

ANTH 545 I/645 I

Human Physical Activity in Evolutionary Perspective

Department of Anthropology
Fall Semester 2023
Monday, 2:00 pm – 5:00 pm; BEH S 107

Instructor: Dr. Thomas Kraft

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Office location: Gardner Commons 4445

Course Canvas page: <https://utah.instructure.com/courses/895957>

Office hours: By appointment. Meetings can be conducted in person or over zoom. Please email me to set up a time that works for us both.

Required course materials:

1. Lieberman, Daniel E (2020) *Exercised: Why Something We Never Evolved to Do Is Healthy and Rewarding*. Pantheon (available via Inclusive Access (online version only) or at Amazon or other online retailers for <\$20)
2. Assigned articles (links and pdfs provided)

Land acknowledgment

The University of Utah sits on land that is the traditional and ancestral homeland of the Shoshone, Paiute, Goshute, and Ute Tribes. We recognize and respect the enduring relationship that exists between many Indigenous peoples and their traditional homelands. We respect the sovereign relationship between tribes, states, and the federal government, and we affirm our commitment, as part of the University of Utah, to a partnership with Native Nations and Urban Indian communities through research, education, and community outreach activities.

Course description

Humans engage in a marvelous diversity of physical activities, from running marathons, to ballet dancing, to fingerpicking guitars. Such activities are not only beautiful, but also characterize who we are as a species. Today, human physical activity and energetics are also among the strongest determinants of our health and longevity.

In this seminar, we will consider the evolutionary factors underlying how and why humans use our bodies the ways we do, and why differences between past and present human physical activity patterns may be causing our bodies to malfunction and suffer from illnesses that our ancestors managed to avoid.

Critical questions include:

- If exercise is so good for you, why do so many people dislike or avoid it?

- Is it bad to slouch? Are humans comparatively slow and weak?
- Is exercise ineffective for losing weight?
- Does running ruin your knees?
- How much does exercise affect our vulnerability to cancer or infectious disease?

Weekly readings and discussions in this seminar course will cover key evidence bearing on these topics from a wide variety of scientific disciplines, including evolutionary biology, paleoanthropology, behavioral ecology, comparative biology, exercise physiology, biomechanics, medicine, and more. This is a 3 credit hour course.

Course Outcomes/Learning objectives:

At the end of the course, students should have obtained:

- An understanding of how evolution has shaped human physical activity and energetics differently than other species.
- A general knowledge of the diversity of physical activities undertaken by peoples from different cultures around the world, including hunter-gatherer and other subsistence societies.
- A broad understanding of the evolutionary theories and principles that biological anthropologists employ to understand energetics and the health impacts of physical activity.
- The ability to read and engage with the primary scientific literature on human energetics, physical activity, and health.
- A grasp of the tools/methodologies available to study physical activity and health from an evolutionary perspective.
- A comprehensive understanding of why and how physical activity is beneficial to human health.

Course prerequisites:

This is a course for upper-level undergraduates and graduate students. Although there are no specific course prerequisites, a background in biological anthropology is assumed and students will be expected to be capable of reading and engaging with articles in the primary literature.

Instructor

Dr. Thomas Kraft (he, him, his)

Email: thomas.kraft@utah.edu

About me: I am a behavioral ecologist interested in how interactions between social behavior, culture, and the environment shape human health and aging. I conduct ethnographic fieldwork with contemporary small-scale subsistence societies (hunter-gatherer and horticulturalist) in tropical environments, utilizing tools and theory from ecology, evolutionary biology, biomedicine, and anthropology to further our understanding of human evolutionary biology. Two questions central to my current research are: How do processes of environmental change, market integration, and sedentarization interact to shape physical activity and health in transitioning populations? And how do changes in social behavior and norms that accompany acculturation affect health disparities? I am a co-founder and director of the Orang Asli Health and Lifeways Project, a longitudinal study of health and behavior in Peninsular Malaysia. For more about my field project in Malaysia, see: <https://www.orangaslihealth.org/>

Contacting me by email: At some points during the semester, my email inbox gets very full, but I do want to hear from you. If you email me and do not hear back from me within two business days, please send a follow up email. I will appreciate the gentle reminder.

Teaching and Learning Methods:

This is a discussion (seminar style) course that will involve a great deal of reading followed by in-depth conversation and the dissection of concepts, theories, methods, and ideas. Learning to engage with the primary scientific literature is a key objective of this class, and thus students will be asked to read cutting-edge work that is necessarily dense and geared towards specialists. As part of this class, students will also engage in some experiential learning exercises involving tracking physical activity. There will be no quizzes or exams, and only some classes will include short lectures. Nevertheless, the course is designed to be challenging and you will need to think and work hard to get the most out of it. I expect everyone to learn a lot and have fun in the process.

