

Carson M. Murray

The George Washington University
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CURRENT APPOINTMENTS

The George Washington University

Associate Professor, Department of Anthropology
Center for the Advanced Study of Human Paleobiology

EDUCATION

University of Minnesota, Ph.D. Behavioral Ecology, 2001- 2006

Dissertation: The Influence of Competition on Chimpanzee Foraging and Ranging Patterns

University of Virginia, B.A. Chemistry, specialization in Biochemistry, 1993 - 1997

PROFESSIONAL HISTORY

Northwestern University

2010 - 2011

Adjunct Faculty

Environmental Policy and Culture Program

University of Chicago

2007 - 2011

Post-doctoral Fellow

Institute of Mind and Biology

Lincoln Park Zoo

2007 - 2011

Post-doctoral Fellow

Lester E. Fisher Center for the Study and Conservation of Apes

Behavioral Endocrinology

University of Minnesota

2004 - 2006

Graduate Research Assistant

Department of Ecology, Evolution, and Behavior

RESEARCH INTERESTS

I am a primate behavioral ecologist who is broadly interested in the adaptive value of social behavior. My work integrates behavioral data with physiological data to uncover the link between proximate mechanisms and ultimate outcomes across generations. My lab accommodates students working on this and allied research, all geared towards understanding how social behavior relates to individual variation in reproductive success.

- Field primate behavioral ecology
- Maternal behavior
- Socio-endocrinology
- Female social relationships
- Spatial ecology
- Social Behavior

PUBLICATIONS

Lonsdorf EV, Stanton MA, and **CM Murray**. 2018. Sex differences in maternal-sibling interactions in wild chimpanzees. *Behavioral Ecology and Sociobiology* 72: 117.

Murray CM, Stanton MA, Wellens KR, Santymire RM, Heintz MR, and EV Lonsdorf. 2018. Maternal effects on offspring stress physiology in wild chimpanzees. *American Journal of Primatology* 80, e2258.

Lonsdorf EV, Gillespie TR, Wolf TM, Lipende I, Raphael J, Bakuza J, **Murray CM**, Wilson ML, Kamenya S, Mjungu D, Collins DA, Gilby IC, Stanton MA, Terio KA, Barbian HJ, Yingying L, Ramirez M,

