

Penn Positive Psychology Center Annual Report

May 25, 2022

Martin Seligman, Director

Peter Schulman, Executive Director

Table of Contents:

I. Research Summaries

II. Recent News

Selected National Media

Awards and Recognition

III. Organization and Operation

PPC Personnel

PPC Advisory Board

Research Grants

IV. Education: Graduate, Undergraduate, and Non-Credit

Master of Applied Positive Psychology Program (MAPP)

Online Certificate through LPS: Applied Positive Psychology (APOP)

Online Certificate on Coursera: Foundations of Positive Psychology

Education Through Popular Websites

V. Resilience Training Programs and Penn Outreach

VI. Research Publications 2021-2022

This is a report on the activities of the Positive Psychology Center (PPC). The PPC was officially created November 7, 2003 and is thriving intellectually and financially. It is a leading center in the world for research, education, application and the dissemination of Positive Psychology. It is widely recognized in both the scholar community and public press. The PPC is financially self-sustaining and contributes substantial overhead to Penn.

The mission of the PPC is to promote empirical research, education, training, applications, and the dissemination of Positive Psychology. Positive Psychology is the scientific study of the strengths that enable individuals and communities to thrive. This field is founded on the belief that people want to lead meaningful and fulfilling lives, to cultivate what is best within themselves, and to enhance their experiences of love, work, and play.

I. RESEARCH SUMMARIES

Following are summaries of current research at the Positive Psychology Center . . .

Professor Martin Seligman's Research

[Professor Seligman](#) is presently working on two research initiatives:

First, **Agency**, that the mental state “I can bring about my goals” produces progress and the opposite “I am helpless” produces stagnation.

Agency is a psychological state that has changed the course of history and it is the immediate cause of progress and innovation. In the absence of this mindset, humanity stagnates.

Agency is the belief that I can influence the world, made up of three components: efficacy, optimism, and imagination. Efficacy is the expectation that I can achieve a specific goal now. Optimism is how long into the future I believe I can achieve that goal. Imagination is the range of goals that I believe I can achieve. Efficacy causes trying hard, optimism causes persistence, and imagination causes innovation. These are the mechanisms by which Agency causes progress.

Progress over the sweep of human history has been viewed through the lens of economics, ecology, theology, ‘great man’ biography, and ‘social force’ history, but almost never through the lens of psychology.

Over the last 14,000 years there have been several psychological epochs in which agency changes radically to keep pace with new social and material demands. Before writing, we can infer agency from behaviors such as the control of fire, burial practices, and the invention of agriculture. The first epoch for which we have writing is the Divine Age in which the gods command and humans obey. We have limited agency and not even much ‘self.’ Then, after the Bronze Age, between 1100 BCE and 600 BCE, the balance between the agency of the gods and of humans tilts toward humans. Greece develops much expanded Agency by 400 BCE with considerable efficacy, considerable optimism, and enormous imagination. Material, technological, artistic and political progress all follow from this Agentive self. This is true, and at about the same time, of Greece, of the Judeo-Christian Bible, and of China. Chinese history adds the importance of the balance between “I” agency and “We” agency.

As Rome declines, the theology of Augustine, in which only God has true Agency, looms large. The quality of human life in the West becomes miserable and life stagnates for almost one thousand years. Very little is invented, but then, around 1450 CE, an Age of Progress in the West, but not elsewhere, begins as humans re-acquire substantial Agency. The printing press, the New World, Michelangelo and Shakespeare appear. Sadly, the Reformation in 1525 abandons free will and human progress in Europe grinds to a halt. With the overthrow of Puritanism in England in 1660, progress resumes. Newtonian science, vaccination in medicine, true wealth in capitalism, and political revolution all stem from this rebirth of Agency. Agency democratizes, particularly in America, during the Industrial Revolution of 1800 and it becomes almost universal around 1950 as technology explodes.

The world is now in labor, about to birth an Age of Agency populated by fully Agentic individuals who peer far into the future in order to flourish. If potential barriers – nuclear war, pandemic, climate catastrophe, racial warfare, and financial collapse – can be overcome, this will be an age of unprecedented progress. Mindful of the limits of human agency, this will be our first Age of Well-being.

Secondly, that the **mental states of high positive emotion, low negative emotion, and high optimism produce success.**

We examined the relation between positive affect (PA), negative affect (NA), optimism and performance over a four-year period in a sample of 908,096 U.S. Army soldiers. Baseline PA, NA and optimism were found to predict future award attainment. The associations held for both women and men, for enlisted soldiers as well as officers, for several ethnicities, for varying levels of education, and controlling for a number of potential confounds. Soldiers with the highest levels of PA or optimism (or lowest NA) were about twice as likely to receive an award, compared to soldiers with the lowest levels of PA or optimism (or highest NA). The relation between PA, NA, and optimism with award attainment was curvilinear, with the greatest change in award attainment probability occurring between low and moderate levels of PA and optimism and between moderate and high levels of NA.

Professor Angela Duckworth's Research

With Katy Milkman, [Dr. Duckworth](#) is co-directing Behavior Change for Good (BCFG). They recently completed a mega study with Zearn Math, testing more than a dozen treatments aimed at increasing student achievement. They are now planning a BCFG mega study aimed at improving college persistence and performance. The novel feature of this mega study is that the unit of change and level of random assignment will be groups of students, not individual students.

In partnership with National Education Equity Lab and also Wharton-SAS, Dr. Duckworth is planning an RCT field study of Grit Lab 101, a psychoeducational intervention aimed at improving life outcomes for students at Title 1 eligible high schools.

And finally, with doctoral and post-doctoral students, Dr. Duckworth is studying the effects of previewing information on self-efficacy and performance, reference frame bias in questionnaire responses, overconfidence in scientists' predictions of treatment effects, the role of friction in decision-making, and more.

Professor Lyle Ungar's Research

The World Well-Being Project ([WWBP](#)) is a collaboration with Stanford University and Stony Brook University. Led by [Dr. Lyle Ungar](#), WWBP is pioneering scientific techniques for measuring psychological well-being and physical health based on the analysis of language in social media and text message data.

As a collaboration between computer scientists, psychologists, and statisticians, they are shedding new light on the psychosocial processes that affect health and happiness and exploring the potential for our unobtrusive well-being measures to supplement, and in part replace, expensive survey methods.

In the past year, they have used Twitter to study a wide range of regional variations in well-being, for example looking at how concerns about Covid have varied across U.S. counties and over time. They are studying what people's text messages reveal about their healthy and unhealthy drinking habits. They are also starting to extend these methods to work in other languages (Chinese, Spanish, Hindi, etc.) so that they can run similar studies in other countries.

They have also started building "chatbots," computers that can hold text-based conversations, that have adjustable personalities and different levels of empathy. This will eventually allow us to make chatbots that can appropriately respond to people's medical questions, balancing the amount of information and sympathy that they supply. In initial work, they have been testing this out in collaboration with Joao Sedoc at NYU and a team at IBM and Johns Hopkins University to answer questions about Covid vaccinations.

