imbalances can cause a whole host of physical and mental health problems With contributions from some of the world s most respected physicians psychiatrists and psychotherapists this book provides accurate information on hormone imbalances and disorders how to recognise the signs in patients and how to treat them effectively *Broken families* United States. Congress. Senate. Committee on Labor and Human Resources. Subcommittee on Family and Human Services, 1983 **The CRF Signal** Jay Schulkin, 2017-04-04 Information molecules such as Cortico Releasing Factor CRF are ancient and widely distributed across diverse organs playing various regulatory roles CRF has been associated with a range of human conditions including fear and anxiety social contact and most recently addiction in particular the euphoric feelings associated with alcohol consumption Since its original discovery research has unearthed that the role of this molecule is much broader than first thought The scientific community now knows that CRF is a dynamic and diversely widespread peptide hormone that plays many roles and has many functions in addition to its role as a releasing factor in the brain This book explores the role of CRF examining the relationship between location and function It considers recurrent features that are linked to CRF movement and change CRF expression in regions of the brain is tied to paying attention to novel events and invoking movement in response to those events Indeed CRF provokes simple organized rhythmic behavior and can be mobilized under diverse conditions including adversity Examining the evolutionary origins of CRH its neural functions and its role in a variety of human characteristics and social behaviors this book provides unique insights into CRF and will be of interest to students and researchers in Neuroscience Psychology and Biology **Steroid Receptors—Advances in Research and Application: 2012 Edition**, 2012-12-26 Steroid Receptors Advances in Research and Application 2012 Edition is a ScholarlyEditions eBook that delivers timely authoritative and comprehensive information about Steroid Receptors The editors have built Steroid Receptors Advances in Research and Application 2012 Edition on the vast information databases of ScholarlyNews You can expect the information about Steroid Receptors in this eBook to be deeper

than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Steroid Receptors Advances in Research and Application 2012 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at <http://www.ScholarlyEditions.com>

Paternal Deprivation Book Review: Unveiling the Magic of Language

In an electronic era where connections and knowledge reign supreme, the enchanting power of language has are more apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Paternal Deprivation**," published by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound affect our existence. Throughout this critique, we will delve to the book is central themes, evaluate its unique writing style, and assess its overall influence on its readership.

https://pinsupreme.com/results/virtual-library/Download_PDFS/make_brilliant_things.pdf

Table of Contents Paternal Deprivation

1. Understanding the eBook Paternal Deprivation
 - The Rise of Digital Reading Paternal Deprivation
 - Advantages of eBooks Over Traditional Books
2. Identifying Paternal Deprivation
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Paternal Deprivation
 - User-Friendly Interface
4. Exploring eBook Recommendations from Paternal Deprivation
 - Personalized Recommendations
 - Paternal Deprivation User Reviews and Ratings
 - Paternal Deprivation and Bestseller Lists
5. Accessing Paternal Deprivation Free and Paid eBooks

- Paternal Deprivation Public Domain eBooks
- Paternal Deprivation eBook Subscription Services
- Paternal Deprivation Budget-Friendly Options
- 6. Navigating Paternal Deprivation eBook Formats
 - ePub, PDF, MOBI, and More
 - Paternal Deprivation Compatibility with Devices
 - Paternal Deprivation Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Paternal Deprivation
 - Highlighting and Note-Taking Paternal Deprivation
 - Interactive Elements Paternal Deprivation
- 8. Staying Engaged with Paternal Deprivation
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Paternal Deprivation
- 9. Balancing eBooks and Physical Books Paternal Deprivation
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Paternal Deprivation
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Paternal Deprivation
 - Setting Reading Goals Paternal Deprivation
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Paternal Deprivation
 - Fact-Checking eBook Content of Paternal Deprivation
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