- Krupnich A, Seidl E, Goodall J, Hahn BH, Pusey AE, and DA Travis. 2018. Socioecological correlates of clinical signs in two communities of wild chimpanzees at Gombe National Park. *American Journal of Primatology* 80: e22562.
- Lantz EL, Heintz MR, **Murray CM**, Santymire RM, Lipende I, Travis DA, and EV Lonsdorf. 2018. Non-invasive quantification of immunoglobulin A in chimpanzees at Gombe National Park, Tanzania. *American Journal of Primatology* 80: e22558.
- Massaro AP, Boehm EE, Lonsdorf EV, **Murray CM**, Stanton MA, and M.L. Wilson. 2018. Copulation calls of female chimpanzees signal fertility. *Journal of the Acoustical Society of America* 143: 1889.
- Stanton MA, Lonsdorf EV, Pusey AE, and **CM Murray**. 2017. Do juveniles help or hinder? Influence of juvenile offspring on maternal social behavior and reproductive outcomes in wild chimpanzees. *Journal of Human Evolution* 111: 152-162.
- Heintz MR, Murray CM, Markham AC, Pusey AE, Lonsdorf EV. 2017. The relationship between social play and developmental milestones in wild chimpanzees. *American Journal of Primatology* 79: e22716.
- Gilby IC, Machanda ZP, O'Malley RC, **Murray CM**, Lonsdorf EV, Walker K, Mjungu DC, Otali E, Muller MN, Emery Thompson ME, Pusey AE, and RW Wrangham. 2017. Predation by female chimpanzees: Toward an understanding of sex differences in meat acquisition among early hominins. *Journal of Human Evolution* 110: 82-94.
- Miller JA, Stanton MA, Lonsdorf EV, Wellens K, Markham AC, and **CM Murray**. 2017. The development of third party affiliation in wild chimpanzees. *Royal Society Open Science* 4: 170500.
- Murray CM**, Stanton MA, Lonsdorf EV, Wroblewski EE, and AE Pusey. 2016. Chimpanzee fathers bias their behavior toward their offspring. *Royal Society Open Science* 3:160441.
- Foerster S, Franz M, **Murray CM**, Gilby IC, Schroepfer-Walker K, and AE Pusey. 2016. Female chimpanzees queue but males strive for social status. *Scientific Reports*, 6.
- Foerster S, Zhong Y, Pintea L, **Murray CM**, Wilson ML, Mjungu D, and AE Pusey. 2016. Feeding habitat quality and behavioral trade-offs in chimpanzees: a case for species distribution models. *Behavioral Ecology*, arw004.
- O'Malley RC, Stanton MA, Gilby IC, Lonsdorf EV, Pusey AE, Markham AC, and **CM Murray**. 2016. Reproductive state and rank influences patterns of meat consumption in wild chimpanzees. *Journal of Human Evolution* 90: 16 – 28.
- Foerster S, McCellan K, Schroepfer-Walker K, **Murray CM**, Krupenye C, Gilby IC, and AE Pusey. 2015. Social bonds in the dispersing sex: partner preferences among adult female chimpanzees. *Animal Behaviour* 105: 139 – 152.
- Markham CM, Lonsdorf EV, Pusey AE, and **CM Murray**. 2015. Maternal rank influences the outcome of aggressive interactions between immature chimpanzees. *Animal Behaviour* 100: 192-198.
- Stanton MA, Heintz MR, Lonsdorf EV, Santymire RM, Lipende I, and **CM Murray**. 2015. Maternal Behavior and physiological stress levels in wild chimpanzees. *International Journal of Primatology* 36: 473 – 488.
- Murray CM**, Lonsdorf EV, Stanton MA, Wellens KR, Miller JA, Goodall J, and AE Pusey. 2014. Early social exposure in wild chimpanzees: Mothers with sons are more gregarious than mothers with daughters. *Proceedings of the National Academy of Sciences* 111:18189-18194.
- Stanton MA, Lonsdorf EV, Pusey AE, Goodall J, and **CM Murray**. 2014. Maternal behavior by birth order in wild chimpanzees: Increased investment by first-time mothers. *Current Anthropology* 55: 483-489.
- Lonsdorf EV, Markham AC, Heintz MR, Anderson KE, Ciuk DJ, Goodall J, and **CM Murray**. 2014. Sex differences in wild chimpanzee infant development mirror those of human children. *PLOS One* 9: e99099.