Professor Allyson Mackey's Research

Children will grow up to solve problems we cannot even imagine today. To be successful, they need to learn not only to read and write, but also to reason and imagine. [Dr. Mackey](#) is interested in understanding how children's experiences shape the development of their minds and brains, so we can develop new ways to support their learning. She has focused on how children's experiences influence neuroplasticity, the brain's ability to change. During development, maturational processes stabilize synaptic connections, cementing knowledge and skills. Even once brakes on plasticity are in place, brains retain mechanisms to boost plasticity when learning is essential.

Neurotransmitters, including dopamine, can signal that current neural configurations are a poor match for new inputs. Dr. Mackey's research program examines how early life experiences influence *maturation* and *motivation*, and their consequences for learning. Her research on the theme of maturation reveals how brain structure and function change through childhood, and how the pace of maturation of the brain and the body varies as a function of early life stress. Her work on motivation explores how early experiences shape motivation systems in the brain, and motivational behaviors. Together, these lines of work can inform interventions to improve children's well-being.

Professor James Pawelski's Research

The [Humanities and Human Flourishing Project](#) (HHF), led by [Dr. Pawelski](#), is an interdisciplinary research project that explores how engaging in the arts and humanities brings well-being to individuals and communities. Since its inception in 2014, the HHF Project has spearheaded the development of the Positive Humanities, an emerging field that integrates the rigorous science of positive psychology with the wisdom of the humanities. HHF is interested broadly in the arts and humanities in their relation to human flourishing. To fill a large gap in empirical research on the relation between arts and humanities, engagement and well-being, HHF conducted a large-scale survey study in which we characterize people's most personally significant arts and humanities experiences and everyday activities. The research addresses questions such as: (1) What are the cognitive, affective, and concrete situational features of such experiences and activities? (2) To what extent are the various features of these arts and humanities-related activities associated with different facets of well-being?

In addition to our research spanning across arts and humanities disciplines, HHF is spearheading the research initiative, “Art Museums: Institutions for Well-being,” partnering with various art museums as well as art museum professionals around the globe to understand and promote well-being within these important cultural institutions. HHF is leading several research studies in this domain, including: (1) a review of psychological literature examining art museum visitation and museum program participation and their associations with flourishing-related outcomes; (2) a survey of art museum professionals to learn more about how they see their institutions as venues that promote well-being, we examined the attitudes, strategies, and practices of professionals; (3) a study of the well-being effects of viewing art in a virtual gallery in four sessions across five weeks and how immersion, a theorized mechanism relevant to art engagement and well-being, may facilitate individual gain in well-being; and (4) development and validation of the Core Museum Survey for Well-being to measure the well-being effects of visiting an art museum.

Dr. Jer Clifton’s Research

The [Primals Project](#) promotes empirical research on the origins and psychological impact of primal world beliefs. Primal world beliefs are very simple and general beliefs about the world (e.g., *the world is abundant*) that are generally uncorrelated to demographic backgrounds (e.g., personal wealth) but highly correlated to well-being and behavior patterns (e.g., low depression and curiosity). They also seek to communicate important empirical findings to the public, such as through a recently launched [freely available opportunity](#) for the general public to take the scientifically validated primals survey, get their scores, and participate in research studies in the process.

One of the topics his group is currently researching, for example, is the plasticity of primals. [Dr. Nick Kerry](#) is leading investigations into (a) if demographic backgrounds influence primals (e.g., do rich people see the world as more abundant?), (b) the impact of very extreme life experiences on primals (incarceration for negligent homicide after accidentally killing a loved one; getting cancer; having cystic fibrosis), and (c) if new interventions can influence primals to improve wellbeing. Much of their work is in partnership with others. For example, [Dr. Clifton](#) is working with [Dr. Richard Lerner’s](#) team at Tufts on primals in students, [Dr. Alia Crum](#) at Stanford on the relationship between primals and personality, [Dr. David Yaden](#) at Johns Hopkins on how psilocybin impacts primals, and robotics expert [Dr. Bilge Mutlu](#) at the University of Wisconsin-Madison on giving different primal world beliefs to robots to simulate human personality characteristics.

Max Genecov’s Research

Mr. Genecov has two research initiatives. First, how do very happy people stay happy? This work surveys people with highly stable positive emotions to understand how this stability, rather than just their average emotion, affects their social lives and internal worlds. The mechanisms are also being examined. For the average person, emotions help regulate behavior. Emotions tell you whether to keep going forward or to change tactics and goals. If someone is stably happy, what non-emotional information are they using to navigate challenges and opportunities?

Second is translating concepts and methods between positive psychology and clinical psychology. Important details often get lost across the divide between the study of human

flourishing and the study of mental disorder. For instance, how much of well-being is just psychological distress in reverse, and how much is uniquely positive? How can clinical methods be used to characterize and investigate well-being? Understanding the shared and distinct components of these subfields can help better illustrate the landscape of human experience.

II. RECENT NEWS

Selected national media:

- A February 16, 2022 article in the *MIT Sloan Management Review* featured a large-scale study by Professor Martin Seligman and colleagues, which found that well-being predicts outstanding job performance among one million U.S. Army soldiers.
<https://sloanreview.mit.edu/article/top-performers-have-a-superpower-happiness/>
- A January 20, 2022 *National Endowment for the Arts* podcast featured research led by Professor James Pawelski and his Humanities and Human Flourishing team on art museums as institutions that promote well-being.
<https://www.arts.gov/stories/research-quick-study/quick-study-january-20-2022>
- In July 2021, *US News & World Report* and *Penn Today* spotlighted Professor Angela Duckworth's research on the impact of remote learning on adolescent well-being.
<https://www.usnews.com/news/education-news/articles/2021-07-14/remote-students-of-all-races-incomes-suffered-during-pandemic>
<https://penntoday.upenn.edu/news/COVID-pandemic-remote-learning-affected-high-schoolers-social-emotional-health>
- In August 2021, the *Harvard Business Review* published an article co-authored by Dr. Karen Reivich on cultivating a sense of wonder and awe, to rejuvenate, calm our anxieties in these trying times, and promote well-being.
<https://hbr.org/2021/08/why-you-need-to-protect-your-sense-of-wonder-especially-now>

Awards and Recognition:

- *Academic Influence* cited Professor Martin Seligman as the single most influential psychologist in the world in the time period 2010-2020, and one of the top 10 most influential psychologists of the last 50 years (1970-2020).
<https://academicinfluence.com/rankings/people/most-influential-psychologists-today>
- Leona Brandwene, Associate Director of Penn's Master of Applied Positive Psychology (MAPP) program, was the recipient of the 2021 *UPCEA Mid-Atlantic Region* Excellence in Teaching Award.
<https://www.lps.upenn.edu/about/news/congrats-leona-brandwene-recipient-2021-upcea-mid-atlantic-region-excellence-teaching>
- Leona Brandwene was a recipient of the 2021 award for Distinguished Teaching in Professional Graduate Programs in the School of Arts and Sciences.
<https://www.college.upenn.edu/teaching-awards>