During class meetings, I will be committed to fostering a learning environment where diverse perspectives are heard and valued. I request that all of you work with me in creating a classroom culture based on open communication, mutual respect, and inclusion. We will approach all discussions with respect and civility to ensure a welcoming space for everyone.

Grading Policy (Evaluation Methods & Criteria):

Category	Grade contribution
Weekly journal assignment	25%
Discussion participation	25%
Discussion leads	10%
Physical activity tracking	10%
Final project	30%

University of Utah Grading Scale		
	Score	GPA
A	: 93-100	4.0
A-	: 90-92	3.7
B+	: 87-89	3.3
B	: 83-86	3.0
B-	: 80-82	2.7
C+	: 77-79	2.3
C	: 73-76	2.0
C-	: 70-72	1.7
D+	: 67-69	1.3
D	: 63-66	1.0
D-	: 60-62	0.7
E	: 0-59	0.0

Descriptions of requirements for the course:

1. Complete all the assigned readings prior to coming to class meetings.

In all likelihood, this will be the most difficult part of this course. Each week, there will be multiple readings to complete that consist of book chapters and scientific journal articles. The readings for this course include much of what I consider to be the most

interesting and influential scientific writings on the subject of human physical activity. Many of the articles are true classics, and I fully expect you to be fascinated and inspired by them as I have been. Over the course of the semester, we will also read the recently published book, "Exercised: Why Something We Never Evolved to Do Is Healthy and Rewarding" (by Daniel E. Lieberman). This is a new book highlighting cutting edge research on physical activity for a general audience that you are likely to find both enlightening and fun to read.

I realize that scientific journal articles can be dense with information and often hard to follow and fully understand. Whenever you find yourself struggling to grasp what you are reading, always keep in mind that you are not alone. We will have plenty of opportunity to discuss these articles as a group during class meetings where you can ask questions and draw on the collective knowledge of your peers.

In the first few weeks of class, you will have access to the required book chapters via Inclusive Access (I will also post PDF versions of the assigned book chapters on the course Canvas page). After that, you can opt out of the Inclusive Access program and purchase a hard copy of the book at the UofU bookstore or online, or you can opt to continue with Inclusive Access. All other assigned readings for the course are journal articles and listed at the end of this document. PDF versions of these articles will be provided on the course website.

***For graduate students (enrolled in 6451) only: Note that a number of extra readings marked on the schedule below are required for graduate students, but optional for undergraduate students in the class.**

2. Attend class meetings and participate in discussions.

Attendance at class meetings is expected. Because this is a discussion based seminar course, participation is critical to the learning experience and will form a significant portion of your grade. At the start of each meeting, there will be some sort of exercise to get the creative juices in our brains flowing. Next, I or another member of the class will provide a short introduction to the topic of the day. Then, for the vast majority of the meeting, we will have a group discussion about the day's topic and assigned readings. Before each meeting, to help prepare for discussions, I will provide you with a list of questions to think about as you complete the assigned readings.

If you cannot attend a particular class meeting due to an emergency or other unforeseen circumstance, please email me *at least 48 hours in advance* of the meeting that you need to miss. I have great respect for students who are balancing their pursuit of education with the responsibilities of having a job or caring for children and other family members. If you run into challenges that require you to miss a meeting, please let me know so that we can find accommodations.

3. Leading class discussions.

Throughout the semester, you will be asked to lead several of our weekly class discussions by providing an introduction to the reading material and thoughts/questions to guide discussion. During each class, there will therefore be 1-3 Discussion Leaders, each assigned one of our weekly readings. These discussions usually last for 30 min – 1 hour.

Here are more specific guidelines: Discussion leaders will read and synthesize the content of an assigned article for the week. Typically this should begin with a synopsis of article covering who the authors are and what are their fields of study, the major question addressed by the paper, the methods/approach utilized, the results found, and how the

authors interpret their results in terms of answering the overall question addressed by the research. Giving an overview of the paper is key for getting us all on the same page in understanding, and also for giving other students that chance to ask questions to the discussion leader and one another.

However, describing the paper is NOT the only responsibility of the discussion leader. Once we are all on the same page about the objectives/results/outcome of the paper, the discussion leader should be prepared to engage the class with thought provoking questions on the theme we are discussing. These could be questions about how the research was performed, future research questions, or how the theme relates to other individuals in the class. Discussion leaders should therefore come to class with at least 3 prepared comments or questions meant to foster quality discussion amongst the class and instructor.

