

When it comes
to staying young,
a mind-lift beats
a face-lift any day.

— Marty Bucella

aging news

NEWSLETTER OF THE INSTITUTE ON AGING (IOA) | UNIVERSITY OF WISCONSIN-MADISON

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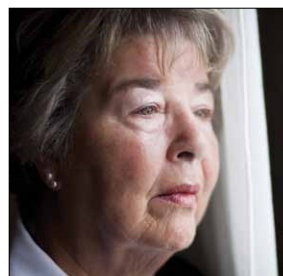
institute on aging

2245 Medical Sciences Center
1300 University Avenue
Madison, WI 53706
608.262.1818

www.aging.wisc.edu

Negative Emotions Become More Costly With Age

Research has shown that, overall, negative emotions decrease across the lifespan. The theory of Strength and Vulnerability Integration (SAVI) hypothesizes that this is because as people age they get better at avoiding negative stimuli and develop better ways of coping with stress. This is seen as beneficial to health, because, according to SAVI, our bodies become less resilient with age. Negative emotions can cause prolonged physical reactions which, as we get older, can lead to wear-and-tear on bodily systems needed to maintain good health. MIDUS investigators tested SAVI by examining whether physical responses to negative emotions were more pronounced for older adults than younger adults, as indicated by higher levels of the stress hormone cortisol, so named because it often increases in response to stressful experiences.



*Older adults
may show a
more pronounced
physical reaction to
negative emotions
that can lead to
poor health.*

afraid, jittery, irritable, ashamed, upset, angry, frustrated, that everything was an effort, or so sad that nothing could cheer them up.

Participants also provided four days of saliva samples (collected four times per day) that were used to measure total daily cortisol output and bedtime cortisol levels.

Cortisol is a hormone that mobilizes energy in the body. It normally peaks in the morning to provide energy to start the day, then declines steadily until bedtime to allow for rest and recuperation. Although everyone needs cortisol for healthy functioning, stress can cause elevated levels or disruptions in its daily rhythm that are associated with worse health outcomes.

Results indicated that younger adults' cortisol levels were

not significantly affected by having high levels of negative emotions. However, the association between negative affect and cortisol was significant for adults over 50. Older adults reporting high levels of average negative affect had daily cortisol outputs that were 20% higher than older adults who had lower average levels of

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negative affect. For younger adults, the difference was only 11%. Additionally, older adults with high negative affect over the eight days of the study had consistently higher levels of bedtime cortisol, regardless of their daily affect levels. Thus, even on days when they experienced fewer negative emotions, those with high average negative affect had the highest bedtime cortisol levels.

These results support SAVI's tenet that arousal from negative emotional states becomes more costly with aging. Older adults with higher average negative affect, such as those who are chronically lonely, seem to

continually respond as if they are having a bad day. Their cortisol levels do not show the normal drop on happier days when they experience fewer negative emotions. Chronically elevated levels of cortisol have been associated with memory impairment, progression of chronic disease, and diminished immune response. These health consequences point to the importance of learning strategies to manage negative emotions as we get older.

Source: Piazza, J. R., Charles, S. T., Stawski, R. S., & Almeida, D. M. (2013). Age and the association between negative affective states and diurnal cortisol. *Psychology and Aging, 28*(1), 47-56. doi:10.1037/a0029983

Anger Can Aggravate the Link Between Age & Metabolic Syndrome

In another test of the Strength and Vulnerability Integration (SAVI) theory, MIDUS investigators examined whether older adults who express more anger have increased health risks. Prior research shows that, with aging, people report having less anger, as well as having greater control over it, when compared to younger adults. However, older adults who experience increased susceptibility to poor health, financial strain, role loss, or widowhood could experience increased anger. Investigators hypothesized that older adults who reported greater anger expression would be at higher risk for metabolic syndrome than those who show the more typical pattern of having better emotional experiences as they get older.

Metabolic syndrome is a compilation of health risk factors, and the chances of developing it increase with age. Health risk measurements were obtained from 1205 subjects during clinic visits. Participants were considered to have metabolic syndrome if they had a large waist circumference (greater than or equal to 94 cm/37" for men or 80 cm/32" for women) and at least two other risk factors, such as high cholesterol, high blood pressure, or high blood glucose (sugar) levels. Metabolic syndrome has been previously associated with anger, which was assessed by eight questions asking how often participants expressed their anger outwardly (verbally or physically) when they felt angry or furious.

Results showed that, on average, anger expression significantly decreased with age, as has been found in previous studies. However, among older adults who exhibited high anger expression, there was greater risk for metabolic syndrome. In support of SAVI's tenet that negative emotions become more costly as we age, the relationship between anger and metabolic syndrome was weaker among middle-aged adults, and not apparent at all in younger adults. Importantly, older adults reporting low levels of anger expression did not exhibit the usual age-related increase in risk of developing metabolic syndrome. Instead, they showed risk comparable to their younger counterparts.

These findings suggest that failing to show the frequently observed decline in anger expression with aging may lead to poorer health. Anger management strategies could thus be beneficial for older adults prone to outward expressions of anger, to help lower their risks for metabolic syndrome and its related health problems, which include increased risk of heart disease, Type II diabetes, physical disability, and mortality.

