



Exploring why males are larger than females among mammals

Date: April 8, 2020

Source: Wiley

Summary: In most animals, females are larger than males, but in most mammals, males are larger than females. A new analysis examines the potential drivers of these differences.

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In most animals, females are larger than males, but in most mammals, males are larger than females. A new analysis published in *Mammal Review* examines the potential drivers of these differences, calling into question the theory that only sexual selection is at play in mammals— that males compete to mate with females, and bigger males are more likely to win.

The analysis suggests that, alongside sexual selection, natural selection may be an evolutionary driver of sexual size differences in mammals. Males and females may have evolved to differ in size so that they could exploit resources such as food.

Warming climate is changing where birds breed

Migratory behaviour and winter geography drive differential range shifts of eastern birds in response to recent climate change.

Date: May 26, 2020

Source: S.J. and Jessie E. Quinney College of Natural Resources, Utah State University.

Summary: Spring is in full swing. Trees are leafing out, flowers are blooming, bees are buzzing, and birds are singing. But a recent study found that those birds in your backyard may be changing right along with the climate.

Spring is in full swing. Trees are leafing out, flowers are blooming, bees are buzzing, and birds are singing. But a recent study

published in Proceedings of the National Academy of Sciences found that those birds in your backyard may be changing right along with the climate.

Clark Rushing, Assistant Professor in the Department of Wildland Resources and Ecology Center, Quinney College of Natural Resources at Utah State University, and colleagues at the US Geological Survey wanted to know how climate change has already affected where birds breed. They used data from the Breeding Bird Survey — one of the oldest and longest citizen-science programs in the world— to conduct their research. "Thousands of devoted volunteers, cooperators, and a joint US-Canadian wildlife management team have contributed to the success of the surveys for the last 54 years," said Andy Royle, a USGS senior scientist and co-author of the study. "The Breeding Bird Survey is fundamental to our understanding and management of wild bird populations in North America."

The research team combined Breeding Bird Survey data with powerful computer models to discover changes in breeding range for 32 species of birds found in eastern North America. What they found is surprising.

Some birds' ranges are expanding. Birds that both breed and winter in North America are extending their ranges north to take advantage of new, warm places to breed. These birds are also maintaining their southern ranges. These results bring hope that some bird populations such as Carolina wrens and red-bellied woodpeckers, may be resilient to future climate change.

Some birds' ranges are shrinking. Neotropical migratory birds breed in North America

during the summer and migrate to the Caribbean, Central America, and South America for the winter. Neotropical migrants include many species that people love and look forward to seeing each spring such as buntings, warblers, orioles, and flycatchers. The team's research shows that these birds are not expanding north, and their southern ranges are shrinking.

To make matters worse, over the past 50 years, Neotropical bird populations have decreased by about 2.5 billion individuals. Rushing explained, "There's a real risk that, if these declines continue at their current pace, many species could face extinction within this century. Neotropical migrants are vulnerable to future climate change, putting them at risk of greater declines."

Neotropical migrants already fly thousands of miles each year to breed, so why can't they go just a bit farther as the climate warms? The researchers suspect the conditions where the birds live during the winter might make this impossible. Migrations require immense reserves of energy, so migratory birds need high-quality winter habitat with abundant food and moisture. Unfortunately, many habitats in the Caribbean, Central America, and South America are being degraded. It is possible that Neotropical birds can't store enough energy during the winter, so they simply can't extend their journeys any farther.

"That's just one explanation," concluded Rushing, "and it highlights how little we know and how much more research is needed." And what the team does know wouldn't have been possible without the help of devoted citizen scientists.

Healthy eating behaviours in childhood may reduce the risk of adult obesity and heart disease

Date: May 11, 2020

Source: American Heart Association

Summary: Encouraging children to make their own decisions about food, within a structured environment focused on healthy food choices, has been linked to better childhood nutrition and healthier lifelong eating behaviours. Parents and caregivers can play a significant role in creating an environment that helps children develop healthier eating behaviours early in life, which can reduce the risk for overweight, obesity and cardiovascular disease as adults.

How children are fed may be just as important as what they are fed, according to a new scientific statement from the American Heart Association, "Caregiver Influences on Eating Behaviors in Young Children," published today in the *Journal of the American Heart Association*.

The statement is the first from the Association focused on providing evidence-based strategies for parents and caregivers to create a healthy food environment for young children that supports the development of positive eating behaviours and the maintenance of a healthy weight in childhood, thereby reducing the risks of overweight, obesity and cardiovascular disease later in life.

Although many children are born with an innate ability to stop eating when they are full, they are also influenced by the overall emotional atmosphere, including caregiver wishes and demands during mealtimes. If children feel under pressure to eat in response to caregiver wants, it may be harder

for them to listen to their individual internal cues that tell them when they are full.

Allowing children to choose what and especially how much to eat within an environment composed of healthy options encourages children to develop and eventually take ownership of their decisions about food and may help them develop eating patterns linked to a healthy weight for a lifetime, according to the statement authors.

"Parents and caregivers should consider building a positive food environment centered on healthy eating habits, rather than focusing on rigid rules about what and how a child should eat," said Alexis C. Wood, PhD, the writing group chair for the scientific statement and assistant professor at the US Department of Agriculture/Agriculture Research Services Children's Nutrition Research Center and the Department of pediatrics (nutrition section) at Baylor College of Medicine in Houston.

The statement suggests that parents and caregivers should be positive role models by creating an environment that demonstrates and supports healthy food choices, rather than an environment focused on controlling children's choices or highlighting body weight. Parents and caregivers should encourage children to eat healthy foods by:

- providing consistent timing for meals;
- allowing children to select what foods they want to eat from a selection of healthy choices;
- serving healthy or new foods alongside foods children already enjoy;
- regularly eating new, healthy foods while eating with the child and demonstrating enjoyment of the food;

- paying attention to a child's verbal or non-verbal hunger and fullness cues; and
- avoiding pressuring children to eat more than they wish to eat.

Wood noted that some parents and caregivers may find it challenging to allow children to make their own food decisions, especially if the children become reluctant to try new foods and/or become picky eaters. These behaviours are common and considered normal in early childhood, ages 1 to 5 years, as children are learning about the tastes and textures of solid foods. Imposing rigid, authoritarian rules around eating and using tactics such as rewards or punishments may feel like successful tactics in the short term. However, research does not support this approach; rather, it may have long-term, negative consequences. An authoritarian eating environment does not allow a child to develop positive decision-making skills and can reduce their sense of control, which are important developmental processes for children.

In addition, the authoritarian approach has been linked to children being more likely to eat when they are not hungry and eating less healthy foods that are likely higher in calories, which increase the risk of overweight and obesity and/or conditions of disordered eating.

On the other hand, an indulgent approach, where a child is allowed to eat whatever they want, whenever they want, does not provide enough boundaries for children to develop healthy eating habits. Research has also linked this "laissez-faire" approach to a greater risk of children becoming overweight or having obesity.