During our first class meeting I will provide further advice/guidance on how to do this successfully.

4. Complete weekly journal assignment.

Each week throughout the semester, I will post an assignment on Canvas with questions that should be completed *prior to coming to class*. The purpose of these assignments is to ensure that students are keeping up with course readings and gaining comprehension of material. A secondary goal is to develop your own thinking on human physical activity and energetics. Throughout the semester, as you gain an increasingly complex understanding of the subject matter, your entries/responses should be making connections among the various topics covered.

Responses will be submitted electronically via Canvas and one lowest score will be dropped.

***For graduate students (enrolled in 6451) only: You may be required to complete journal assignments with extended questions, particularly those pertaining to readings that are required for graduate students but supplementary for undergraduates.**

5. Keep track of your daily physical activity levels.

Since this is a course on the study of human physical activity, throughout the semester, we are going to study our own physical activity patterns. And we are going to try to do so in a way that promotes social engagement, by using a smartphone app called Pacer (www.mypacer.com). Pacer is a free and easy-to-use tool for measuring daily step counts, as well as sharing information and photos among users. I have created a private group in Pacer called "ANTH 5451/6451 (Fall 2023)" that you all will be invited to join, which will allow us to keep track of our daily step counts as a group. The group is meant for fun and to encourage us to pay closer attention to our physical activity levels. What the group is NOT meant for is competition or to make us feel guilty about our physical activity levels. If for whatever reason you are uncomfortable sharing your daily step counts with the group, that is absolutely fine. If you want, when you download Pacer, you can create your account using a fake name, which will allow you to join the group without anybody (except me) knowing who you are. You may choose to use Pacer to keep track of your steps but choose not to join the group. If you do not have a smartphone, please let me know, and I will loan you a Fitbit to use to measure your daily step counts. Throughout the

semester, you will be asked to reflect on your own data in relation to course material.

6. Final project.

Starting near the middle of the semester, you will be asked to begin planning a final project due at the end of the course that will consist of your choice of the following options:

(i) A practice grant write-up, written in the form of an NSF Graduate Research Fellowship Program (GRFP) application (2-3 pages in length). This application may be based on any topic related to energetics or physical activity covered in the course. For the purposes of the application, you can assume you have access to any field site in the world or specialized equipment, so dream big! Students working on real grants for graduate school or other purposes may petition to write a proposal in an alternative format.

(ii) A short original research paper, making use of quantitative data relevant to topics covered in this class. This would typically involve students who have their own primary data available, but I will also provide the class with relevant data sets from the National Health and Nutrition Examination Survey (NHANES) and instructions on accessing and utilizing these data as well as other available datasets. Papers do not need to include heavy quantitative or statistical analysis unless desired, and should instead focus on the graphical presentation of ideas and hypothesis testing with supporting information.

Final projects will be completed solo, although students with exceptional project ideas may request to work in pairs. Part of the grade will be based on a “project pitch” and short class presentation at the end of the semester. More information on the format/expectations of the final project will be provided during the semester. Some class time will also be devoted to working on these projects.

***For graduate students (enrolled in 6451) only: Note that final project expectations for graduate students will be different (i.e. considerably higher) than for undergraduates. Specifically, your final project should aim to be of sufficient quality that it could be submitted as a real application by the time it is due.**

Course Policies

Attendance & Punctuality: *This is a discussion-based course and thus the quality of the course is dependent on student participation. It is not possible for students to make up material missed in class after the fact. As such, attendance is required. Each student is allowed one unexcused absence during the semester. After that, your participation grade for any missed class will receive no credit. If you are unable to make it to class for a legitimate reason, please contact me in advance so that arrangements can be made on a case by case basis.*

Electronic Devices in Class: *The use of electronic devices for anything other than class related reasons will not be tolerated.*

Canvas: *All materials and assignments will be made accessible via a Canvas site online.*

Late assignments: *Due to the need for students to prepare assignments in advance of coming to class to facilitate productive discussion, late assignments will incur a heavy penalty of 20% per day. Please let me know in advance if you are unable to complete an assignment due to external factors and I will do my best to accommodate.*

Pronouns: *Class rosters are provided to the instructor with the student’s legal name as well as “Preferred first name” (if previously entered by you in the Student Profile section of your CIS account, which managed can be managed at any time). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class or on assignments. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support, please reach out to the LGBT Resource Center. https://lgbt.utah.edu/campus/faculty_resources.php*

Inclusivity: *It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.*

Meeting schedule:

*Articles marked with an asterisk are ONLY REQUIRED FOR GRADUATE STUDENTS (6451 level enrollment). For undergraduates in 5451, these are great supplementary articles but are not required readings. Read these articles only if you are especially interested in the topic. If you are not very interested in the topic, just read the abstract of these articles.