- In March 2021, Dr. Allyson Mackey received a National Science Foundation Career award for her work combining approaches in neuroscience, psychology, and education to predict and improve science learning in early elementary school students. Mackey's work focuses on understanding how early experiences shape the brain and how brain development supports learning, with the aim of developing strategies for improved learning in STEM (Science, Technology, Engineering, and Math).
<https://www.sas.upenn.edu/news/allyson-mackey-receives-nsf-award-study-early-science-learning>
- On April 19, 2022, Dr. Karen Reivich was awarded honorary membership to the *Penn Friar Senior Society* for “outstanding work, enthusiasm, and commitment to Penn.”
<https://friarsseniorsociety.com/honorary-friars/>

III. **ORGANIZATION AND OPERATION**

PPC Personnel:

Martin Seligman, Ph.D., Director of PPC and Zellerbach Family Professor of Psychology
 Peter Schulman, Executive Director
 Angela Duckworth, Ph.D., Christopher H. Browne Distinguished Professor of Psychology
 Allyson Mackey, Ph.D., Assistant Professor of Psychology
 James Pawelski, Ph.D., Professor of Practice, Director of Education
 Karen Reivich, Ph.D., Director of Training Programs
 Lyle Ungar, Ph.D., Professor, Computer and Information Science
 Paul Rozin, Ph.D., Professor of Psychology (emeritus)
 Jeremy Clifton, Ph.D., Postdoctoral Fellow, Primals Project Director
 John Hollway, J.D., Associate Dean and Executive Director of the Quattrone Center for the Fair Administration of Justice, Penn Law School
 Howard Blumenthal, Senior Scholar
 Michael Baime, MD, Clinical Associate Professor of Medicine, Penn School of Medicine, Director, Penn Program for Mindfulness

Master of Applied Positive Psychology Program (MAPP):

James Pawelski, Ph.D., Director of Education
 Leona Brandwene, Associate Director
 Aaron Boczkowski, Program Coordinator
 Laura Taylor, Program Assistant Coordinator
 Nicole Stottlemeyer, Assistant Coordinator, Positive Education Programs

Humanities and Human Flourishing Project:

James Pawelski, Ph.D., Principal Investigator
 Sarah Sidoti, M.S.Ed., Assistant Director
 Katherine Cotter, Ph.D., Associate Director of Research
 Damien Crone, Ph.D., Postdoctoral Fellow
 Christa Mahlobo, Ph.D., Postdoctoral Fellow

Agency and the History of Human Progress

Martin E.P. Seligman, Ph.D., Project Director
Noah Love, Research Manager
Jacob Lisner, Data Scientist

Primals Grant:

Jeremy Clifton, Ph.D., Primals Project Director
Rive Cadwallader, Project Manager
Nicholas Kerry, Postdoctoral Fellow

Resilience and Positive Psychology Training Programs:

Karen Reivich, Ph.D., Director of Training Programs
Peter Schulman, Client Development, Operations Oversight
Judy Saltzberg, Ph.D., Instructor and Curriculum Developer
Robert Szybist, MAPP, Instructor and Project Director, PRP for Law Enforcement
Jennifer Knapp, Strategic Advisor
Catherine Thompson, Project Manager
Erin Oelkers, Project Manager
Colleen Fegley, Project Manager
Laura Vriend, Project Coordinator

Happy People Project:

Max Genecov, Graduate Student and Project Leader
Abigail Blyler, Research Manager

World Well Being Research:

Lyle Ungar, Ph.D., Project Director
Garrick Sherman, Data Scientist
Rupa Jose, Postdoctoral Fellow
Tingting Liu, Postdoctoral Fellow

Graduate Student with Dr. Seligman: Max Genecov**Dr. Allyson Mackey's Research: Brain Plasticity and Development:**

Anne Park, Postdoctoral Fellow
Lourdes Delgado Reyes, Postdoctoral Fellow
Ivan Simpson Kent, Postdoctoral Fellow
Morgan Botdorf, Postdoctoral Fellow
Austin Boroshok, Graduate Student
Cassidy McDermott, Graduate Student
Sophie Sharp, Research Coordinator
Isis Cowan, Research Coordinator

Dr. Angela Duckworth's Research: Grit, Self-Control, and Character Development:

Sean Talamas, Executive Director
Paolo Terni, Director, Senior Research Support

Information Technology Support Staff:

Tammer Ibrahim, IT Systems Administrator
Ani Leonhart, IT Systems Support Specialist

Undergraduate Student Assistants: Various Penn student research assistants help with various projects.

PPC Advisory Board:

The advisory board for PPC and the MAPP program includes:

David Brainard

Associate Dean for the Natural Sciences, SAS
Director, Vision Research Center
RRL Professor of Psychology

Nora Lewis

Vice Dean, Professional and Liberal Education

Susan Meyer (emeritus)

Professor of Philosophy

Michael Platt

Professor of Neuroscience, James S. Riepe University Professor
Professor of Neuroscience, Professor of Psychology, Professor of Marketing

Lyle Ungar

Professor of Computer and Information Science

Research Grants**PI MARTIN SELIGMAN RESEARCH GRANTS:**

The Primals Project: Seeding Catalytic Investigations in Psychology, February 2021 to July 2024, Templeton Religion Trust (PI Seligman, Co-PI Clifton).

Penn Resilience Program for Law Enforcement Personnel, January 2018 to September 2023 (PI Seligman), Subcontract from International Association of Chiefs of Police (IACP), under prime award from the U.S. Department of Justice.

PI JAMES PAWELSKI RESEARCH GRANTS:

The Humanities and Human Flourishing: A Multi-Disciplinary Collaboration for Understanding, Assessing and Cultivating Well-Being (Templeton Religion Trust, PI Pawelski).

The Arts and the Science of Well-Being: A Multi-Disciplinary Collaboration for Understanding, Assessing, and Cultivating Human Flourishing (National Endowment for the Arts: Includes designation as an NEA Research Lab. PI Pawelski).

PI ANGELA DUCKWORTH RESEARCH GRANTS:

Using Behavioral Science to Help Students Thrive (Walton Family Foundation, PI Duckworth).

PI ALLYSON MACKEY RESEARCH GRANTS AND FUNDING:

CAREER: Leveraging neuroscience to predict and improve science learning in early elementary school (National Science Foundation, PI Mackey).

The hidden costs of COVID-19 on child development and health: Investigating pathways linking inactivity, adrenarche, and brain development among disadvantaged children (CIFAR, PIs Mackey, Samuel Urlacher, and Thomas McDade).

Evaluating the impact of early cognitive enrichment on brain development (William Penn Foundation, PI Mackey).

CIFAR Azrieli Global Scholar in Child & Brain Development (CIFAR, PI Mackey).

Exploring the Effects of a Curiosity Intervention on Learning, Cognition, Motivation, and Brain Connectivity (Jacobs Foundation, PI Mackey and Bonawitz).

A Feasibility Study of Novel Technologies to Minimize Motion-induced Biases in Functional and Structural MRI of Young, Opioid-affected Cohorts (National Institute on Drug Abuse, PIs Mackey and Tisdall).