Research does suggest that some strategies can increase children's dietary variety during the early years if they are "picky" or "fussy" about foods. Repeatedly offering children a wide variety of healthy foods increases the likelihood they will accept them, particularly when served with foods they prefer. In addition, caregivers or parents who enthusiastically eat a food may also help a child accept this food. Modeling eating healthy foods - by caregivers, siblings and peers— is a good strategy for helping children to be open to a wider variety of food options.

"Children's eating behaviours are influenced by a lot of people in their lives, so ideally, we want the whole family to demonstrate healthy eating habits," said Wood.

It is important to note that not all strategies work for all children, and parents and caregivers should not feel undue stress or blame for children's eating behaviours. "It is very clear that each child is an individual and differs in their tendency to make healthy decisions about food as they grow. This is why it is important to focus on creating an environment that encourages decision-making skills and provides exposure to a variety of healthy, nutritious foods throughout childhood, and not place undue attention on the child's individual decisions," concluded Wood.

Caregivers can be a powerful force in helping children develop healthy eating habits, and yet their role is limited by other factors. The statement authors encourage policies that address barriers to implementing the statement's recommendations within the wider socioeconomic context, including social determinants of health such as socio-economic status, food insecurity

and others. While efforts that encourage caregivers to provide a responsive, structured feeding environment could be an important component of reducing obesity and cardiometabolic risk across the lifespan, they note that they will be the most effective as part of a multi-level, multi-component prevention strategy.

More berries, apples and tea may have protective benefits against Alzheimer's

Study shows low intake of flavonoid-rich foods linked with higher Alzheimer's risk over 20 years.

Date: May 5, 2020

Source: Tufts University, Health Sciences Campus

Summary: Older adults with low intake of foods and drinks containing flavonoids such as berries, apples, and tea, were more likely to develop Alzheimer's disease and related dementias over 20 years, compared with people who consumed more of those items, according to a new study.

Older adults who consumed small amounts of flavonoid-rich foods such as berries, apples and tea, were two to four times more likely to develop Alzheimer's disease and related dementias over 20 years compared with people whose intake was higher, according to a new study led by scientists at the Jean Mayer USDA Human Nutrition Research Center on Aging (USDA HNRCA) at Tufts University.

The epidemiological study of 2,800 people aged 50 and older examined the long-term relationship between eating foods containing

flavonoids and risk of Alzheimer's disease (AD) and Alzheimer's disease and related dementias (ADRD). While many studies have looked at associations between nutrition and dementias over short periods of time, the study published today in the *American Journal of Clinical Nutrition* looked at exposure over 20 years.

Flavonoids are natural substances found in plants, including fruits and vegetables such as pears, apples, berries, onions, and plant-based beverages like tea and wine. Flavonoids are associated with various health benefits, including reduced inflammation. Dark chocolate is another source of flavonoids.

The research team determined that low intake of three flavonoid types was linked to higher risk of dementia when compared to the highest intake. Specifically:

- Low intake of flavonols (apples, pears and tea) was associated with twice the risk of developing ADRD.
- Low intake of anthocyanins (blueberries, strawberries, and red wine) was associated with a four-fold risk of developing ADRD.
- Low intake of flavonoid polymers (apples, pears, and tea) was associated with twice the risk of developing ADRD.

The results were similar for AD.

"Our study gives us a picture of how diet over time might be related to a person's cognitive decline, as we were able to look at flavonoid intake over many years prior to participants' dementia diagnoses," said Paul Jacques, senior author and nutritional epidemiologist at the USDA HNRCA. "With

no effective drugs currently available for the treatment of Alzheimer's disease, preventing disease through a healthy diet is an important consideration."

The researchers analysed six types of flavonoids and compared long-term intake levels with the number of AD and ADRD diagnoses later in life. They found that low intake (15th percentile or lower) of three flavonoid types was linked to higher risk of dementia when compared to the highest intake (greater than 60th percentile).

Examples of the levels studied included:

- Low intake (15th percentile or lower) was equal to no berries (anthocyanins) per month, roughly one-and-a-half apples per month (flavonols), and no tea (flavonoid polymers).
- High intake (60th percentile or higher) was equal to roughly 7.5 cups of blueberries or strawberries (anthocyanins) per month, 8 apples and pears per month (flavonols), and 19 cups of tea per month (flavonoid polymers).

"Tea, specifically green tea, and berries are good sources of flavonoids," said first author Esra Shishtar, who at the time of the study, was a doctoral student at the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy at Tufts University in the Nutritional Epidemiology Program at the USDA HNRCA. "When we look at the study results, we see that the people who may benefit the most from consuming more flavonoids are people at the lowest levels of intake, and it doesn't take much to improve levels. A cup of tea a day or some berries two or three times a week would be adequate," she said.

Jacques also said 50, the approximate age at which data was first analysed for participants, is not too late to make positive dietary changes. "The risk of dementia really starts to increase over age 70, and the take home message is, when you are approaching 50 or just beyond, you should start thinking about a healthier diet if you haven't already," he said.

Methodology

To measure long-term flavonoid intake, the research team used dietary questionnaires, filled out at medical exams approximately every four years by participants in the Framingham Heart Study, a largely Caucasian group of people who have been studied over several generations for risk factors of heart disease.

To increase the likelihood that dietary information was accurate, the researchers excluded questionnaires from the years leading up to the dementia diagnosis, based on the assumption that, as cognitive status declined, dietary behaviour may have changed, and food questionnaires were more likely to be inaccurate.

The participants were from the Offspring Cohort (children of the original participants), and the data came from exams 5 through 9. At the start of the study, the participants were free of AD and ADRD, with a valid food frequency questionnaire at baseline. Flavonoid intakes were updated at each exam to represent cumulative average intake across the five exam cycles.

Researchers categorised flavonoids into six types and created four intake levels based on percentiles: less than or equal to the 15th percentile, 15th-30th percentile, 30th-60th

percentile, and greater than 60th percentile. They then compared flavonoid intake types and levels with new diagnoses of AD and ADRD.

There are some limitations to the study, including the use of self-reported food data from food frequency questionnaires, which are subject to errors in recall. The findings are generalisable to middle-aged or older adults of European descent. Factors such as education level, smoking status, physical activity, body mass index and overall quality of the participants' diets may have influenced the results, but researchers accounted for those factors in the statistical analysis. Due to its observational design, the study does not reflect a causal relationship between flavonoid intake and the development of AD and ADRD.

Today's atmospheric carbon dioxide levels greater than 23 million-year record

Date: June 1, 2020

Source: Geological Society of America

Summary: A common message in use to convey the seriousness of climate change to the public is: 'Carbon dioxide levels are higher today than they have been for the past one million years!' This new study used a novel method to conclude that today's carbon dioxide (CO₂) levels are actually higher than they have been for the past 23 million years.

A common message in use to convey the seriousness of climate change to the public is: "Carbon dioxide levels are higher today than they have been for the past one million years!" This new study by Brian Schubert (University of Louisiana at Lafayette) and co-authors Ying

Cui and A. Hope Jahren used a novel method to conclude that today's carbon dioxide (CO₂) levels are actually higher than they have been for the past 23 million years.