- Markham AC, Santymire RM, Lonsdorf, EV, Heintz MR, Lipende I, and **CM Murray**. 2014. Rank effects on social stress in lactating chimpanzees. *Animal Behaviour* 87: 195-202.
- Miller JA, Pusey AE, Gilby IC, Schroepfer-Walker K, Markham AC, and **CM Murray**. 2014. Competing for space: female chimpanzees are more aggressive inside their core areas than outside. *Animal Behaviour* 87: 147-152.
- Lonsdorf EV, Anderson KE, Stanton MA, Shender M, Heintz MR, Goodall J, and **CM Murray**. 2014. Boys will be boys: Sex differences in wild infant chimpanzee social interactions. *Animal Behaviour* 88: 79-83.
- Murray CM**, Heintz M, Lonsdorf EV, Parr LA, and RM Santymire. 2013. Field method and validation for fecal hormone glucocorticoid concentrations in wild chimpanzees. *American Journal of Primatology* 75: 57-64.
- O'Malley RC, Wallauer W, **Murray CM**, and J Goodall. 2012. The appearance and spread of ant-fishing among the Kasekela chimpanzees of Gombe: A case of inter-community transmission of a cultural transmission. *Current Anthropology* 53:650-663.
- Lonsdorf EV, **Murray CM**, Lonsdorf EV, Travis DA, Gilby IC, Chosy J, Goodall J, and AE Pusey. 2011. A retrospective analysis of factors correlated to chimpanzee (*Pan troglodytes schweinfurthii*) respiratory health at Gombe National Park. *Ecohealth* 8: 26-35.
- Jones JH, Wilson ML, **Murray CM**, and AE Pusey. 2010. Phenotypic quality influences fertility in Gombe Chimpanzees. *Journal of Animal Ecology* 79: 1262-1269.
- Murray CM**, Lonsdorf EV, Eberly LE, and AE Pusey. 2009. Rank-dependent reproductive energetics in free-living female chimpanzees. *Behavioral Ecology* 20: 1211-1216.
- Wroblewski EE, **Murray CM**, Keele B, Hahn B, Schumacher-Stankey J, and AE Pusey. 2009. Male dominance rank and reproductive success in wild chimpanzees. *Animal Behaviour* 77: 873-885.
- Foster MW, Gilby IC, **Murray CM**, Johnson A, Wroblewski EE, and AE Pusey. 2009. Alpha male chimpanzee grooming patterns: implications for dominance 'style'. *American Journal of Primatology* 71: 136-144.
- Murray CM**, Gilby I, Mane SV, and AE Pusey. 2008. Male chimpanzees inherit maternal ranging patterns, *Current Biology* 18: 20-24.
- Pusey AE, **Murray CM**, Wallauer W, Wilson M, and E Wroblewski. 2008. Severe aggression among female chimpanzees at Gombe National Park, Tanzania. *International Journal of Primatology* 29: 949-973.
- Murray CM**. 2007. A method for assigning categorical rank in female chimpanzees via the frequency of approaches. *International Journal of Primatology* 28: 856-864.
- Murray CM**, Mane SV, and AE Pusey. 2007. Dominance rank influences female chimpanzee space use: Towards an ideal despotic distribution. *Animal Behaviour* 74: 1795-1804.
- Murray CM**, Wroblewski EE, and AE Pusey. 2007. A new case of intra-group infanticide in the chimpanzees of Gombe National Park. *International Journal of Primatology* 28: 23-37.
- Murray CM**, Eberly LE, and AE Pusey. 2006. Foraging strategies as a function of season and rank among wild female chimpanzees. *Behavioral Ecology* 17: 1020-1028.
- Mane S, **Murray CM**, Shekhar S, Srivastava J, and AE Pusey. 2005. Spatial clustering of chimpanzee locations for neighborhood identification. *Proceedings of the Fifth IEEE International Conference*.

In Progress

- Miller JM, Stanton MA, Gilby IC, Pusey AE, and **Murray CM**. In revision. The function of policing behavior in wild chimpanzees.
- Wellens KR, **Murray CM**, Stanton MA, O'Malley RO, and EV Lonsdorf. In revision. Sex differences in social behavior in wild chimpanzee juveniles.

Wellens KR, Stanton MA, Pusey AE, Lonsdorf EV, and **CM Murray**. In submission. Early life social exposure predicts adult male chimpanzee gregariousness.

Walker, K, Foerster S, **Murray CM**, Mjungu D, and AE Pusey. In submission. Female-led infanticide in chimpanzees reduces competition for the aggressive female.

Lee S, **Murray CM**, Lonsdorf EV, Fruth B, Stanton MA, and G Hohmann. In submission. High fission-fusion dynamics and social development in wild bonobos and chimpanzees.

Murray CM, Stanton MA, Lonsdorf EV, Gaynor H, and AE Pusey. In preparation. Little investment and no effect of grandmother presence on grandoffspring in wild chimpanzees at Gombe National Park.

Shimwa AK, Power M, **Murray CM**, and RO O'Malley. In preparation. Sodium content in plant and insect food resources consumed by chimpanzees in Gombe National Park, Tanzania

RESEARCH SUPPORT

Current Support

National Science Foundation (FSML)

Mjungu, Collins, Gilby, Murray (co-PI), Pusey

Improving Collaborative Research Infrastructure at Gombe National Park

Amount Awarded: \$329,000

Grants in Active Preparation

National Science Foundation (Biological Anthropology)

Murray (PI), O'Malley

Female Chimpanzee Hydration and Diet Selection during Lactation

National Science Foundation (Biological Sciences)

Murray (PI), Hohmann, Fruth, Lonsdorf

Comparative Development in Pan: Unraveling the Developmental Pathways for Species Differences in Competitive Regimes and Female Dominance.

National Geographic Society.

Ndwani, Wroblewski, Murray (co-PI).