Week	Date	Topic	Readings
Week 1	Aug 21	Introduction	No readings
Week 2	Aug 28	The myth of the athletic savage	Lieberman ch. 1 Norman 1976 McDougall 2004 Lieberman et al. 2020 *Collier 2007 *Gurven & Lieberman 2020
Week 3	Sept 4	NO CLASS: LABOR DAY	
Week 4	Sept 11	Why be physically inactive? (energy expenditure trade-offs)	Lieberman ch. 2 Pontzer 2017a Gibson & Mace 2006 Kramer & Ellison 2010 Pontzer et al. 2016a *Urlacher et al. 2019 Optional: Careau et al. 2021

Week 5	Sept 18	Human physical inactivity: Sitting, squatting, & sleeping	Lieberman ch. 3 & 4 Yetish et al. 2015 Raichlen et al. 2020 Hewes 1955 *Smit et al 2019
Week 6	Sept 25	Why be physically active? (why and how hard do humans work)	Church et al. 2011 Crittenden 2016 Pontzer et al. 2016b Kraft et al. 2021 *Leonard & Robertson 1997 *Kaplan D. 2000
Week 7	Oct 2	Human brawn: Speed, strength, & fighting	Lieberman ch. 5, 6, & 7 Carrier 2004 O'Neill et al. 2017 *Wrangham 2018
Week 8	Oct 9	NO CLASS: FALL BREAK	
Week 9	Oct 16	Human endurance: Walking (including <i>Australopithecus</i> & the origins of bipedalism)	Lieberman ch. 8 Lovejoy 1988 Sockol et al. 2007 Pontzer 2017 Pontzer et al 2014* Stern 2000* Ward 2002*
Week 10	Oct 23	Human endurance: Running and dancing	Lieberman ch. 9 Carrier 1984 Bramble & Lieberman 2004 Liebenberg 2006 <i>Podcast (listen prior to class): "Running after antelope"</i> *Laland 2016
Week 11	Oct 30	Workshop day: Final project	Due: final project initial ideas
Week 12	Nov 6	Social & environmental influences on human physical activity	Due: final project pitch Mauss 1935 Bornstein & Borstein 1976 Wallace et al. 2022 Bauman et al. 2012 *Lieberman et al. 2010
Week 13	Nov 13	Gender, race, and physical activity	Marlowe 2007 Young 1980 Roth & Basow 2004 Dutch 2020 *Althoff et al. 2017 *McGuire-Adams & Giles 2018 *Smith-Tran 2020

Week 14	Nov 20	Co-evolution of human brains & physical activity	Lieberman ch. 10 + 11 Raichlen & Alexander 2020 Raichlen & Polk 2013 Raichlen et al. 2012 Keeney et al. 2008*
Week 15	Nov 27	Why is physical activity good for our health?	Lieberman ch. 12 & 13 Lieberman 2015 Pontzer 2018 Lee et al. 2012 *Ekelund et al. 2019 <u>Supp readings:</u> Careau et al. 2021 Kaplan et al. 2017 Shave et al. 2019 *Raichlen et al. 2017 Raichlen & Alexander 2017
Week 16	Dec 4	Final project presentations and closing thoughts	No readings
Week 17	Dec 12	Final projects due by 5 pm MST	

Note: This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas.

Reading list

- Althoff T, et al. (2017) Large-scale physical activity data reveal worldwide activity inequality. *Nature* 547, 336–339
- Bauman AE, et al. (2012) Correlates of physical activity: why are some people physically active and others not? *Lancet* 380, 258–271
- Berenbaum F, et al. (2018) Modern-day environmental factors in the pathogenesis of osteoarthritis. *Nature Reviews Rheumatology* 14, 674–681
- Bornstein MH, Bornstein HG (1976) The pace of life. *Nature* 259, 557–559
- Bramble DM, Lieberman DE (2004) Endurance running and the evolution of Homo. *Nature* 432, 345–352
- Careau, V., Halsey, L.G., Pontzer, H., Ainslie, P.N., Andersen, L.F., Anderson, L.J., Arab, L., Baddou, I., Bedu-Addo, K., Blaak, E.E. and Blanc, S. (2021) Energy compensation and adiposity in humans. *Current Biology*, 31(20), 4659-4666.
- Carrier DR (1984) The energetic paradox of human running and hominid evolution. *Current Anthropology* 25, 483–495
- Carrier DR (2004) The running-fighting dichotomy and the evolution of aggression in hominids. In, *From Biped to Strider: The Emergence of Modern Human Walking, Running, and Resource Transport* (J Meldrum, C Hilton eds.) Kluwer/Plenum Press: New York. pp. 135–162
- Collier BS (2007) “To bring honor to my village”: Steve Gachupin and the community ceremony of Jemez running and the Pike’s Peak Marathon. *Journal of the West* 46, 62-71.
- Chirchir H, et al. (2014) Recent origin of low trabecular bone density. *Proceedings of the National Academy of Sciences USA* 112, 366–371
- Church TS, et al. (2011) Trends over 5 decades in U.S. occupation-related physical activity and their associations with