The team used the fossilised remains of ancient plant tissues to produce a new record of atmospheric CO₂ that spans 23 million years of uninterrupted Earth history. They have shown elsewhere that as plants grow, the relative amount of the two stable isotopes of carbon, carbon-12 and carbon-13 changes in response to the amount of CO₂ in the atmosphere. This research, published this week in *Geology*, is a next-level study measuring the relative amount of these carbon isotopes in fossil plant materials and calculating the CO₂ concentration of the atmosphere under which the ancient plants grew.

Furthermore, Schubert and colleagues' new CO₂ "timeline" revealed no evidence for any fluctuations in CO₂ that might be comparable to the dramatic CO₂ increase of the present day, which suggests today's abrupt greenhouse disruption is unique across recent geologic history.

Another point, important to geological readers, is that because major evolutionary changes over the past 23 million years were not accompanied by large changes in CO₂, perhaps ecosystems and temperature might be more sensitive to smaller changes in CO₂ than previously thought. As an example: The substantial global warmth of the middle Pliocene (5 to 3 million years ago) and middle Miocene (17 to 15 million years ago), which are sometimes studied as a comparison for current global warming, were associated with only modest increases in CO₂.

As many as six billion Earth-like planets in our galaxy, according to new estimates

Date: June 16, 2020

Source: University of British Columbia

Summary: There may be as many as one Earth-like planet for every five Sun-like stars in the Milky Way Galaxy, according to new estimates.

There may be as many as one Earth-like planet for every five Sun-like stars in the Milky way Galaxy, according to new estimates by University of British Columbia astronomers using data from NASA's Kepler mission.

To be considered Earth-like, a planet must be rocky, roughly Earth-sized and orbiting Sun-like (G-type) stars. It also has to orbit in the habitable zones of its star the range of distances from a star in which a rocky planet could host liquid water, and potentially life, on its surface.

"My calculations place an upper limit of 0.18 Earth-like planets per G-type star," says UBC researcher Michelle Kunimoto, co-author of the new study in *The Astronomical Journal*. "Estimating how common different kinds of planets are around different stars can provide important constraints on planet formation and evolution theories, and help optimize future missions dedicated to finding exoplanets."

According to UBC astronomer Jaymie Matthews: "Our Milky Way has as many as 400 billion stars, with seven per cent of them being G-type. That means less than six billion stars may have Earth-like planets in our Galaxy."

Previous estimates of the frequency of Earth-like planets range from roughly 0.02

potentially habitable planets per Sun-like star, to more than one per Sun-like star.

Typically, planets like Earth are more likely to be missed by a planet search than other types, as they are so small and orbit so far from their stars. That means that a planet catalogue represents only a small subset of the planets that are actually in orbit around the stars searched. Kunimoto used a technique known as 'forward modelling' to overcome these challenges.

"I started by simulating the full population of exoplanets around the stars Kepler searched," she explained. "I marked each planet as 'detected' or 'missed' depending on how likely it was my planet search algorithm would have found them. Then, I compared the detected planets to my actual catalogue of planets. If the simulation produced a close match, then the initial population was likely a good representation of the actual population of planets orbiting those stars."

Kunimoto's research also shed more light on one of the most outstanding questions in exoplanet science today: the 'radius gap' of planets. The radius gap demonstrates that it is uncommon for planets with orbital periods less than 100 days to have a size between 1.5 and two times that of Earth. She found that the radius gap exists over a much narrower range of orbital periods than previously thought. Her observational results can provide constraints on planet evolution models that explain the radius gap's characteristics.

Previously, Kunimoto searched archival data from 200,000 stars of NASA's Kepler mission. She discovered 17 new planets outside of the Solar System, or exoplanets, in addition to recovering thousands of already known planets.

Breakthrough discovery to transform prostate cancer treatment

Date: June 20, 2020

Source: University of South Australia

Summary: A novel formulation of the prostate cancer drug abiraterone acetate— currently marketed as Zytiga— will dramatically improve the quality of life for people suffering from prostate cancer, as pre-clinical trials show the new formulation improves the drug's effectiveness by 40 per cent.

A novel formulation of the prostate cancer drug abiraterone acetate— currently marketed as Zytiga— will dramatically improve the quality of life for people suffering from prostate cancer, as pre-clinical trials by the University of South Australia show the new formulation improves the drug's effectiveness by 40 per cent.

Developed by Professor Clive Prestidge's Nanostructure and Drug Delivery research group at UniSA's Cancer Research Institute, the breakthrough discovery uses an oil-based oral formulation that not only enables a smaller dose of the drug to be effective, but also has the potential to dramatically reduce possible side effects such as joint swelling and diarrhea.

Despite Zytiga being the leading formulation to treat prostate cancer, lead researcher, Dr Hayley Schultz says the new formulation will ultimately provide a better treatment for patients with prostate cancer.

Prostate cancer is the most commonly diagnosed cancer in men, with one in six at risk of diagnosis before the age of 85. In 2019, more than 19,500 cases of prostate cancer

were diagnosed in Australia. Globally, prostate cancer cases reached 1.28 million in 2018.

"Many drugs are poorly water soluble, so when they're ingested, they enter the gut but don't dissolve, which means that their therapeutic effect is limited," Dr Schultz says.

"This is the case for Zytiga. Here, only 10 per cent of the dose is absorbed, leaving the other 90 per cent undissolved, where it simply passes through the body as waste.

"On top of this, patients taking Zytiga must fast for two hours prior to taking the drug, and another hour after taking the drug to achieve predictable absorption. And as you can imagine, this can be painstakingly inconvenient.

"Our new formulation changes this. By using oils to mimic pharmaceutical food effects, we're able to significantly increase the drug's solubilisation and absorption, making it more effective and a far less invasive treatment for patients."

The new formulation uses very high levels of abiraterone acetate dissolved within a specific oil and encapsulated within porous silica microparticles to form a powder that can be made into tablets or filled into capsules. Applied to human treatment, it could reduce the dose from 1000mg to 700mg per day, without the need for fasting.

Professor Prestidge says if the team can secure funding, clinical trials in humans could be just two years away.

"Based on our knowledge of this drug's pharmaceutical food effect, we hypothesise its absorption in humans will be extensively improved using this technology," Professor Prestidge says.

"Anything we can do to contribute to the development of a commercialised product to improve the lives of patients, is invaluable.

"This novel formulation is flexible enough to be adopted by thousands of different medicines; its potential to help patients of all kinds is exponential."

No single solution helps all students complete MOOCs

Date: June 15, 2020

Source: Cornell University

Summary: In one of the largest educational field experiments ever conducted, researchers found that promising interventions to help students complete online courses were not effective on a massive scale suggesting that targeted solutions are needed to help students in different circumstances or locations.

In one of the largest educational field experiments ever conducted, a team co-led by a Cornell researcher found that promising interventions to help students complete online courses were not effective on a massive scale— suggesting that targeted solutions are needed to help students in different circumstances or locations.

Researchers tracked 250,000 students from nearly every country in 250 massive open online courses (MOOCs) over 2 ½ years in the study, "Scaling Up Behavioural Science Interventions in Online Education," published June 15 in the Proceedings of the National Academy of Sciences.

"Behavioural interventions are not a silver bullet," said Rene Kizilcec, Assistant Professor of information science and co-lead author.