Between Encoding and Retrieval: Behavioral and Neural Indices of Reactivation in Children’s Memory Development (National Institute of Child Health and Human Development, PI: Olson, Mackey Co-Investigator).

IV. EDUCATION: GRADUATE, UNDERGRADUATE, AND NON-CREDIT:

The Master of Applied Positive Psychology (MAPP). The MAPP program has completed its seventeenth year and this program has been successful in academic and financial terms. During the pandemic, we quickly transitioned to virtual delivery of this program, with positive results. The number and quality of applicants and matriculates has been consistently high and the students have given the program high marks in their evaluations. Following are the number of applicants and admissions each year:

	<u>2005/6</u>	<u>2006/7</u>	<u>2007/8</u>	<u>2008/9</u>	<u>2009/10</u>	<u>2010/11</u>	<u>2011/12</u>	<u>2012/13</u>
Applications	106	111	123	166	163	181	178	236
Admits	34	36	41	38	45	36	36	36
	<u>2013/14</u>	<u>2014/15</u>	<u>2015/16</u>	<u>2016/17</u>	<u>2017/18</u>	<u>2018/19</u>	<u>2019/20</u>	<u>2020/21</u>
Applications	198	166	162	209	178	189	182	187
Admits	39	32	38	39	42	47	49	43
	<u>2021/22</u>	<u>2022/23</u>						
Applications	223	192						
Admits	39	50 (est.)						

In line with the PPC's stated mission of promoting education, PPC faculty, lecturers, post-doctoral fellows and graduate students teach the following undergraduate and graduate-level courses through the School of Arts and Sciences and the College of Liberal and Professional Education:

Martin Seligman

- MAPP 600: Intro to Positive Psychology (graduate level)

Angela Duckworth

- Psych 005: Grit Lab: Fostering Passion and Perseverance (undergraduate level)
- MAPP 712: Positive Education (graduate level) – Guest Speaker

James Pawelski

- MAPP 602: Foundations of Positive Interventions (graduate level)
- MAPP 710: Humanities and Human Flourishing (graduate level)

Allyson Mackey

- MAPP 712: Positive Education (graduate level)

Leona Brandwene

- MAPP 603: Perspectives on Well-being (graduate level)
- MAPP 714: Applying Positive Interventions in Institutions (graduate level)

Karen Reivich

- MAPP 708: Positive Psychology and Individuals (graduate level)

Judith Saltzberg

- MAPP 708: Positive Psychology and Individuals (graduate level)
- MAPP 800: Capstones (graduate level)

Laura Taylor

- MAPP 602: Foundations of Positive Interventions (graduate level) – Assistant Instructor
- MAPP 710: Humanities and Human Flourishing (graduate level) – Assistant Instructor

Michael Baime

- MAPP 603: Approaches to Well-being (graduate level) – Guest Speaker

David Yaden

- MAPP 601: Research Methods and Evaluation (graduate level)
- MAPP 708: Positive Psychology and Individuals (graduate level) – Guest Speaker

Chris (John) Feudtner

- MAPP 714: Applying Positive Interventions in Institutions (graduate level) – Guest Speaker

Faisal Khan

- MAPP 600: Intro to Positive Psychology (graduate level) – Assistant Instructor
- MAPP 708: Positive Psychology and Individuals (graduate level) – Assistant Instructor

Tamara Myles

- MAPP 708: Positive Psychology and Individuals (graduate level) – Assistant Instructor

Jodi Wellman

- MAPP 708: Positive Psychology and Individuals (graduate level) – Assistant Instructor

Mina Simhai

- MAPP 708: Positive Psychology and Individuals (graduate level) – Assistant Instructor

Courtney Daly

- MAPP 708: Positive Psychology and Individuals (graduate level) – Assistant Instructor

Gloria Park

- MAPP 708: Positive Psychology and Individuals (graduate level) – Guest Speaker
- MAPP 800: Capstone (graduate level) – Assistant Instructor

Eric Patterson

- MAPP 600: Intro to Positive Psychology (graduate level) – Assistant Instructor
- MAPP 710: Humanities and Human Flourishing (graduate level) – Assistant Instructor

Online Certificate through LPS: Applied Positive Psychology (APOP):

The [Applied Positive Psychology \(APOP\) certificate](#) launched in January 2019 with support from the Positive Psychology Center, as a part of Penn’s College of Liberal and Professional Studies (LPS) online Bachelor of Applied Arts and Sciences ([BAAS](#)). This online, accredited degree offers a variety of degree concentrations and certificate “clusters” that are designed to meet the needs of working adults and non-traditional students who wish to pursue a liberal arts education with career enhancement in mind.

- The certificate continues to sustain strong enrollments. In Summer 2021, Fall 2021, and Spring 2022, we have offered 11 courses with a combined total of 350 course enrollments.
- We have replaced APOP 300: The Scientific Method in Positive Psychology with APOP 290: Understanding the Science of Positive Psychology. The new course was developed by Katherine Cotter and was taught in Fall 2021 and Spring 2022.

The APOP four-course certificate launched with its first courses in Spring 2019 and **total course enrollments to date are 1,080**. Those students have learned from 31 different U.S. states, the District of Columbia, and 25 different countries. There is also a six-course “Level 2” certificate. The six courses are:

- 100: Introduction to Positive Psychology
- 120: Human Flourishing: Strengths and Resilience
- 200: Positive Psychology at Work
- 220: Flourishing with Others: Building Thriving Relationships
- 290: Understanding the Science of Positive Psychology
- 320: Morality and the Good Life

APOP develops tools and practices to enhance human flourishing. Students are introduced to the field of Positive Psychology and learn practical strategies that support personal, organizational, and community well-being. The courses teach the theoretical and empirical foundations of human flourishing, how well-being is measured, and what activities increase human flourishing in various contexts and settings.

Online Certificate on Coursera: Foundations of Positive Psychology:

Under the leadership of Dr. Martin Seligman, the Positive Psychology Center and the College of Liberal and Professional Studies produced a five-course online specialization on the Coursera platform called Foundations of Positive Psychology, which launched March 2017. Students learn about the theories, research, and applications of Positive Psychology.

The five courses are taught by Positive Psychology Center personnel, including:

- **Positive Psychology: Martin Seligman’s Visionary Science**, taught by Dr. Seligman.
 - Total Learners as of May 24, 2021: 85,510.
 - Student rating = 4.9 out of 5.0 (4,959 ratings).
- **Positive Psychology: Resilience Skills**, taught by Dr. Karen Reivich.
 - Total Learners as of May 24, 2021: 60,848.
 - Student rating = 4.9 out of 5.0 (1,787 ratings).
- **Positive Psychology: Applications and Interventions**, taught by Dr. James Pawelski.
 - Total Learners as of May 24, 2021: 35,693.
 - Student rating = 4.8 out of 5.0 (1,812 ratings).
- **Positive Psychology: Character, Grit, and Research Methods**, taught by Dr. Angela Duckworth.
 - Total Learners as of May 24, 2021: 21,968.
 - Student rating = 4.4 out of 5.0 (1,006 ratings).
- **Positive Psychology Specialization Project: Design Your Life for Well-Being**, taught by Dr. Martin Seligman.
 - Total Learners as of May 24, 2021: 19,715.
 - Student rating = 4.8 out of 5.0 (663 ratings).