Habitat Fragmentation, Genetic Diversity, and Behavior in Rwandan Chimpanzees

Completed Support

National Institutes of Health (NICHD)

R00, Murray PI

How Maternal Stress Influences Offspring Health and Development in Chimpanzees

Award number: ROOHD057992-03

Grant period: 9/1/2011 – 5/30/2015

Award Amount: \$746,000

National Institutes of Health (NICHD)

K99 Training Award, Murray PI

Award number: K99HD057992-02

Dates: 2/15/09-1/31/2011

Award Amount: \$175,000

Small grants (≤ \$25,000): Milton Harris Foundation, Heilig-Meyers Foundation, Dayton-Wilkie Natural History Fund, Leakey Foundation, Mazuri Foundation,

Completed Support from GW

Smithsonian Institution and The George Washington University Collaborative Grant

Murray & Power (co-PI)

Dominance Rank, Nutrition, and Sociality in Wild Female Chimpanzees

Generated the most complete nutritional survey to-date of primate foods consumed at Gombe.

Award Amount: \$ 46,000

TEACHING EXPERIENCE

The George Washington University

2011 - present

Assistant Professor, Department of Anthropology

- Biological Bases of Human Behavior (Undergraduate)
- Primatology (Undergraduate)
- The Evolution of Human Families (Undergraduate and Graduate)
- Problem-Based Learning (Graduate)
- Paleobiology Lab Rotation (Graduate)
- Independent Readings on Primate Behavior (5)

Northwestern University

2010 - 2011

Adjunct Teaching Faculty

- Animal Behavior and Conservation in a Changing World (Undergraduate)

University of Minnesota

2002 - 2005

Graduate-level Teaching Assistant

Award: Outstanding Performance as a Teaching Assistant

- Plant Interactions with Animals
- Evolution of Social Behavior
- Introductory Biology

United States Peace Corps, Tanzania

1997 - 1999

Secondary School Teacher

- Biology
- Chemistry

University of Virginia

1996 - 1997

Undergraduate-level Teaching Assistant

- Organic Chemistry

MENTORSHIP

Post-Doctoral

Dr. Robert O'Malley, The George Washington University

2013 - 2017

Current Position: Senior Program Associate, American Association for the Advancement of Science

Dr. Margaret Stanton, The George Washington University

2012 - 2017

Current Position: Visiting Professor of Psychology, Franklin & Marshall College

Dr. Catherine Markham, The George Washington University

2012 - 2014

Current Position: Assistant Professor of Anthropology, Stony Brook University

Graduate

Sylvain Nyandwi, The George Washington University, Advisor

2017 - present

Thesis Title: Habitat Fragmentation and Resiliency in Sympatric Primates in Rwanda

Sean Lee, The George Washington University, Advisor 2014 - present
 Thesis Title: Comparative Study on Bonobo and Chimpanzee Development
 Grant History: William Warren Research Fellowship, Cotlow Field Research Fund, Explorers Club Field Research Grant, Shenkman Award (\$5400)

Axelle Shimwa, The George Washington University, Advisor 2017 - 2018
 Thesis Title: Nutritional Ecology and Competition in Male Great Apes

Kaitlin Wellens, The George Washington University, Advisor 2012 - 2018
 Thesis Title: Wild Chimpanzee Maternal Effects on Offspring Social Behavior Later in Life
 Grant History: Leakey Foundation Dissertation Grant (\$14,300)

Kate McGrath, The George Washington University, Committee Member 2014 - 2018
 Thesis Title: Enamel Hypoplasia in Wild Mountain Gorillas of Known Life History

Jordan Miller, The George Washington University, Advisor 2012 - 2017
 Thesis Title: Chimpanzee Third-party Behavior: Insights into the Evolution of Human Prosociality
 Grant History: Cosmos Club Foundation, Nacey Maggioncalda Foundation, Sigma Xi Grant, Cotlow Field Research Fund (\$8500)

Megan Wallen, Georgetown University, Committee Member 2013 - 2017
 Thesis Title: Sexual Coercion in Bottlenose Dolphins

Serena Bianchi, George Washington University, Committee Member 2013 - 2015
 Thesis Title: Neuroanatomical Correlates of Attention-getting Sounds in Captive Chimpanzees

Matthew Heintz, University of Chicago, Field Advisor 2008 - 2013
 Thesis Title: The Benefits of Play Behavior in Wild Chimpanzees

Durga Gumaste, University of Minnesota, Mentor 2004 - 2005
 Thesis Title: Extracting Chimpanzee Space Use Data