"Earlier studies showed that short, light-touch interventions at the beginning of a few select courses can increase persistence and completion rates," he said. "But when scaled up to over 250 different courses and a quarter of a million students, the intervention effects were an order of magnitude smaller."

The study was co-led by Justin Reich of the Massachusetts Institute of Technology and Michael Yeomans of Imperial College London. The research was conducted on the edX and Open edX platforms, and edX has engaged in work to make the data available to institutional researchers to advance educational science at scale.

The 250 courses the researchers studied came from Harvard University, MIT and Stanford University.

Failure to complete online courses is a well-known and long-standing obstacle to virtual learning, particularly among disadvantaged communities and in developing nations - where online education can be a key path to social advancement. The findings have added relevance with so much education around the world taking place online during the COVID-19 pandemic.

"My advice to instructors is to understand and address the specific challenges in their learning environment," Kizilcec said. "If students have issues with their internet connection, you can't help them overcome them with a self-regulation intervention. But if students need to go to bed on time in order to be awake for a morning lecture, or they need to plan ahead for when to start working on homework in order to have it ready to hand in, then a brief self-regulation intervention can in fact help students overcome these obstacles."

Previous, smaller-scale research, performed by Kizilcec and his co-authors as well as other scholars, found that goal-setting interventions such as writing out a list of intentions at the start of the class improved students' course completion rates.

In this study, the researchers explored the effects of four interventions:

- plan-making, where students are prompted to develop detailed plans for when, where, and how they complete coursework;
- a related activity in which students reflect on the benefits and barriers of achieving their goal, and plan ahead about how to respond to challenges;
- social accountability, where they pick someone to hold them accountable for their progress in the course, and plan when and what to tell them; and
- value-relevance, where they write about how completing the course reflects and reinforces their most important values.

For the first three interventions, involving planning ahead, the researchers found that the approach was effective in boosting engagement for the first few weeks of the course, but the impact dwindled as the course progressed. The value-relevance intervention was effective in developing countries where student outcomes were significantly worse than others, but only in courses with a global achievement gap; in other courses, it actually had a negative impact in developing countries.

The researchers tested whether they could predict in which courses an achievement gap would occur, in order to decide where the extremely difficult to predict.

intervention should be added, but found it "Not knowing if it will help or hurt students in a given course is a big issue," he said.

The researchers attempted to use machine learning to predict which interventions might help which students, but found the algorithm was no better than assigning the same intervention to all students.

"It calls into question the potential of AI to provide personalised interventions to struggling students," Kizilcec said. "Approaches that focus on understanding what works best in individual environments and then tailoring interventions to those environments might be more effective."

The researchers said their findings suggest that future studies should be designed to consider and reveal the differences among students, in addition to studies assessing overall effects.

The paper was co-authored by Christopher Dann of Carnegie Mellon University, Emma Brunskill of Stanford University, Glenn Lopez and Dustin Tingley of Harvard, Selen Turkay of the Queensland University of Technology and Joseph J. Williams of the University of Toronto. The research was partly funded by the National Science Foundation, a Stanford Interdisciplinary Graduate Fellowship and a Microsoft Faculty Fellowship.

Survey finds large increase in psychological distress reported among US adults during the COVID-19 pandemic

Date: June 3, 2020

Source: Johns Hopkins University Bloomberg School of Public Health

Summary: A new survey conducted during the COVID-19 pandemic found a more-than-threefold increase in the percentage of US adults who reported symptoms of psychological distress— from 3.9 per cent in 2018 to 13.6 per cent in April 2020.

A new survey conducted by researchers at the Johns Hopkins Bloomberg School of Public Health during the COVID-19 pandemic found a more-than-threefold increase in the percentage of US adults who reported symptoms of psychological distress— from 3.9 per cent in 2018 to 13.6 per cent in April 2020. The percentage of adults ages 18–29 in the U.S. who reported psychological distress increased from 3.7 percent in 2018 to 24 per cent in 2020.

The survey, fielded online April 7 to 13, found that 19.3 per cent of adults with annual household incomes less than \$35,000 reported psychological distress in 2020 compared to 7.9 per cent in 2018, an increase of 11.4 percentage points. Nearly one-fifth, or 18.3 per cent, of Hispanic adults reported psychological distress in 2020 compared to 4.4 per cent in 2018, a more than four-fold increase of 13.9 percentage points. The researchers also found that psychological distress in adults age 55 and older almost doubled from 3.8 per cent in 2018 to 7.3 per cent in 2020.

The survey found only a slight increase in feelings of loneliness, from 11 per cent in 2018 to 13.8 per cent in 2020, suggesting that loneliness is not driving increased psychological distress.

The findings were published online June 3 in a research letter in JAMA.

The disruptions of the COVID-19 pandemic— social distancing, fear of contracting the disease, economic uncertainty, including high unemployment— have negatively affected mental health. The pandemic has also disrupted access to mental health services.

"We need to prepare for higher rates of mental illness among US adults post-COVID," says McGinty. "It is especially important to identify mental illness treatment needs, and connect people to services, with a focus on groups with high psychological distress, including young adults, adults in low-income households, and Hispanics."

The survey used a scale to assess feelings of emotional suffering and symptoms of anxiety and depression in the past 30 days. The survey questions included in this analysis did not ask specifically about COVID-19. The scale, a validated measure of psychological distress, has been shown to accurately predict clinical diagnoses of serious mental illness.

Using NORC AmeriSpeak, a nationally representative online survey panel, the researchers analysed survey responses of 1,468 adults age 18 and older. They compared the measure of psychological distress in this survey sample from April 2020 to an identical measure from the 2018 National Health Interview Survey.

"The study suggests that the distress experienced during COVID-19 may transfer to longer-term psychiatric disorders requiring clinical care," says McGinty. "Healthcare providers, educators, social workers, and other front-line providers can help promote mental wellness and support."

"Psychological distress and loneliness reported by US adults in 2018 and April, 2020"

was written by Emma E. McGinty, Rachel Presskreischer, Hahrie Han, and Colleen L. Barry.

The study was supported by the Johns Hopkins University, the Johns Hopkins Bloomberg School of Public Health, and the Robert Wood Johnson Foundation.

Bat 'super immunity' may explain how bats carry coronaviruses, study finds

Bat-virus adaptation may explain species spillover, researchers say

Date: May 6, 2020

Source: University of Saskatchewan

Summary: Researchers have uncovered how bats can carry the Middle East Respiratory Syndrome (MERS) coronavirus without getting sick— research that could shed light on how coronaviruses make the jump to humans and other animals.

A University of Saskatchewan (USask) research team has uncovered how bats can carry the Middle East Respiratory Syndrome (MERS) coronavirus without getting sick— research that could shed light on how coronaviruses make the jump to humans and other animals.

Coronaviruses such as MERS, Severe Acute Respiratory Syndrome (SARS), and more recently the COVID19-causing SARS-CoV-2 virus, are thought to have originated in bats. While these viruses can cause serious and often fatal disease in people, for reasons not previously well understood, bats seem unharmed.