Education Through Popular Websites. The PPC has two popular websites to educate people around the world about the Positive Psychology Center and the field of Positive Psychology:

- <https://www.authentichappiness.sas.upenn.edu/>
 - Google Analytics from May 24, 2021 to May 23, 2022:
 - 2,322,984 Users
 - 25,936,738 Pageviews
 - 943,746 new registered users (7,159,345 since launch in 2004)
 - Heaviest usage is for the online surveys.

- <https://ppc.sas.upenn.edu>
 - Google Analytics from May 24, 2021 to May 23, 2022:
 - 392,040 Users
 - Google’s definition: “Users who have initiated at least one session during the date range.”
 - 838,405 Pageviews
 - Google’s definition: “Pageviews is the total number of pages viewed. Repeated views of a single page are counted.”

Dissemination through Professional Associations:

- **The International Positive Psychology Network (IPPA).** <http://www.ippanetwork.org/>
Dr. Martin Seligman played the lead role in creating IPPA, with contributions from Dr. James Pawelski. IPPA has thousands of members and it’s three-part mission is to promote the science and practice of Positive Psychology to enable individuals and institutions to thrive; to facilitate collaboration among researchers, teachers, students, and practitioners of positive psychology around the world and across academic disciplines; and to share the findings of positive psychology with a broad audience. IPPA virtually hosted the Seventh World Congress in July 2021. IPPA hosted the Sixth World Congress on Positive Psychology in June 2019 in Melbourne, Australia and there were more than 1,200 registrants. The Positive Psychology Center staffed a booth at that conference to promote Penn’s Online Applied Positive Psychology Certificate program (APOP), Penn’s Master of Applied Positive Psychology program (MAPP) and the online Foundations of Positive Psychology Coursera Certificate. Speakers from the PPC included Dr. Martin Seligman, Dr. James Pawelski, among others.

- **The International Positive Education Network (IPEN).** IPEN was created by Dr. Martin Seligman and Lord James O’Shaughnessy to bring together teachers, parents, academics, students, schools, colleges, universities, charities, companies and governments to promote a new approach to education: academics + character + well-being. The goals are to support collaboration, change education practice and reform government policy. IPEN hosted the Second World Positive Education Conference in June 2018 in Fort Worth, Texas and there were more than 600 registrants. The Positive Psychology Center staffed a booth at this conference to promote the MAPP program and the online Foundations of Positive Psychology Coursera Certificate. Speakers from the PPC included Dr. Martin Seligman, Dr. James Pawelski, and Dr. Angela Duckworth.
<http://ipen-festival.com/>

V. RESILIENCE TRAINING PROGRAMS:

Since 2007, we have delivered more than 350 Penn Resilience and Well-Being Programs to more than 60,000 people. Many of these programs are train-the-trainer programs in which we train people how to teach resilience and well-being skills to others, using a structured curriculum. Attendees of these programs have gone on to teach these skills to well over a million people around the world. These train-the-trainer programs are an effective model for large-scale, sustainable dissemination of the resilience skills.

These programs have been delivered to a variety of populations, including health care professionals, educators (secondary and college), U.S. Army soldiers, law enforcement personnel, a professional sports team, and corporate executives and their employees.

Following are clients of our programs . . .

Penn Resilience Program for Law Enforcement Personnel, 2018 to 2023 (PI Seligman), Subaward from International Association of Chiefs of Police (IACP), under prime award from the U.S. Department of Justice.

Penn Resilience and Well-Being Train-the-Trainer Program for University of Notre Dame Students, September 2021 to October 2022.

Penn Resilience and Well-Being Train-the-Trainer Program for Western Governors University Employees, May 2021 to April 2022.

Penn Resilience and Well-Being Train-the-Trainer Program for PSI Pharma Support Inc. Employees, November 2021 to June 2023.

Penn Resilience Program for Indeed Inc. Marketing Employees, July to December 2021.

Penn Resilience and Well-Being Train-the-Trainer Program for Medical Students at the Royal College of Surgeons in Ireland, September 2021 to July 2022.

Penn Resilience Program for Hemophilia Patients and their Caregivers, December 2018 to December 2021 (PI Seligman), Sponsored by Genentech USA, Inc.

Penn Resilience Program for City of Philadelphia First Responders, July 2020 to December 2021 (PI Seligman).

Penn Resilience Program for Oklahoma City Thunder, September 2014 to August 2020.

Penn Resilience Program for Oklahoma City Thunder Community Outreach with Oklahoma City High School Students, January 2018 to June 2020.

Penn Resilience and Well-Being Train-the-Trainer Program for University of Michigan Medical School, 2020.

Penn Resilience and Well-Being Train-the-Trainer Program for Western Governors University, 2020.

Penn Resilience Program for Western Governors University, 2019.

Penn Resilience Program for Oklahoma State University, 2019.

Penn Resilience Program for Alcon Vision, 2019.

Penn Resilience Program for University of Michigan Medical School, 2019.

Penn Resilience and Well-Being Program for Sales Managers at Investors Group, 2019.

Penn Resilience Program for Sentara Healthcare, June 2018.

Penn Well-Being Program for the World Bank, June 2018 (PI Seligman).

Penn Resilience Program for Royal College of Surgeons in Ireland, November 2017.

Positive Psychology Program for Delta Galil Executives, August 2017.

Penn Resilience Program for UAE Ministry of Happiness, March 2017.

Penn Resilience Program for U.S. Department of Defense, Washington Headquarters Services, FY17.

Penn Resilience Program for Deloitte Senior Leaders, September 2016.

Penn Resilience Program for University of Texas System, May 2015 to August 2016 (PI Seligman).

Penn Resilience Program for St. Catherine's School Educators (Australia) FY16.

Penn Resilience Program for Deloitte Clinicians, FY16.

Penn Resilience Program for Kimberly-Clark Professional Global Marketing & Sales Team, FY16.

Penn Resilience Program for U.S. Army, Sept 2014 through Sept 2016 (PI Seligman).

U.S. Army Resilience Training of Soldiers 2012 through Sept 2014 (PI Seligman).

U.S. Army Resilience Training of Soldiers in 2011 (PI Seligman).

U.S. Army Resilience Training of Soldiers in 2010 (PI Seligman).

U.S. Army Resilience Curriculum Development and Training Soldiers in 2009 (PI Seligman).