Undergraduate

John Winans, The George Washington University 2015 – 2018
 Thesis Title: Proximity between Juvenile Chimpanzees and Unrelated Individuals

Helen Gaynor, The George Washington University 2013 - 2015
 Thesis Title: Grandmother Effect in Wild Chimpanzees (Hart Award for Outstanding Thesis Recipient)
 In prep for *Philosophical Transactions*

Aisha Mustapha, The George Washington University 2013 - 2014
 Research Topic: Sex Differences in Vocalization Production in Young Chimpanzees
 Presented at George Washington University Research Days

Emma Lantz, The University of Chicago 2009 - 2011
 Research Topic: Immuno-competence and Stress among Chimpanzees at Gombe National Park
 Published in *American Journal of Primatology*

Mark Foster, University of Minnesota 2005 – 2007
 Thesis Title: Chimpanzee Alpha Male Styles
 Published in *American Journal of Primatology*

Research Interns (last 5 years): Victoria Fiorentino, Eva Schwartz, Aaron Schmidt, Aisha Mustapha, Sophia Reji, Karen Anderson, Marissa Shender, John Winans, Helen Gaynor, Rachel Sinsheimer, Leah Gillon, Lorraine Smith, Anna Heffernan, Jillie Drutz, Zachary Bengston, Anna Fenzel, Hannah Soffield

DEPARTMENTAL SERVICE

Colonial Health Service Student and Faculty Meetings (Organizer)	2017
Departmental Advisory Committee	2016 - 2018
CASHP PhD Requirements Evaluation	2016
CASHP Web Committee	2015 - present
Teaching Load Proposal Committee (Member)	2015 - 2016
Anthropology Genomics Search Committee (Member)	2013
Junior Faculty Mentorship Planning Committee (Member)	2013
Undergraduate Thesis Second Reader	2013 - 2015
Graduation Celebration Representative	2012 - 2015
Center for the Advanced Study of Human Paleobiology Post-doctoral Search	2012 - 2013
Jane B. Hart Award and Lecture Committee (Chair)	2012 - present
Primate Behavior Reading Group	2012 - present
Socio-cultural Anthropology Search Committee (Member)	2011 - 2012
Departmental Library Representative	2011 - present
Center for the Advanced Study of Human Paleobiology Admissions (Member)	2011 - present
Center for the Advanced Study of Human Paleobiology Curriculum (Member)	2011 - present
Colonial Parents Weekend (Representative)	2011

UNIVERSITY SERVICE

Animal Research Facilities Committee	2018 - present
George Washington University Center for Climate Change Proposal Working Group	2016 - 2017
George Washington University Roots & Shoots Student Group (Faculty Mentor)	2016 - 2017
Conversation with the Dean Interview Series	2015
Diversity in Science Series (Faculty Co-founder & Steering Committee)	2013 - present
Columbian College of Arts & Sciences National Council Dinner (Representative)	2013
Development Meeting for Science & Engineering Hall (Presenter)	2013
Columbian College Dean's Lunch (Presenter)	2013
Colonial Parents Weekend (Representative)	2011

PROFESSIONAL SERVICE

International Primatological Society Session (Co-Organizer)	2015 – present
Session Title: Collaborative Approaches to Chimpanzee Behavioral Ecology (12 participants)	
Greater DC Primatology Club (Member)	2014 – present

Gombe Stream Research Scientific Advisory Board (Member)	2013 – present
Gombe Stream Research Center White Paper Committee (Co-chair)	2013
Women in Science Blog Contributor	2013
Scientist-is-In Program, Smithsonian Institution	2012 – present
International Primatological Society Grant Reviewer	2009 - 2011
Lincoln Park Zoo Research Ethics Committee (Member)	2008 - 2011
Member of: American Society of Primatologists, International Primatological Society, Animal Behavior Society, American Association of Physical Anthropologists	
Reviewer for: <i>Behavioral Ecology</i> , <i>American Journal of Primatology</i> , <i>International Journal of Primatology</i> , <i>Folia Primatologica</i> , <i>International Primatological Society Conservation Committee</i> , <i>Plos One</i> , <i>Building Babies</i> , <i>Conservation Physiology</i> , <i>Animal Behaviour</i> , and National Science Foundation	