"The bats don't get rid of the virus and yet don't get sick. We wanted to understand why

the MERS virus doesn't shut down the bat immune responses as it does in humans," said USask microbiologist Vikram Misra.

In research just published in *Scientific Reports*, the team has demonstrated, for the first time, that cells from an insect-eating brown bat can be persistently infected with MERS coronavirus for months, due to important adaptations from both the bat and the virus working together.

"Instead of killing bat cells as the virus does with human cells, the MERS coronavirus enters a long-term relationship with the host, maintained by the bat's unique 'super' immune system," said Misra, corresponding author on the paper. "SARS-CoV-2 is thought to operate in the same way."

Misra says the team's work suggests that stresses on bats – such as wet markets, other diseases, and possibly habitat loss— may have a role in coronavirus spilling over to other species.

"When a bat experiences stress to their immune system, it disrupts this immune system-virus balance and allows the virus to multiply," he said.

The research was carried out at USask's Vaccine and Infectious Disease Organization-International Vaccine Centre (VIDO-InterVac), one of the world's largest containment level 3 research facilities, by a team of researchers from USask's Western College of Veterinary Medicine and VIDO-InterVac.

"We see that the MERS coronavirus can very quickly adapt itself to a particular niche, and although we do not completely understand what is going on, this demonstrates how coronaviruses are able to jump from species to species so effortlessly," said VIDO-InterVac scientist Darryl Falzarano, who co-led the bat study, developed the first potential treatment

for MERS-CoV, and is leading VIDO-InterVac's efforts to develop a vaccine against COVID-19.

So far, the SARS-CoV-2 virus has infected more than 3.5 million people worldwide and killed 7 per cent of those infected. In contrast, the MERS virus infected nearly 2,500 people in 2012 but killed one in every three people infected. There is no vaccine for either SARS-CoV-2 or MERS. While camels are the known intermediate hosts of MERS-CoV, bats are suspected to be the ancestral host.

Coronaviruses rapidly adapt to the species they infect, Misra said, but little is known on the molecular interactions of these viruses with their natural bat hosts. A 2017 USask-led study showed that bat coronaviruses can persist in their natural bat host for at least four months of hibernation.

When exposed to the MERS virus, bat cells adapt— not by producing inflammation-causing proteins that are hallmarks of getting sick, but rather by maintaining a natural antiviral response, a function which shuts down in other species, including humans. Simultaneously, the MERS virus also adapts to the bat host cells by very rapidly mutating one specific gene, he said.

Operating together, these adaptations result in the virus remaining long-term in the bat but being rendered harmless until something— such as disease or other stressors—upsets this delicate equilibrium.

Next, the team will turn its focus to understanding how the bat-borne MERS virus adapts to infection and replication in camelid (a group of even-toed ungulates that includes camels) and human cells.

"This information may be critical for predicting the next bat virus that will cause a pandemic," said Misra.

Lead researchers on the paper were Misra's former PhD students Arinjay Banerjee and Sonu Subudhi who are now at McMaster University and Massachusetts General Hospital respectively. Other team members included researchers Noreen Rapin and Jocelyne Lew, as well as summer student Richa Jain.

Why COVID-19 may be less common in children than adults

Findings could lead to potential biomarker of susceptibility

Date: May 22, 2020

Source: The Mount Sinai Hospital / Mount Sinai School of Medicine

Summary: Researchers have found that children have lower levels of ACE2 gene expression than adults, which may explain children's lower risk of COVID-19 infection and mortality.

The virus that causes COVID-19 uses a receptor known as ACE2, found on the surface of certain cells in the human body, to enter its victims. Now, Mount Sinai researchers have found that children have lower levels of ACE2 gene expression than adults, which may explain children's lower risk of COVID-19 infection and mortality. Gene expression is a measure of how much a gene is transcribed.

These results, published in JAMA on Wednesday, May 20, may point to a potential biomarker of susceptibility to the virus, known as SARS-CoV-2.

"ACE2 expression may be linked to our susceptibility to COVID-19," says lead author Supinda Bunyavanich, MD, MPH, Professor of Genetics and Genomic Sciences and

Pediatrics, Icahn School of Medicine at Mount Sinai. "ACE2, which stands for angiotensin converting enzyme 2, is a receptor that some might be familiar with because of its role in blood pressure regulation. The coronavirus uses ACE2 to enter the human body, where it spreads. ACE2 is known to be present in our airway, kidneys, heart, and gut. In our study, we took this knowledge a step further, finding that there are low levels of ACE2 expression in the nasal passages of younger children, and this ACE2 level increases with age into adulthood. This might explain why children have been largely spared in the pandemic."

The research focused on ACE2 due to its significance in COVID-19 infection. The nasal passages are usually the first point of contact for SARS-CoV-2 and the human body. Dr. Bunyavanich's study is one of only a few examining the relationship between ACE2 in the airway and age.

The retrospective analysis, led by Dr. Bunyavanich, examined nasal passages epithelium from Mount Sinai Health System patients aged 4 to 60. The researchers found ACE2 gene expression in nasal epithelium was age-dependent, lowest in younger children and increasing with age into adulthood.

Wearing surgical masks in public could help slow COVID-19 pandemic's advance Masks may limit the spread diseases, including influenza, rhinoviruses and coronaviruses

Date: April 3, 2020

Source: University of Maryland

Summary: Surgical masks may help prevent infected people from making others sick with

seasonal viruses, including coronaviruses, according to new research. In laboratory experiments, the masks significantly reduced the amounts of various airborne viruses coming from infected patients, measured using the breath-capturing 'Gesundheit II machine.'

Surgical masks may help prevent infected people from making others sick with seasonal viruses, including coronaviruses, according to new research that could help settle a fierce debate spanning clinical and cultural norms.

In laboratory experiments, the masks significantly reduced the amounts of various airborne viruses coming from infected patients, measured using the breath-capturing "Gesundheit II machine" developed by Dr. Don Milton, a professor of applied environmental health and a senior author of the study published April 3 in the journal *Nature Medicine*.

Milton has already conferred with federal and White House health officials on the findings, which closely follow statements this week from the head of the Centers for Disease Control and Prevention saying the agency was reconsidering oft-stated advice that surgical masks aren't a useful precaution outside of medical settings. (The debate takes place at a time when clinicians themselves face dangerously inadequate supplies of masks—a shortfall other UMD researchers are scrambling to help solve).

The question of masks has roiled society as well, with some retailers refusing to let employees wear them for fear of sending negative signals to customers, and cases of slurs and even physical attacks in the United States and elsewhere against Asians or Asian Americans who were wearing masks, a

measure some consider a necessity during a disease outbreak.

The study, conducted prior to the current pandemic with a student of Milton's colleagues on the Faculty of Medicine at the University of Hong Kong, does not address the question of whether surgical masks protect wearers from infection. It does suggest that masks may limit how much the infected—who in the case of the novel coronavirus often don't have symptoms—spread diseases including influenza, rhinoviruses and coronaviruses.

Milton, who runs the Public Health Aerobiology, Virology, and Exhaled Biomarker Laboratory in the School of Public Health, demonstrated in a 2013 study that surgical masks could help limit flu transmission. However, he cautions that the effect may not be as great outside of controlled settings.