obesity. PLoS ONE 6, e19657

Crittenden AN (2016). Children's foraging and play among the Hadza. In, *Origins and Implications of the Evolution of Childhood* (CL Meehan, AN Crittenden eds.) University of New Mexico Press: Albuquerque. pp. 155–172

Dunsworth HM, et al. (2012) Metabolic hypothesis for human altriciality. *Proceedings of the National Academy of Sciences USA* 109, 15212–15216

Ekelund U, et al. (2019) Dose-response associations between accelerometry measured physical activity and sedentary time and all cause mortality: systematic review and harmonised meta-analysis. *British Medical Journal* 366, I4570

Gibson MA, Mace R (2006) An energy-saving development initiative increases birth rate and childhood malnutrition in rural Ethiopia. *PLoS Medicine* 3, e87

Hewes G (1955) World distribution of certain postural habits. *American Anthropologist* 57, 231–244

Hillman CH, et al. (2008) Be smart, exercise your heart: exercise effects on brain and cognition. *Nature Reviews Neuroscience* 9, 58–65

Holowka NB, et al. (2018) Foot strength and stiffness are related to footwear use in a comparison of minimally- vs. conventionally-shod populations. *Scientific Reports* 8, 3679

Kaplan H, et al. (2017) Coronary atherosclerosis in indigenous South American Tsimane: a cross-sectional cohort study. *Lancet* 389, 1730–1739

Kaplan (2000) The darker side of the “original affluent society.” *Journal of Anthropological Research* 56, 301-324.

Kaptchuk TJ, Miller FG (2015) Placebo effects in medicine. *New England Journal of Medicine* 373, 8–9

Kaptchuk TJ, et al. (2020) Placebos in chronic pain: evidence, theory, ethics, and use in clinical practice. *British Medical Journal* 370, m1668

Keeney BK, et al. (2008) Differential response to a selective cannabinoid receptor antagonist (SR141716: rimonabant) in female mice from lines selectively bred for high voluntary wheel- running behavior. *Behavioral Pharmacology* 19, 812–820

Kraft TS, et al. (2021) The energetics of uniquely human subsistence strategies. *Science*.

Kramer KL, Ellison PT (2010) Pooled energy budgets: resituating human energy allocation trade-offs. *Evolutionary Anthropology* 19, 136–147

Laland K, et al. (2016) The evolution of dance. *Current Biology* 26, R5-R9.

Lee IM, et al. (2012) Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 380, 219–229

Leonard WR, Robertson ML (1997) Comparative primate energetics and hominid evolution. *American Journal of Physical Anthropology* 102, 265–281

Liebenberg L (2006) Persistence hunting by modern hunter-gatherers. *Current Anthropology* 47, 1017–1026

Lieberman DE (2015) Is exercise really medicine? An evolutionary perspective. *Current Sports Medicine Reports* 14, 313–319

Lieberman DE (2020) *Exercised: Why Something We Never Evolved to Do Is Healthy and Rewarding*. Pantheon: New York.

Lieberman DE, et al. (2006) The human gluteus maximus and its role in running. *Journal of Experimental Biology* 209, 2143–2155

Lieberman DE, et al. (2010) Foot strike patterns and collision forces in habitually barefoot versus shod runners. *Nature* 463, 531–535

Lieberman DE, et al. (2020) Running in Tarahumara (Rarámuri) culture: persistence hunting, footracing, dancing, work, and the fallacy of the athletic savage. *Current Anthropology* 61, 356–379

Lovejoy CO (1988) Evolution of human walking. *Scientific American* 259, 118–125

Mauss M (1935) Les techniques du corps [Techniques of the body]. *Journal de Psychologie* 32, 271–293

McDougall C (2004) *Secrets of the Tarahumara*. *Runner's World* (December issue)