Paternal Deprivation Introduction

Free PDF Books and Manuals for Download: Unlocking Knowledge at Your Fingertips In today's fast-paced digital age, obtaining valuable knowledge has become easier than ever. Thanks to the internet, a vast array of books and manuals are now available for free download in PDF format. Whether you are a student, professional, or simply an avid reader, this treasure trove of downloadable resources offers a wealth of information, conveniently accessible anytime, anywhere. The advent of online libraries and platforms dedicated to sharing knowledge has revolutionized the way we consume information. No longer confined to physical libraries or bookstores, readers can now access an extensive collection of digital books and manuals with just a few clicks. These resources, available in PDF, Microsoft Word, and PowerPoint formats, cater to a wide range of interests, including literature, technology, science, history, and much more. One notable platform where you can explore and download free Paternal Deprivation PDF books and manuals is the internet's largest free library. Hosted online, this catalog compiles a vast assortment of documents, making it a veritable goldmine of knowledge. With its easy-to-use website interface and customizable PDF generator, this platform offers a user-friendly experience, allowing individuals to effortlessly navigate and access the information they seek. The availability of free PDF books and manuals on this platform demonstrates its commitment to democratizing education and empowering individuals with the tools needed to succeed in their chosen fields. It allows anyone, regardless of their background or financial limitations, to expand their horizons and gain insights from experts in various disciplines. One of the most significant advantages of downloading PDF books and manuals lies in their portability. Unlike physical copies, digital books can be stored and carried on a single device, such as a tablet or smartphone, saving valuable space and weight. This convenience makes it possible for readers to have their entire library at their fingertips, whether they are commuting, traveling, or simply enjoying a lazy afternoon at home. Additionally, digital files are easily searchable, enabling readers to locate specific information within seconds. With a few keystrokes, users can search for keywords, topics, or phrases, making research and finding relevant information a breeze. This efficiency saves time and effort, streamlining the learning process and allowing individuals to focus on extracting the information they need. Furthermore, the availability of free PDF books and manuals fosters a culture of continuous learning. By removing financial barriers, more people can access educational resources and pursue lifelong learning, contributing to personal growth and professional development. This democratization of knowledge promotes intellectual curiosity and empowers

individuals to become lifelong learners, promoting progress and innovation in various fields. It is worth noting that while accessing free Paternal Deprivation PDF books and manuals is convenient and cost-effective, it is vital to respect copyright laws and intellectual property rights. Platforms offering free downloads often operate within legal boundaries, ensuring that the materials they provide are either in the public domain or authorized for distribution. By adhering to copyright laws, users can enjoy the benefits of free access to knowledge while supporting the authors and publishers who make these resources available. In conclusion, the availability of Paternal Deprivation free PDF books and manuals for download has revolutionized the way we access and consume knowledge. With just a few clicks, individuals can explore a vast collection of resources across different disciplines, all free of charge. This accessibility empowers individuals to become lifelong learners, contributing to personal growth, professional development, and the advancement of society as a whole. So why not unlock a world of knowledge today? Start exploring the vast sea of free PDF books and manuals waiting to be discovered right at your fingertips.

FAQs About Paternal Deprivation Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer web-based readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Paternal Deprivation is one of the best book in our library for free trial. We provide copy of Paternal Deprivation in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Paternal Deprivation. Where to download Paternal Deprivation online for free? Are you looking for Paternal Deprivation PDF? This is definitely going to save you time and cash in something you should think about.

Find Paternal Deprivation :

make brilliant things

making babies new edition

~~making connections achieving success understanding others~~

make it through accounting

making photographs

making of a champion-world-class mountai

making america a history of the united states

make it in paper

~~making money in film and video a handbook for freelancers and independents~~

making of britain middle ages the making of britain

making american foreign policy president-congress relations from the second world war to vietnam

major controversies of contemporary hist

~~making of guyana~~

making america the society and culture of the united states

making peace with yourself

Paternal Deprivation :

Handbook of Forensic Drug Analysis by Smith, Fred The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs. Handbook of Forensic Drug Analysis - 1st Edition The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs. HANDBOOK OF FORENSIC DRUG ANALYSIS ... drug testing and drug screenings. The Handbook of Forensic Drug Analysis is not meant for the casual reader interested in gaining an overview of illicit drugs. Handbook of Forensic Drug Analysis (Hardcover) Description. The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs. Handbook of Forensic Drug Analysis / Edition 1 The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs. With chapters. Handbook of Forensic Drug Analysis - Fred Smith The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs. Handbook of Forensic Drug Analysis - Smith, Fred The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs.