Training programs we have delivered, organized by type of organization:

- **Higher Education:**
 - University of Notre Dame
 - Western Governors University
 - University of Texas
 - Oklahoma State University
 - University of Pennsylvania
- **Secondary Schools:**
 - Oklahoma City public school high school students, sponsored by the Oklahoma City Thunder
 - UK public schools
 - Geelong Grammar School (Australia)
 - St. Peter's College (Australia)
 - The Hackley School
 - St. Catherine's School (Australia)
 - Wellington College (England)
- **Health Care:**
 - Hemophilia patients and their caregivers, sponsored by Genentech
 - Royal College of Surgeons in Ireland: Students, leadership, staff, faculty
 - University of Michigan Medical School: Leadership Development Team
 - Penn School of Medicine: Faculty and Physicians
 - Penn Dental Medicine: Students
 - Yale School of Medicine: Physicians
 - Sentara Healthcare: Executives
 - Children's Hospital of Philadelphia Foundation: Leadership and Staff
- **Government / Law Enforcement / Military:**
 - U.S. Army
 - U.S. Department of Justice
 - International Association of Chiefs of Police
 - City of Philadelphia Fire Department
 - Pennsylvania State Police
 - Penn Division of Public Safety
 - World Bank
- **Corporations:**
 - PSI Pharma
 - Indeed
 - Oklahoma City Thunder (NBA team)
 - Delta Galil
 - Alcon Vision
 - Deloitte
 - Kimberly-Clark
- **Wharton Executive Education programs:**
 - Estée Lauder Companies
 - Client Psychology for Certified Financial Planners
 - Client Psychology Program for Citi Global Sales Managers
 - Client Psychology Program for Merrill Lynch Financial Advisors

- Securities Industry Institute
- Athlete Development Professional Certification Program

Penn Resilience Programs for Penn Students, Faculty, and Staff: We are delighted to bring our programs to the Penn community. These programs have received positive feedback and word-of-mouth has increased demand, especially during the pandemic. During the pandemic, we have delivered about 50 resilience programs to more than 1,000 Penn staff, faculty, and students, so they can benefit from these evidence-based programs. We have been delivering programs to:

- Penn Human Resources Work-Life Program (Karen Kille): Six, 90-minute virtual workshop series for 35 faculty and staff in FY21 and 45 in FY22.
- Penn Dental Medicine (Margaret Yang): Six, 90-minute virtual workshop series for 150 Penn Dental Medicine students in FY22.
- Penn School of Medicine (Megan Maxwell): One, 90-minute virtual workshop for 30 Penn Medicine Master's Students in FY22.
- Penn Athletics Wharton Leadership Academy (PAWLA: Rudy Fuller): Five workshops for 350 Penn student-athletes in FY21 and 300 in FY22.
- Penn Executive Vice President (Craig Carnaroli): One-hour virtual presentation for 100 senior administrative leadership speaker series in FY21 (July 2020).
- Penn Provost Centers (Ufuoma Pela): Six, 90-minute virtual workshop series for 20 staff in FY21.
- Penn Division of Human Resources (Jack Heuer): Six, 90-minute virtual workshop series for 75 staff in FY21.
- Penn Development and Alumni Relations (Gretchen Ekeland): Six, 90-minute virtual workshops (3+3) for 100 staff in FY21.
- Penn Graduate School of Education (Emma Grigore): Two, 90-minute virtual workshops for 37 staff in FY21.
- Penn Law School (John Hollway): Two-hour workshop for 4 law school students in FY21.
- Penn School of Medicine (Lisa Bellini, Deborah Driscoll): Five, one-day programs for 203 faculty and physicians in FY18-20.
- Penn Professional and Liberal Education (Nora Lewis): One-day program for 60 staff in FY19.
- Penn Athletics (Rudy Fuller): For 91 coaches in FY19.
- Penn Athletics (Rudy Fuller): Two-semester course for 87 student athletes in FY19.
- Penn Division of Human Resources (Jack Heuer): A two-day program for 30 leadership and 30 staff in FY17-18.
- Penn Wharton MBA Staff (Paula Greenberg): One-day program for 50 staff in FY17 and 30 in FY19.
- Penn Rodin College House (Kathryn McDonald): A 1.5 hour workshop for 20 undergraduate students in January 2019 and 20 in February 2020.
- Penn Division of Finance (Paul Richards): A 2-hour program for 220 staff in FY18.
- Penn Wharton Computing (Scott McNulty): One-day program for 50 leadership and staff in FY18.
- Penn Office of Audit, Compliance, and Privacy (Greg Pellicano). One-day program for 30 staff in FY18.

- Penn School of Social Policy and Practice (Regine Metellus): One-day program for 9 staff in FY18.
- Penn Business Services Division (Marie Witt): A 3-day program for 40 on the leadership team and a one-day program for 120 staff in FY17.
- Penn Division of Public Safety (Maureen Rush): A one-day program for 170 police officers and staff in FY16 (10 cohorts of about 17).
 - In July 2020, Dr. Karen Reivich and the Positive Psychology Center produced a video, “Resilience: Strategies of Optimistic Thinking” for Penn’s Division of Public Safety”. <https://vimeo.com/438684773/afb52085a7>
- [Online resilience course through PLE for Penn staff \(click here for press coverage\)](#).

Penn Outreach. Positive Psychology Center (PPC) faculty and staff have provided support for Penn and beyond, including wellness resources to help people navigate the challenges of the COVID-19 pandemic:

- Throughout FY21-22, the Center’s Penn Resilience Program team, under the leadership of Dr. Karen Reivich, has delivered more than 50 resilience workshops to more than 1,000 Penn faculty, staff and students through several departments.
- On May 22, 2022, Professor Angela Duckworth gave the Commencement speech for the graduating Penn Classes of 2020 and 2021. <https://penntoday.upenn.edu/news/oft-delayed-never-deterred-class-2020-and-2021-grads-celebrate-person-commencement>
- In the November 22, 2021 *Penn Today*, Professor James Pawelski offered six tips for making the holiday season joyful, fun, and safe amidst the ongoing pandemic. <https://penntoday.upenn.edu/news/advice-Penn-experts-navigating-holidays-pandemic-again>
- A May 10, 2022 article in *Penn Today* featured the emerging field of Positive Humanities led by Professor James Pawelski and his Humanities and Human Flourishing team. <https://penntoday.upenn.edu/news/past-present-future-positive-humanities-James-Pawelski>
- The December 15, 2021 *Penn Today* spotlighted research by Professor Allyson Mackey on the relationship between parental praise and toddler persistence. <https://penntoday.upenn.edu/news/parental-praise-associated-longer-toddler-toothbrushing-persistence>
- A January 7, 2022 article in *Penn Today* featured a study led by Professors Katy Milkman and Angela Duckworth on the best ways to boost exercise habits. <https://penntoday.upenn.edu/news/wharton-study-best-ways-boost-workout-habits>
- On June 3, 2021, Dr. Karen Reivich delivered a one-hour virtual presentation for Penn Alumni on “[Developing Resilience: Surviving to Thriving](#)”.

- On April 7, 2021, Dr. Karen Reivich and Charles “Chaz” Howard led a virtual discussion on Building the Pillars of a Purposeful Life for the Penn community, sponsored by the Wharton Wellness Speaker Series.
https://groups.wharton.upenn.edu/WWB/rsvp_boot?id=110852

VI. RESEARCH PUBLICATIONS 2021-2022

Martin E.P. Seligman Publications:

Book: Kellerman, G. and Seligman, M. (2022). *TomorrowMind*. N.Y.: Atria/Simon & Schuster.