Norman J (1976) The Tarahumaras: Mexico's long distance runners. *National Geographic* 149, 702–718

O'Neill MC, et al. (2017) Chimpanzee super strength and human muscle evolution. *Proceedings of the National Academy of Sciences USA* 114, 7343–7348

- Pagnotti GM, et al. (2019) Combating osteoporosis and obesity with exercise: leveraging cell mechanosensitivity. *Nature Reviews Endocrinology* 15, 339–355
- Pontzer, H., Raichlen, D. A., & Rodman, P. S. (2014). Bipedal and quadrupedal locomotion in chimpanzees. *Journal of Human Evolution*, 66, 64-82.
- Pontzer H, et al. (2016a) Constrained total energy expenditure and metabolic adaptation to physical activity in adult humans. *Current Biology* 26, 410–417
- Pontzer H, et al. (2016b) Metabolic acceleration and the evolution of human brain size and life history. *Nature* 533, 390–392
- Pontzer H (2017a) The exercise paradox. *Scientific American*, 316:26-31.
- Pontzer H (2017b) Economy and endurance in human evolution. *Current Biology* 27, R613– R621
- Pontzer H (2018) Energy constraint as a novel mechanism linking exercise and health. *Physiology* 33, 384–393
- Raichlen DA, Polk JD (2013) Linking brains and brawn: exercise and the evolution of human neurobiology. *Proceedings of the Royal Society B: Biological Sciences* 280, 20122250
- Raichlen DA, Alexander GE (2017) Adaptive capacity: an evolutionary neuroscience model linking exercise, cognition, and brain health. *Trends in Neurosciences* 40, 408–421
- Raichlen DA, et al. (2012) Wired to run: exercise-induced endocannabinoid signaling in humans and cursorial mammals with implications for the “runner’s high”. *Journal of Experimental Biology* 215, 1331–1336
- Raichlen DA, et al. (2014) Evidence of Levy walk foraging patterns in human hunter-gatherers. *Proceedings of the National Academy of Sciences USA* 111, 728–733
- Raichlen DA, et al. (2017) Physical activity patterns and biomarkers of cardiovascular disease risk in hunter-gatherers. *American Journal of Human Biology* 29, e22919
- Raichlen DA, et al. (2020) Sitting, squatting, and the evolutionary biology of human inactivity. *Proceedings of the National Academy of Sciences USA* 117, 7115–7121
- Raichlen DA, Alexander GE (2020) Why your brain needs exercise. *Scientific American* 322, 26-31.
- Roach NT, et al. (2013) Elastic energy storage in the shoulder and the evolution of high-speed throwing in Homo. *Nature* 498, 483–486
- Shave RE, et al. (2019) Selection of endurance capabilities and the trade-off between pressure and volume in the evolution of the human heart. *Proceedings of the National Academy of Sciences USA* 116, 19905–19910
- Smit AN, et al. (2019) Sleep timing and duration in indigenous villages with and without electric lighting on Tanna Island, Vanuatu. *Scientific Reports* 9, 17278.
- Sockol MD, et al. (2007) Chimpanzee locomotor energetics and the origin of human bipedalism. *Proceedings of the National Academy of Sciences USA* 104, 12265–12269
- Stern JT Jr. (2000) Climbing to the top: a personal memoir of Australopithecus afarensis. *Evolutionary Anthropology* 9, 113–133
- Urlacher SS, et al. (2019) Constraint and trade-offs regulate energy expenditure during childhood. *Science Advances* 5, eaax1065
- Venkataraman VV, et al. (2018) Locomotor constraints favour the evolution of the human pygmy phenotype in tropical rainforests. *Proceedings of the Royal Society B: Biological Sciences* 285, 20181492
- Vaanholt LM, et al. (2010) Exercising for life? Energy metabolism, body composition, and longevity in mice exercising at different intensities. *Physiological and Biochemical Zoology* 83, 239-251.
- Wallace IJ, et al. (2015) Osteoporosis. *Evolution, Medicine, and Public Health* 2015, 343
- Wallace IJ, et al. (2017) Knee osteoarthritis has doubled in prevalence since the mid-20th century. *Proceedings of the National Academy of Sciences USA* 114, 9332–9336
- Wallace IJ, et al. (2018) Sports and the human brain: an evolutionary perspective. In, *Sports Neurology* (B Hainline, RA Stern eds.) Elsevier: San Diego. pp. 3–10
- Wallace IJ, et al. (2019) Knee osteoarthritis risk in non-industrial societies undergoing an energy balance transition: evidence from the indigenous Tarahumara of Mexico. *Annals of the Rheumatic Diseases* 78, 1693–1698
- Ward CV (2002) Interpreting the posture and locomotion of Australopithecus afarensis: where do we stand? *American Journal of Physical Anthropology* 45 (suppl. 35), 185–215