Nevertheless, he said, the chance they could help justifies taking a new look at whether all people should be encouraged to wear them when they venture out of their houses to stores or other populated locations during the current COVID-19 lockdown.

"In normal times, we'd say that if it wasn't shown statistically significant or the effective in real-world studies, we don't recommend it," he said. "But in the middle of a pandemic, we're desperate. The thinking is that even if it cuts down transmission a little bit, it's worth trying."

Previous studies have shown that coronavirus and other respiratory infections are mostly spread during close contact, which has been interpreted by some infectious disease specialists to mean that the disease could spread only through contact and large

droplets, such as from a cough or sneeze—a message that has often been shared with the public.

"What they don't understand is that is merely a hypothesis," Milton said. The current study (along with earlier ones) shows, by contrast, that tiny, aerosolised droplets can indeed diffuse through the air. That means it may be possible to contract COVID-19 not only by being coughed on, but by simply inhaling the breath of someone nearby who has it, whether they have symptoms or not. Surgical masks, however, catch a lot of the aerosolized virus as it's exhaled, he said.

The study was conducted at the University of Hong Kong as part of the dissertation research of the lead author, Dr. Nancy Leung, who, under the supervision of the co-senior authors Drs. Cowling and Milton, recruited 246 people with suspected respiratory viral infections. Milton's Gesundheit machine compared how much virus they exhaled with and without a surgical mask.

"In 111 people infected by either coronavirus, influenza virus or rhinovirus, masks reduced detectable virus in respiratory droplets and aerosols for seasonal coronaviruses, and in respiratory droplets for influenza virus," Leung said. "In contrast, masks did not reduce the emission of rhinoviruses."

Although the experiment took place before the current pandemic, COVID-19 and seasonal coronaviruses are closely related and may be of similar particle size. The report's other senior author, Professor Benjamin Cowling, division head of epidemiology and biostatistics, School of Public Health, HKUMed, and co-director of the World Health Organization Collaborating Centre for Infectious Disease Epidemiology and Control,

said, "The ability of surgical masks to reduce seasonal coronavirus in respiratory droplets and aerosols implies that such masks can contribute to slowing the spread of (COVID-19) when worn by infected people."

Milton pointed to other measures his research has found is even more effective than masks, such as improving ventilation in public places like grocery stores, or installing UV-C lights near the ceiling that works in conjunction with ceiling fans to pull air upwards and destroy viruses and bacteria.

"Personal protective equipment like N95 masks are not our first line of defense," Milton said. "They are our last desperate thing that we do."

Crises are no excuses for lowering scientific standards, say ethicists

Date: April 23, 2020

Source: Carnegie Mellon University

Summary: Ethicists are calling on the global research community to resist treating the urgency of the current COVID-19 outbreak as grounds for making exceptions to rigorous research standards in pursuit of treatments and vaccines.

Ethicists from Carnegie Mellon and McGill Universities are calling on the global research community to resist treating the urgency of the current COVID-19 outbreak as grounds for making exceptions to rigorous research standards in pursuit of treatments and vaccines.

With hundreds of clinical studies registered on ClinicalTrials.gov, Alex John London, the Clara L. West Professor of Ethics and Philosophy and director of the Center

for Ethics and Policy at Carnegie Mellon, and Jonathan Kimmelman, James McGill Professor and director of the Biomedical Ethics Unit at McGill University, caution that urgency should not be used as an excuse for lowering scientific standards. They argue that many of the deficiencies in the way medical research is conducted under normal circumstances seem to be amplified in this pandemic. Their paper, published online April 23 by the journal *Science*, provides recommendations for conducting clinical research during times of crises.

"Although crises present major logistical and practical challenges, the moral mission of research remains the same: to reduce uncertainty and enable care givers, health systems and policy makers to better address individual and public health," London and Kimmelman said.

Many of the first studies out of the gate in this pandemic have been poorly designed, not well justified, or reported in a biased manner. The deluge of studies registered in their wake threaten to duplicate efforts, concentrate resources on strategies that have received outsized media attention and increase the potential of generating false positive results purely by chance.

"All crises present exceptional situations in terms of the challenges they pose to health and welfare. But the idea that crises present an exception to the challenges of evaluating the effects drugs and vaccines is a mistake," London and Kimmelman said. "Rather than generating permission to carry out low-quality investigations, the urgency and scarcity of pandemics heighten the responsibility of key actors in the research enterprise to coordinate their activities to uphold the standards necessary to advance this mission."

The ethicists provide recommendations for multiple stakeholder groups involved in clinical trials:

- Sponsors, research consortia and health agencies should prioritise research approaches that test multiple treatments side by side. The authors argue that "master protocols" enable multiple treatments to be tested under a common statistical framework.
- Individual clinicians should avoid off-label use of unvalidated interventions that might interfere with trial recruitment and resist the urge to carry out small studies with no control groups. Instead, they should seek out opportunities to join larger, carefully orchestrated studies.
- Regulatory agencies and public health authorities should play a leading role in identifying studies that meet rigorous standards and in fostering collaboration among a sufficient number of centers to ensure adequate recruitment and timely results. Rather than making public recommendations about interventions whose clinical merits remain to be established, health authorities can point stakeholders to recruitment milestones to elevate the profile and progress of high-quality studies.

"Rigorous research practices can't eliminate all uncertainty from medicine," London and Kimmelman said, "but they can represent the most efficient way to clarify the causal relationships clinicians hope to exploit in decisions with momentous consequences for patients and health systems."

Scientists unveil how general anesthesia works

Date: April 27, 2020

Source: Okinawa Institute of Science and Technology (OIST) Graduate University

Summary: The discovery of general anesthetics— compounds which induce unconsciousness, prevent control of movement and block pain— helped transform dangerous operations into safe surgery. But scientists still don't understand exactly how general anesthetics work. Now, researchers have revealed how a general anesthetic called isoflurane weakens the transmission of electrical signals between neurons, at junctions called synapses.

Hailed as one of the most important medical advances, the discovery of general anesthetics— compounds which induce unconsciousness, prevent control of movement and block pain— helped transform dangerous and traumatic operations into safe and routine surgery. But despite their importance, scientists still don't understand exactly how general anesthetics work.

Now, in a study published this week in the *Journal of Neuroscience*, researchers from the Okinawa Institute of Science and Technology (OIST) Graduate University and Nagoya University have revealed how a commonly used general anesthetic called isoflurane weakens the transmission of electrical signals between neurons, at junctions called synapses.

"Importantly, we found that isoflurane did not block the transmission of all electrical signals equally; the anesthetic had the strongest

effect on higher frequency impulses that are required for functions such as cognition or movement, whilst it had minimal effect on low frequency impulses that control life-supporting functions, such as breathing," said Professor Tomoyuki Takahashi, who leads the Cellular and Molecular Synaptic Function (CMSF) Unit at OIST. "This explains how isoflurane is able to cause anaesthesia, by preferentially blocking the high frequency signals."

At synapses, signals are sent by presynaptic neurons and received by postsynaptic neurons. At most synapses, communication occurs via chemical messengers— or neurotransmitters.