Lester, P.B., Diener, E., & Seligman M. (2022). Top performers have a superpower: Happiness: A large-scale study found that well-being predicts outstanding job performance. MIT Sloan Management Review, Spring 2022 Issue. <https://sloanreview.mit.edu/article/top-performers-have-a-superpower-happiness/>

Rashid, T., Summers, R. F. & Seligman, M.E.P. (In press). Positive Psychology Model of Mental Function and Behavior. In A. Tasman, M.B. Riba, T.G. Schulze, C.H. Ng, C.A. Alfonso, D. Lecic-Tosevski, S. Kanba, R.D. Alarcon, & D.M. Ndeti (Eds.). *Tasman's Psychiatry* (Fifth Edition). Cham, Switzerland: Springer Nature Switzerland AG.

Seligman, M.E.P. (2021). Agency in Greco-Roman philosophy. *Journal of Positive Psychology*, 16(1), 1-10. <https://www.tandfonline.com/doi/full/10.1080/17439760.2020.1832250>

Yaden, D.B., Giorgi, S., Kern, M.L., Adler, A., Ungar, L.H., Seligman, M.E.P., & Eichstaedt, J.C. (2021). Beyond beliefs: Multidimensional Aspects of Religion and Spirituality in Language. *Psychology of Religion and Spirituality*. <http://dx.doi.org/10.1037/rel0000408>

Giorgi, S., Nguyen, K.L., Eichstaedt, J.C., Kern, M.L., Yaden, D.B., Kosinski, M., Seligman, M.E.P., Ungar, L.H., Schwartz, H.A., & Park, G. (2021). Regional Personality Assessment through Social Media Language. *Journal of Personality*.
<https://onlinelibrary.wiley.com/doi/10.1111/jopy.12674>

Zhao, Y., Seligman, M.E.P., Peng, K., Ye, L., Liang, C., Wang, H., & Gao, H. (2021). Agency in ancient China. *Journal of Positive Psychology*, 1-15.
<https://doi.org/10.1080/17439760.2021.1926533>

Lester, P.B., Stewart, E.P., Vie, L.L., Bonett, D.G., Seligman, M.E.P., & Diener, E. (2021). Happy soldiers are highest performers. *Journal of Happiness Studies*, 1-22.
<https://doi.org/10.1007/s10902-021-00441-x>

Chopik, W.J., Kelley, W.L., Vie, L.L., Lester, P.B., Bonett, D.G., Lucas, R.E., & Seligman, M.E.P. (2021). Individual and experiential predictors of character development across the deployment cycle. *European Journal of Personality*, 1-19,
<http://dx.doi.org/10.1177/08902070211012931>

Seligman, M. (2021). Effectiveness of Positive Psychology: Setting the record straight. *Chronicle of Higher Education*. June 14, 2021.
<https://www.chronicle.com/article/effectiveness-of-positive-psychology>

James Pawelski Publications:

Book Series: Pawelski, J.O. (Series Editor) (in press). *The Humanities and Human Flourishing*. Nine volumes. New York: Oxford University Press.

- Book:** Tay, L., & Pawelski, J. O. (Eds.) (2022). *The Oxford handbook of the Positive Humanities*. New York: Oxford University Press.
- Pawelski, J. O. (in press). Teaching philosophy: The love of wisdom and the cultivation of human flourishing. In J. J. Stuhr (Ed.), *Philosophy and Human Flourishing*. New York: Oxford University Press.
- Tay, L., & Pawelski, J. O. (2022). Introduction: The role of the arts and humanities in human flourishing. In L. Tay and J. O. Pawelski (Eds.), *The Oxford handbook of the Positive Humanities* (pp. 3-16). New York: Oxford University Press.
- Pawelski, J. O. (2022). The Positive Humanities: Culture and human flourishing. In L. Tay and J.O. Pawelski (Eds.), *The Oxford handbook of the Positive Humanities* (pp. 17-42). New York: Oxford University Press.
- Pawelski, J. O., & Yaden, D. B. (2022). William James and the quest for meaningful measurement. In S. Marchetti (Ed.), *The Jamesian Mind* (pp. 473-481). Routledge Philosophical Minds Series. New York: Routledge.
- Pawelski, J. O., & Tay, L. (2021). Better together: The sciences and the humanities in the quest for human flourishing. In C. R. Snyder, S. J. Lopez, L. M. Edwards, & S. C. Marques (Eds.), *The Oxford handbook of positive psychology* (3rd ed.) (pp. 108-124). Oxford: Oxford University Press. doi: 10.1093/oxfordhb/9780199396511.013.67
- Pawelski, J. O. (in press). The Positive Humanities: A focus on human flourishing. Special issue on the humanities in American life. *Daedalus*.
- Pawelski, J. O. (2022). Martin Seligman: Answering the call to help others. *Journal of Positive Psychology*, 17, 2, 143-148. doi:10.1080/17439760.2021.2016914.
- Cotter, K. N., & Pawelski, J. O. (2022). Art museums as institutions for human flourishing. *Journal of Positive Psychology*, 17, 2, 288-302. doi:10.1080/17439760.2021.2016911. 6
- Shim, Y., Jebb, A. T., Tay, L., & Pawelski, J. O. (2021). Arts and humanities interventions for flourishing in healthy adults: A mixed studies systematic review. *Review of General Psychology*. doi:10.1177/10892680211021350
- Waters, L., Cameron, K., Nelson-Coffey, S. K., Crone, D. L., Kern, M. L., Lomas, T., Oades, L., Owens, R. L., Pawelski, J. O., Rashid, T., Warren, M. A., White, M. A., & Williams, P. (2021). Collective wellbeing and posttraumatic growth during COVID-19: How positive psychology can help families, schools, workplaces and marginalized communities. *Journal of Positive Psychology*. doi:10.1080/17439760.2021.1940251

Angela Duckworth Publications:

- Zhang, T., Park, D., Ungar, L. H., Tsukayama, E., Luo, L., & Duckworth, A. L. (in press). The development of grit and growth mindset in Chinese children. *Journal of Experimental Child Psychology*.
- Buttenheim, A., Milkman, K. L., Duckworth, A. L., Gromet, D. M., Patel, M., & Chapman, G. (2022). Effects of ownership text message wording and reminders on receipt of an influenza vaccination: A randomized clinical trial. *JAMA network open*, 5(2), 1-9. <https://doi.org/10.1001/jamanetworkopen.2021.43388>
- Duckworth, A. L. (2022). How to write for other people. *The Journal of Positive Psychology*, 17(2), 177-181. <https://doi.org/10.1080/17439760.2021.2016903>
- Duckworth, A. L. (2022). People who need people. *Psychological Inquiry*, 33(1), 26-29. <https://doi.org/10.1080/1047840x.2022.2037995>