Handbook of Forensic Drug Analysis - Document by CL Winek · 2005 — Gale Academic OneFile includes Handbook of Forensic Drug Analysis by Charles L. Winek. Read the beginning or sign in for the full text. Handbook of Forensic Drug Analysis eBook : Smith, Fred The Handbook of Forensic Drug Analysis is a comprehensive chemical and analytic reference for the forensic analysis of illicit drugs. Handbook of Forensic Drug Analysis - by Fred Smith ... This Handbook discusses various forms of the drug as well as the origin and nature of samples. It explains how to perform various tests, the use of best ... Toyota Coaster Service Repair Manuals | Free Pdf Free Online Pdf for Toyota Coaster Workshop Manuals , Toyota Coaster OEM Repair Manuals, Toyota Coaster Shop Manuals, Toyota Coaster Electrical Wiring ... Toyota Coaster Manuals Toyota Coaster Upload new manual ... land cruiser coaster 1hd ft engine repair manual.pdf, French, 16.1 MB, 258. Coaster, toyota trucks service manual.pdf ... Toyota Coaster Bus Diesel And Petrol Engines PDF ... Workshop Repair Manual is a rare collection of original OEM Toyota Factory workshop manuals produced for the Toyota Coaster, Land Cruiser, Hino & Dutro. Now ... Toyota COASTER Manuals Manuals and User Guides for Toyota COASTER. We have 1 Toyota COASTER manual available for free PDF download: Owner's Manual ... Toyota Coaster repair manual for chassis & body Toyota Coaster repair manual for chassis & body | WorldCat.org. Repair manuals and video tutorials on TOYOTA COASTER TOYOTA COASTER PDF service and repair manuals with illustrations · Manuf. year (from - to): (08/1977 - 04/1982) · Car body type: Bus · Power (HP): 76 - 98 ... TOYOTA Coaster 1982-90 Workshop Manual TOYOTA Coaster B20 and B30 Series 1982-1990 Comprehensive Workshop Manual. PDF DOWNLOAD. With easy step by step instructions for the DIY mechanic or ... TOYOTA COASTER BUS 1982 1983 1984 1985 REPAIR ... Manual Transmission. - Service Specifications. - Body Electrical. - Restraint System. - Suspension & Axle. - Propeller Shaft. - Transfer Case. User manual Toyota Coaster (2012) (English - 186 pages) The Coaster is powered by a diesel engine, providing ample torque and fuel efficiency. It features a seating capacity of 21 passengers, making it ideal for ... The Heavy Guitar Bible: A Rock Guitar Instruction Manual This book gives you everything you need to really be able to play your guitar like a professional. It's an easy method to learn your music theory and how to use ... The Heavy Guitar Bible - A Rock Guitar Manual This bestseller is now available with a CD! The complete book on the world of rock guitar, covering fretboard basics, chords, structure, and all rock styles, ... Heavy Guitar Bible Vol2 A Rock Guitar Manual Heavy Guitar Bible Vol2 A Rock Guitar Manual · Book overview. Book by Richard Daniels. The Heavy Guitar Bible: A Rock Guitar Instruction Manual The complete book on the world of rock guitar, covering fretboard basics, chords, structure, and all rock styles, with accompanying illustrations. GenresMusic. The Heavy Metal Guitar Bible The Heavy Metal Guitar Bible is a three-part series that teaches you the essential skills required to become a master Heavy Metal guitarist. Heavy Guitar Bible Rock by Richard Daniels The Heavy Guitar Bible: A Rock Guitar Instruction Manual by Richard Daniels and a great selection of related books, art and collectibles available now at ... The Heavy Guitar Bible: A Rock Guitar Manual (Guitar Educational). This bestseller is now available with a CD! The complete book on the world of rock guitar, covering

fretboard basics, chords, The Heavy Guitar Bible [HL:2501149] A Rock Guitar Manual. This bestseller is now available with a CD! The complete book on the world of rock guitar, covering fretboard basics, chords, structure, ... The Heavy Guitar Bible by Richard Daniels, Paperback (Guitar Educational). The complete book on the world of rock guitar, covering fretboard basics, chords, structure, and all rock styles, with accompanying. Cherry Lane The Heavy Guitar Bible Book The Heavy Guitar Bible provides you with an incredibly resourceful book on the world of rock guitar, covering fretboard basics, chords, structure, ...