When an electrical nerve impulse, or action potential, arrives at the end of the presynaptic neuron, this causes synaptic vesicles— tiny membrane 'packets' that contain neurotransmitters— to fuse with the terminal membrane, releasing the neurotransmitters into the gap between neurons. When enough neurotransmitters are sensed by the postsynaptic neuron, this triggers a new action potential in the post-synaptic neuron.

The CMSF unit used rat brain slices to study a giant synapse called the calyx of Held. The scientists induced electrical signals at different frequencies and then detected the action potentials generated in the postsynaptic neuron. They found that as they increased the frequency of electrical signals, isoflurane had a stronger effect on blocking transmission.

To corroborate his unit's findings, Takahashi reached out to Dr. Takayuki Yamashita, a researcher from Nagoya University who conducted experiments on synapses, called cortico-cortical synapses, in the brains of living mice.

Yamashita found that the anaesthetic affected cortico-cortical synapses in a similar way to the calyx of Held. When the mice were anaesthetised using isoflurane, high frequency transmission was strongly reduced whilst there was less effect on low frequency transmission.

"These experiments both confirmed how isoflurane acts as a general anaesthetic," said Takahashi. "But we wanted to understand what underlying mechanisms isoflurane targets to weaken synapses in this frequency-dependent manner."

Tracking down the targets

With further research, the researchers found that isoflurane reduced the amount of neurotransmitter released, by both lowering the probability of the vesicles being released and by reducing the maximum number of vesicles able to be released at a time.

The scientists therefore examined whether isoflurane affected calcium ion channels, which are key in the process of vesicle release. When action potentials arrive at the presynaptic terminal, calcium ion channels in the membrane open, allowing calcium ions to flood in. Synaptic vesicles then detect this rise in calcium, and they fuse with the membrane.

The researchers found that isoflurane lowered calcium influx by blocking calcium ion channels, which, in turn, reduced the probability of vesicle release.

"However, this mechanism alone could not explain how isoflurane reduces the number of releasable vesicles, or the frequency-dependent nature of isoflurane's effect," said Takahashi.

The scientists hypothesized that isoflurane could reduce the number of releasable vesicles by either directly blocking the process of vesicle release by exocytosis, or by indirectly blocking vesicle recycling, where vesicles are reformed by endocytosis and then refilled with neurotransmitter, ready to be released again.

By electrically measuring the changes in the surface area of the presynaptic terminal membrane, which is increased by exocytosis and decreased by endocytosis, the scientists concluded that isoflurane only affected vesicle release by exocytosis, likely by blocking exocytic machinery.

"Crucially, we found that this block only had a major effect on high frequency signals, suggesting that this block on exocytic machinery is the key to isoflurane's anesthetizing effect," said Takahashi.

The scientists proposed that high frequency action potentials trigger such a massive influx of calcium into the presynaptic terminal that isoflurane cannot effectively reduce the calcium concentration. Synaptic strength is therefore weakened predominantly by the direct block of exocytic machinery rather than a reduced probability of vesicle release.

Meanwhile, low frequency impulses trigger less exocytosis, so isoflurane's block on exocytic machinery has little effect. Although isoflurane effectively reduces entry of calcium into the presynaptic terminal, lowering the probability of vesicle release, by itself, is not powerful enough to block postsynaptic action potentials at the calyx of Held and has only a minor effect in cortico-cortical synapses. Low frequency transmission is therefore maintained.

Overall, the series of experiments provide compelling evidence to how isoflurane weakens synapses to induce anesthesia.

"Now that we have established techniques of manipulating and deciphering presynaptic mechanisms, we are ready to apply these techniques to tougher questions, such as presynaptic mechanisms underlying symptoms of neurodegenerative diseases," said Takahashi. "That will be our next challenge."

Replacing time spent sitting with sleep or light activity may improve your mood

Date: May 20, 2020

Source: Iowa State University

Summary: New research found that substituting prolonged sedentary time with sleep was associated with lower stress, better mood and lower body mass index (BMI), and substituting light physical activity was associated with improved mood and lower BMI across the next year.

Moving more and sitting less was a challenge for many of us, even before states started issuing stay-at-home orders. Despite disruptions to our daily work and exercise routines, there are some subtle changes we can make at home to help improve our mental health.

New research, published by the American Journal of Preventive Medicine, found that substituting prolonged sedentary time with sleep was associated with lower stress, better mood and lower body mass index (BMI), and substituting light physical activity was

associated with improved mood and lower BMI across the next year. Jacob Meyer, lead author and Assistant Professor of kinesiology at Iowa State University, says, "light activity can include walking around your home office while talking on the phone or standing while preparing dinner."

"People may not even think about some of these activities as physical activity," Meyer said. "Light activity is much lower intensity than going to the gym or walking to work, but taking these steps to break up long periods of sitting may have an impact."

Meyer and colleagues used data collected as part of the Energy Balance Study at the University of South Carolina. For 10 days, study participants, ranging in age from 21 to 35, wore an armband that tracked their energy expenditure. Meyer, director of the Wellbeing and Exercise Lab at Iowa State, says the data allowed researchers to objectively measure sleep, physical activity and sedentary time, rather than relying on self-reports.

In addition to the benefits of sleep and light physical activity, the researchers found moderate to vigorous activity was associated with lower body fat and BMI. Given the negative health effects of prolonged sedentary time, Meyer says the findings may encourage people to make small changes that are sustainable.

"It may be easier for people to change their behaviour if they feel it's doable and doesn't require a major change," Meyer said. "Replacing sedentary time with housework or other light activities is something they may be

able to do more consistently than going for an hour-long run."

Getting more sleep is another relatively simple change to make. Instead of staying up late watching TV, going to bed earlier and getting up at a consistent time provides multiple benefits and allows your body to recover, Meyer said. Sleeping is also unique in that it is time you're not engaging in other potentially problematic behaviors, such as eating junk food while sitting in front of a screen.

Something we can control

Making these subtle changes was associated with better current mood, but light physical activity also provided benefits for up to a year, the study found. While the research was conducted prior to the COVID-19 pandemic, Meyer says the results are timely given the growing mental health concerns during this time of physical distancing.

"With everything happening right now, this is one thing we can control or manage, and it has the potential to help our mental health," Meyer said.

As the states start to ease stay-at-home restrictions, Meyer is looking at changes in physical activity and sitting time with potentially interesting results for those who regularly worked out prior to the pandemic. Preliminary data from a separate study show a 32 per cent reduction in physical activity. The question he and colleagues hope to answer is how current changes in activity interact with mental health and how our behaviours will continue to change over time.

Control over work-life boundaries creates crucial buffer to manage after-hours work stress

Date: June 25, 2020

Source: University of Illinois at Urbana-Champaign, News Bureau

Summary: Workers with greater boundary control over their work and personal lives were better at creating a stress buffer to prevent them from falling into a negative rumination trap, says a new study by experts who study occupational stress and employee well-being.

When work intrudes after hours in the form of pings and buzzes from smartphone alerts, it can cause spikes of stress that lead to a host of adverse effects for workers, including negative work rumination, poor affect and insomnia.