- Warden SJ, et al. (2014) Physical activity when young provides lifelong benefits to cortical bone size and strength in men. *Proceedings of the National Academy of Sciences USA* 111, 5337–5342
- Warrener AG, et al. (2015) A wider pelvis does not increase locomotor cost in humans, with implications for the evolution of childbirth. *PLoS ONE* 10, e0118903
- Wiessner P (2014) Embers of society: firelight talk among the Ju/'hoansi Bushmen. *Proceedings of the National Academy of Sciences USA* 111, 14027–14035
- Wrangham R (2018) Two types of aggression in human evolution. *Proceedings of the National Academy of Sciences USA* 115, 245–253
- Yetish G, et al. (2015) Natural sleep and its seasonal variations in three pre-industrial societies. *Current Biology* 25, 2862–2868

Resources

Ten Simple Rules for Reading a Scientific Paper: For tips on how to read scientific papers, see this article: (<https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1008032>)

University Policies

1. ***The Americans with Disabilities Act.*** The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

- ***If in-class attendance is a necessary component of the course for pedagogical reasons (e.g., laboratories, studios, or artistic training), state it explicitly.***

Use this standard language: “Given the nature of this course, attendance is required and adjustments cannot be granted to allow non-attendance. However, if you need to seek an ADA accommodation to request an exception to this attendance policy due to a disability, please contact the Center for Disability and Access (CDA). CDA will work with us to determine what, if any, ADA accommodations are reasonable and appropriate

2. ***University Safety Statement.*** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.
3. ***Addressing Sexual Misconduct.*** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential

consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

4. **COVID-19 Fall 2023 Statement**

The COVID-19 guidelines for the University of Utah are adapted often due to the ever-changing status of the pandemic. For the most up-to-date information regarding the campus guidelines, visit <https://coronavirus.utah.edu>.

5. **Undocumented Student Support Statement.** Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit dream.utah.edu.

6. **Drop/Withdrawal Policies.** Students may drop a course within the first two weeks of a given semester without any penalties. Students may officially withdraw (W) from a class or all classes after the drop deadline through the midpoint of a course. A “W” grade is recorded on the transcript and appropriate tuition/fees are assessed. The grade “W” is not used in calculating the student’s GPA. For deadlines to withdraw from full-term, first, and second session classes, see the U’s Academic Calendar.

7. Other important information to consider including:

- a. Student Code: <http://regulations.utah.edu/academics/6-400.php>
- b. Accommodation Policy (see Section Q): <http://regulations.utah.edu/academics/6-100.php>

8. **Student Mental Health Resources**

- *Rates of burnout, anxiety, depression, isolation, and loneliness have noticeably increased during the pandemic. If you need help, reach out for [campus mental health resources](#), including counseling, trainings and other support.*
- *Consider participating in a [Mental Health First Aid](#) or other [wellness-themed](#) training provided by our Center for Student Wellness and sharing these opportunities with your peers, teaching assistants and department colleagues*

9. **Diverse Student Support.** Your success at the University of Utah is important to all of us here! If you feel like you need extra support in academics, overcoming personal difficulties, or finding community, the U is here for you.

Student Support Services (TRIO)

TRIO federal programs are targeted to serve and assist low-income individuals, first-generation college students, and individuals with disabilities.

Student Support Services (SSS) is a TRIO program for current or incoming undergraduate university students who are seeking their first bachelor's degree and need academic assistance and other services to be successful at the University of Utah.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

Student Support Services (TRIO)

801-581-7188

trio.utah.edu

Room 2075

1901 E. S. Campus Dr.

Salt Lake City, UT 84112

American Indian Students

The AIRC works to increase American Indian student visibility and success on campus by advocating for and providing student centered programs and tools to enhance academic success, cultural events to promote personal well-being, and a supportive “home-away-from-home” space for students to grow and develop leadership skills.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

American Indian Resource Center

801-581-7019

diversity.utah.edu/centers/airc

Fort Douglas Building 622

1925 De Trobriand St.

Salt Lake City, UT 84113

Black Students

Using a pan-African lens, the Black Cultural Center seeks to counteract persistent campus-wide and global anti-blackness. The Black Cultural Center works to holistically enrich, educate, and advocate for students, faculty, and staff through Black centered programming, culturally affirming educational initiatives, and retention strategies.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