- Leonard, J. A., Lydon-Staley, D. M., Sharp, S. D. S., Liu, H. Z., Park, A. T., Bassett, D. S., Duckworth, A. L., & Mackey, A. P. (2022). Daily fluctuations in young children's persistence. *Child Development, 93*(2), e222-e236. <https://doi.org/10.1111/cdev.13717>
- Milkman, K. L., Gandhi, L., Patel, M. S., Graci, H. N., Gromet, D. M., Ho, H., Kay, J. S., Lee, T. W., Rothschild, J., Bogard, J. E., Brody, I., Chabris, C. F., Chang, E., Chapman, G. B., Dannals, J. E., Goldstein, N. J., Goren, A., Hershfield, H., Hirsch, A., . . . Duckworth, A. L. (2022). A 680,000-person megastudy of nudges to encourage vaccination in pharmacies. *Proceedings of the National Academy of Sciences, 119*(6), e2115126119. <https://doi.org/10.1073/pnas.2115126119>
- Yeager, D. S., Carroll, J. M., Buontempo, J., Cimpian, A., Woody, S., Crosnoe, R., Muller, C., Murray, J., Mhatre, P., Kersting, N., Hulleman, C., Kudym, M., Murphy, M., Duckworth, A. L., Walton, G. M., & Dweck, C. S. (2022). Teacher mindsets help explain where a growth mindset intervention does and doesn't work. *Psychological Science, 33*(1), 18-32. <https://doi.org/10.1177/09567976211028984>
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- Duckworth, A. L., Quinn, P. D., & Tsukayama, E. (2021). Revisiting the factor structure of grit: A commentary on Duckworth and Quinn (2009). *Journal of Personality Assessment, 103*(5), 573-575. <https://doi.org/10.1080/00223891.2021.1942022>
- Gross, J. J., & Duckworth, A. L. (2021). Beyond willpower. *Behavioral and Brain Sciences, 44*, e37. <https://doi.org/10.1017/S0140525X20000722>
- Gruber, J., Mendle, J., Lindquist, K. A., Schmader, T., Clark, L. A., Bliss-Moreau, E., Akinola, M., Atlas, L., Barch, D. M., Barrett, L. F., Borelli, J. L., Brannon, T. N., Bunge, S. A., Campos, B., Cantlon, J., Carter, R., Carter-Sowell, A. R., Chen, S., Craske, M. G., . . . Williams, L. A. (2021). The future of women in psychological science. *Perspectives on Psychological Science, 16*(3), 483-516. <https://doi.org/10.1177/1745691620952789>
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- Milyavskaya, M., Galla, B. M., Inzlicht, M., & Duckworth, A. L. (2021). More effort, less fatigue: The role of interest in increasing effort and reducing mental fatigue. *Frontiers in Psychology, 12*. <https://doi.org/10.3389/fpsyg.2021.755858>
- Santos, I., Petroska-Beska, V., Carneiro, P., Eskreis-Winkler, L., Boudet, A. M. M., Berniell, I., Krekel, C., Arias, O., & Duckworth, A. (2021). Can grit be taught? Lessons from a nationwide field experiment with middle-school students. *Policy Research Working Paper*,

no. WPS 983, *Impact Evaluation Series*. World Bank Group. <https://doi.org/10.1596/1813-9450-9831>

Allyson Mackey Publications:

- Hart, Y., Kosoy, E., Liquin, E., Leonard, J.A.², **Mackey, A.P.**, & Gopnik, A. (2022) The development of creative search strategies. *Cognition*, 225, 105102.
- Murtha, K., Larsen, B., Pines, A., Parkes, L., Moore, T., Adebimpe, A., Alexander-Bloch, A., Calkins, M., **Mackey, A.P.**, Roalf, D., Scott, J., Wolf, D., Gur, R.E., Gur, R.C., Barzilay, R., & Satterthwaite, T. (2022). Associations between neighborhood socioeconomic status, parental education, and executive system activation in youth. *Cerebral Cortex*. <https://doi.org/10.1093/cercor/bhac120>
- Park, A.T.¹ & **Mackey, A.P.** (2022). Do younger children benefit more from cognitive and academic interventions? How training studies can provide insights into developmental changes in plasticity. *Mind, Brain, and Education*, 16(1), 24-35. <https://doi.org/10.1111/mbe.12304>
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- Bugden, S., Park, A.T.¹, **Mackey, A.P.**, Brannon, E.M. (2021). The neural basis of number word processing in children and adults. *Developmental Cognitive Neuroscience*. doi:10.1016/j.dcn.2021.101011
- Kominsky, J.F., Begus, K., Bass, I., Colantonio, J., Leonard, J.A.², **Mackey, A.P.**, and Bonawitz, E. (2021). Organizing the methodological toolbox: Lessons learned from implementing developmental methods online. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2021.702710>
- McDermott, C.L.¹, Hilton, K., Park, A.T.¹, Tooley, U.A.¹, Boroshok, A.L.¹, Mupparapu, M., Scott, J.M., Bumann, E.E., & **Mackey, A.P.** (2021). Early life stress is associated with earlier emergence of permanent molars. *PNAS*. <https://doi.org/10.1101/2021.03.22.436513>
- Tooley, U.A.¹, Bassett, D.S., & **Mackey, A.P.** (2021). Environmental influences on the pace of brain development. *Nature Reviews Neuroscience*, 22, 372-384.
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- Mahadevan, A.S., Tooley, U.A.¹, Bertolero, M.A., **Mackey, A.P.**, & Bassett, D.S. (2021) Evaluating the sensitivity of functional connectivity measures to motion artifact in resting-state fMRI data. *NeuroImage*, 241, 118408.
- Sydnor, V.J., Larsen, B., Bassett, D.S., Alexander-Bloch, A., Fair, D.A., Liston, C., **Mackey, A.P.**, Milham, M. P., Pines, A., Roalf, D.R., Seidlitz, J., Xu, T., Raznahan, A., & Satterthwaite, T.D. (2021) Neurodevelopment of the association cortices: Patterns, mechanisms, and implications for psychopathology. *Neuron*, 109(18), 2820-2846. <https://doi.org/10.1016/j.neuron.2021.06.016>
- Romeo, R.R., Leonard, J.A.², Grotzinger, H.M., Robinson, S.T., Takada, M.E., **Mackey, A.P.**, Scherer, E., Rowe, M.L., West, M.R., & Gabrieli, J.D.E. (2021) Neuroplasticity associated with conversational turn-taking following a family-based intervention. *Developmental Cognitive Neuroscience*, 49, 100967.

- Cieslak, M., Cook, P.A., He, X., Yeh, F.C., Dhollander, T., Adebimpe, A., Aguirre, G.K., Bassett, D.S., Bourque, J., Cabral, L., Davatzikos, C., Detre, J., Earl, E., Elliott, M.A., Fadnavis, S., Fair, D., Foran, W., Fotiadis, P., Garyfallidis, E., Giesbrecht, B., Gur, R.C., Gur, R.E., Kelz, M., Keshavan, A., Larsen, B., Luna, B., **Mackey, A.P.**, Milham, M., Oathes, D.J., Perrone, A., Pines, A., Roalf, D.R., Richie-Halford, A., Rokem, A., Sydnor, V.J., Tapera, T.M., Tooley, U.A.¹, Vettel, J.M., Yeatman, J., Grafton, S.T. & Satterthwaite, T.D. (2021). QSIPrep: An integrative platform for preprocessing and reconstructing diffusion MRI. *Nature Methods*, 18(7), 775-778.
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