But according to research co-written by a team of researchers at the University of Illinois at Urbana-Champaign who study occupational stress and employee well-being, those who have greater "boundary control" over their work and personal lives were better at creating a stress buffer that helped protect them from falling into a negative-rumination trap.

Information communication technologies such as smartphones and tablets enable employees to work anywhere and anytime, thereby blurring work and non work boundaries. But that convenience comes at the expense of increased stress and mental health woes for workers unless they have control over the boundaries between work and non work life, said YoungAh Park, a professor of labor and employment relations at Illinois.

"Most people simply can't work without a smartphone, tablet or laptop computer," she said. "These technologies are so ubiquitous and convenient that it can lead some people to think that employees have to be always on or always available. Clearly, this kind of after-hours intrusion into the home or personal life domain is unhealthy, and our research shows that an always-on mentality has a big downside in the form of increased job stress."

In the study, Park and co-authors surveyed more than 500 full-time public school teachers in grades K-6 to measure their off-the-clock work intrusion via technologies on a weekly basis for five consecutive weeks.

"We asked about their weekly work intrusion involving technology, specifically their after-hours work— whether they were expected to respond to work-related messages and emails immediately, and whether they were contacted about work-related issues after hours," she said.

The researchers found that teachers' adoption of technological boundary tactics such as keeping work email alerts turned off on smartphones was related to lower perceptions of the weekly work intrusion.

The study builds on recent scholarship on how coping with off-hours occupational demands is becoming an increasingly important issue for workers, said Yihao Liu, a professor of labor and employment relations at Illinois and a co-author of the study.

"Managing your work-life balance through boundary control is not only helpful for you and your family, it also could be a benefit for your co-workers, because they also have to potentially read and respond to the back-and-forth messages that people are

sending after the workday is done," he said. "Setting a good boundary between work and regular life is going to help more people and more stakeholders. Overall, it's critical that individuals manage their work-life boundaries for their own health and well-being, but also for their own productivity and their colleagues' productivity."

Moreover, the researchers found that teachers' boundary control softened the work intrusion-negative rumination link and that this boundary control was an important mechanism by which two "border keepers"—principals, who effectively functioned as supervisors in the study; and parents, who could be thought of as clientele—can affect teachers' weekly stress experiences.

In other words, the weekly strain symptoms involving work intrusion can be alleviated by a supervisor who supports employees' work-life balance, Park said. Or conversely, it can be aggravated by clientele who expect employees to be always accessible and available.

"A really important point around the sense of boundary control is that stakeholders can influence employees' control," she said. "Our study suggests that school principals can play a positive role in that their support for work-life balance was associated with the teachers' greater sense of boundary control. When you have supportive leaders who model behaviors for work-life balance and work effectively with employees to creatively solve work-life conflicts, that translates into less stress for teachers through boundary control."

Although the study only included elementary school teachers in its sample, the findings about drawing clear boundaries after work ought to apply to most workers, especially now that more are working remotely due to

the COVID-19 pandemic, the researchers said.

"Our initial motivation was to study teachers because we tend to assume that their work and nonwork lives are separate and distinct," Park said. "Teachers have set schedules in a physical building, along with discrete blocks of free time over the weekends. But even with this working population, we found that after-hours work intrusion via technology can be really stressful for them. So although this finding is particular to teachers, a class of employees who we tend to assume have clear work-life boundaries, it's now an issue for everyone who is electronically tethered to their work after regular hours."

Drinking sugary drinks daily may be linked to higher risk of CVD in women

Date: May 13, 2020

Source: American Heart Association

Summary: In a study of female California teachers, drinking one or more sugary beverages daily was associated with nearly a 20 per cent higher risk of having cardiovascular disease (CVD) when compared to those who rarely or never drank sugary beverages. Daily consumption of fruit drinks with added sugars was associated with a 42 per cent greater likelihood of having cardiovascular disease when compared to those who rarely or never drank sugary beverages.

Drinking one or more sugary beverages a day was associated with a nearly 20 per cent greater likelihood of women having a cardiovascular disease compared to women who rarely or never drank sugary beverages, according to new research published

today in the Journal of the American Heart Association, an open access journal of the American Heart Association.

In the large, ongoing California Teacher's Study, which began in 1995, drinking one or more of any type of sugary beverage daily was associated with a 26 per cent higher likelihood of needing a revascularization procedure, such as angioplasty to open clogged arteries and a 21 per cent higher likelihood of having a stroke compared to women who rarely or never drank sugary beverages. Sugary beverages in this study were defined as caloric soft drinks, sweetened bottled waters or teas and sugar-added fruit drinks, not 100 per cent fruit juices.

There were also differences based on the type of beverage women consumed. Drinking one or more sugar-added fruit drinks daily was associated with a 42 per cent greater likelihood of having cardiovascular disease. Drinking soft drinks such as sodas daily was associated with a 23 per cent higher risk of cardiovascular disease overall, compared to those who rarely or never drank sugary beverages.

The study included more than 106,000 women, with an average age of 52, who had not been diagnosed with heart disease, stroke or diabetes when they were enrolled in the study.

The women reported how much and what they drank via a food questionnaire. Statewide inpatient hospitalisation records were used to determine whether a woman had experienced a heart attack, stroke or surgery to open clogged arteries. Women with the highest sugar-sweetened beverage intake were

younger, more likely to be current smokers, obese and less likely to eat healthy foods, among other things.

"Although the study is observational and does not prove cause and effect, we hypothesize that sugar may increase the risk of cardiovascular diseases in several ways. It raises glucose levels and insulin concentrations in the blood, which may increase appetite and lead to obesity, a major risk factor for cardiovascular disease," said lead study author Cheryl Anderson, Ph.D., M.P.H., M.S., professor and interim chair of Family and Public Health, University of California San Diego, and chair of the American Heart Association's Nutrition Committee.

"In addition, too much sugar in the blood is associated with oxidative stress and inflammation, insulin resistance, unhealthy cholesterol profiles and type 2 diabetes, conditions that are strongly linked to the development of atherosclerosis, the slow narrowing of the arteries that underlies most cardiovascular disease," said Anderson.

Strengths of the study included its large sample size, extensive follow-up time and prospective data collection on sugar-sweetened beverages and lifestyle characteristics. In addition, the ability to annually link to statewide hospitalisation and procedure records resulted in accurate endpoints.

Limitations of the study included having only one measurement of sugar-sweetened beverage intake. The study was also unable to evaluate consumption of artificially sweetened beverages and/or sweetened hot beverages.

The American Heart Association recommends limiting added sugar to no more than 100 calories a day (6 teaspoons of sugar or 25 grams) for most women, and no more than 150 calories a day (9 teaspoons of sugar or 38 grams) for most men. Sugar-sweetened beverages are the biggest source of added sugars in the American diet; a typical 12-ounce can of regular soda has 130 calories and 8 teaspoons (34 grams) of sugar.

Although diet soda may provide an alternative for some people who are trying to reduce the amount of sugary drinks in their diet, they do include artificial sweeteners such as saccharin, aspartame, sucralose and others. Water remains the most accessible and healthy beverage to drink regularly -- water has no sugar, no artificial sweeteners and no calories.

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