Black Cultural Center

801-213-1441

diversity.utah.edu/centers/bcc

Fort Douglas Building 603

95 Fort Douglas Blvd.

Salt Lake City, UT 84113

Students with Children

Our mission is to support and coordinate information, program development and services that enhance family resources as well as the availability, affordability and quality of child care for University students, faculty and staff.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

Center for Childcare & Family Resources

801-585-5897

childcare.utah.edu

408 Union Building

200 S. Central Campus Dr.

Salt Lake City, UT 84112

Students with Disabilities

The Center for Disability Services is dedicated to serving students with disabilities by providing the opportunity for success and equal access at the University of Utah. They also strive to create an inclusive, safe, and respectful environment.

For more information about what support they provide and links to other resources, view their website or contact:

Center for Disability Services

801-581-5020

disability.utah.edu

162 Union Building

200 S. Central Campus Dr.

Salt Lake City, UT 84112

Students across Intersectional Identities and Experiences

The Center for Equity and Student Belonging (CESB) creates community and advocates for academic success and belonging for students across inter-sectional identities and experiences among our African, African American, Black, Native, Indigenous, American Indian, Asian, Asian American, Latinx, Chicanx, Pacific Islander, Multiracial, LGBTQ+, Neurodiverse and Disabled students of color.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

Center for Equity and Student Belonging (CESB)

801-581-8151

diversity.utah.edu/centers/CESB/

235 Union Building

200 S. Central Campus Dr.
Salt Lake City, UT 84112

English as a Second/Additional Language (ESL) Students

If you are an English language learner, there are several resources on campus available to help you develop your English writing and language skills. Feel free to contact:

Writing Center

801-587-9122

writingcenter.utah.edu

2701 Marriott Library
295 S 1500 E
Salt Lake City, UT 84112

English Language Institute

801-581-4600

continue.utah.edu/eli

540 Arapeen Dr.
Salt Lake City, UT 84108

Undocumented Students

Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles that prevent you from engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center.

Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families.

For more information about what support they provide and links to other resources, view their website or contact:

Dream Center

801-213-3697

dream.utah.edu

1120 Annex (Wing B)
1901 E. S. Campus Dr.
Salt Lake City, UT 84112

LGBTQ+ Students

The LGBTQ+ Resource Center acts in accountability with the campus community by identifying the needs of people with a queer range of [a]gender and [a]sexual experiences and responding with university-wide services.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

LGBTQ+ Resource Center

801-587-7973

lgbt.utah.edu (Links to an external site.)

409 Union Building

200 S. Central Campus Dr.

Salt Lake City, UT 84112

Veterans & Military Students

The mission of the Veterans Support Center is to improve and enhance the individual and academic success of veterans, service members, and their family members who attend the university; to help them receive the benefits they earned; and to serve as a liaison between the student veteran community and the university.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

Veterans Support Center

801-587-7722

veteranscenter.utah.edu (Links to an external site.)

418 Union Building

200 S. Central Campus Dr.

Salt Lake City, UT 84112

Women

The Women's Resource Center (WRC) at the University of Utah serves as the central resource for educational and support services for women. Honoring the complexities of women's identities, the WRC facilitates choices and changes through programs, counseling, and training grounded in a commitment to advance social justice and equality.

For more information about what support they provide, a list of ongoing events, and links to other resources, view their website or contact:

Women's Resource Center

801-581-8030

womenscenter.utah.edu

411 Union Building

200 S. Central Campus Dr.
Salt Lake City, UT 84112

Inclusivity at the U

The Office for Inclusive Excellence is here to engage, support, and advance an environment fostering the values of respect, diversity, equity, inclusivity, and academic excellence for students in our increasingly global campus community. They also handle reports of bias in the classroom as outlined below:

Bias or hate incidents consist of speech, conduct, or some other form of expression or action that is motivated wholly or in part by prejudice or bias whose impact discriminates, demeans, embarrasses, assigns stereotypes, harasses, or excludes individuals because of their race, color, ethnicity, national origin, language, sex, size, gender identity or expression, sexual orientation, disability, age, or religion.

For more information about what support they provide and links to other resources, or to report a bias incident, view their website or contact:

Office for Inclusive Excellence

801-581-4600

inclusive-excellence.utah.edu (Links to an external site.)

170 Annex (Wing D)

1901 E. S. Campus Dr.

Salt Lake City, UT 84112

Other Student Groups at the U

To learn more about some of the other resource groups available at the U, check out:

getinvolved.utah.edu/

studentsuccess.utah.edu/resources/student-support