Source: Boylan, J. M., & Ryff, C. D. (2013). High anger expression exacerbates the relationship between age and metabolic syndrome. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. Advance online publication. doi:10.1093/geronb/gbt092

Anger is an acid that can do more harm to the vessel in which it is stored than to anything on which it is poured.

— Mark Twain

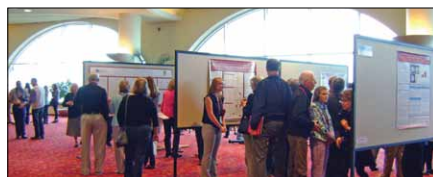


Our 26th Successful IOA Colloquium on Aging



If you missed our event,
you can still access
these resources online at:

[aging.wisc.edu/
outreach/colloquium.php](http://aging.wisc.edu/outreach/colloquium.php)



DOWNLOAD HANDOUTS and VIEW VIDEOS of PRESENTATIONS:

- **The Day-to-Day Management of Chronic Illness: How Family Members Help and (Sometimes) Hinder**
Karen D. Rook, PhD
- **The March of Longevity: the Role of Genes, Behavior, Environment, and the Microbiome**
Alberto Palloni, PhD
- **Aging Parents as Caregivers to Adult Children with Serious Mental Illness: Patterns of Vulnerability and Resiliency** Jan Steven Greenberg, PhD
- **The Caloric Restriction Paradigm: Implications for Healthy Human Aging**
Rozalyn Anderson, PhD

VIEW AGING RESEARCH POSTERS:

See "Highlighted Posters" on our home page for pdfs of some of the posters presented at the event.

FIND LOCAL AGING ORGANIZATIONS:

See descriptions of more than 60 local organizations offering resources for positive aging.

2014 New Investigator Award Winners

These awards are given to UW-Madison students or advanced trainees to recognize outstanding achievement by new investigators in aging research. Posters summarizing the winner's research can be viewed on our website. This year's winners are:



For Biomedical Research: Joshua Neuman (left)

Poster: *Dietary fat composition impacts insulin secretion in type 2 diabetes*

For Psychological/Clinical Research: Christopher Nicholas (right)

Poster: *Posteromedial hyperactivation during episodic recognition among people with memory decline: Findings from the WRAP Study*



Thank You!

We send our thanks to the following, whose donations helped us continue to offer this event for free to its 550 attendees:

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Donations can be made
via our website any time
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Save the Date!



The 27th annual
Colloquium on Aging
will be held in Madison, WI on

Tues., Sept. 22, 2015

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on the UW-Madison campus

Registration fills up fast and should open on the first Monday in August. To receive event news, join our mailing list via our website or contact:

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new findings from MIDUS



Why should we think upon things that are lovely? Because thinking determines life.

— William James



MIDUS studies aging as a long-term journey involving multiple factors (psychological, social, biological). It began in 1995 with over 7000 participants, aged 25-74, and continues with follow-up studies at 10 year intervals. Almost 600 publications have utilized MIDUS data. They are archived at: midus.wisc.edu/findings

Savoring Positive Experiences May Improve Your Health

Studies have shown that those with higher psychological well-being, who have a sense of purpose and are engaged with life, are likely to be healthier. However, the biological mechanisms that

link well-being to health are not understood. It may be that individuals who can sustain brain activity in response to positive experiences, even when interrupted by negative ones, are better able to maintain well-being. MIDUS researchers tested whether the ability to engage the brain's reward circuitry influences the relationship between well-being and health.

Participants included 72 individuals aged 38-79 years who viewed numerous positive, negative, and neutral images in random order while functional-MRI scans were taken of their brains. Several dimensions of psychological well-being were measured via questionnaire, including having a sense of purpose, feeling in charge of one's life, being open to new experiences, and having good relationships with others. Health status was assessed via the hormone cortisol, higher levels of which have been associated with poor health.

Results showed that sustained brain activity in response to positive images in two regions of the brain (the striatum and the right dorsolateral prefrontal cortex) was associated with increased well-being and lower daily cortisol output. Further, sustained activity in both these regions mediated the relationship between well-being and cortisol output, such that increased well-being influenced

brain activity, which in turn lowered cortisol levels. This suggests a possible biological mechanism through which psychological states can influence physical health. Those who savor positive experiences and sustain related brain activity may benefit from having the lower levels of cortisol that are associated with good health.

Source: Heller, A. S., van Reekum, C. M., Schaefer, S. M., Lapate, R. C., Radler, B. T., Ryff, C. D., & Davidson, R. J. (2013). Sustained ventral striatal activity predicts eudaimonic well-being and cortisol output. *Psychological Science*, 24(11), 2191-2200. doi:10.1177/0956797613490744

Marital Strain Decreases Response to Positive Events

In a related neuroscience study, MIDUS investigators examined whether marital quality affects one's ability to respond to emotional events. Research has shown that those with good marriages tend to be healthier and happier, whereas marital stress is associated with psychiatric disorders, such as depression. It may be that marital quality influences well-being by reducing positive responses to good experiences, or increasing our recovery time after negative ones.

Data were examined from 116 adults aged 39-84, who reported levels of marital strain at MIDUS I and ten years later at MIDUS II, via questions about how often their spouse was a source of tension, arguments, criticism, annoyance, or feelings of being let down. Subjects also viewed numerous positive, negative, and neutral images in random order while their emotional state was measured via facial electromyography (EMG). Sensors placed on the forehead measured activity in the corrugator supercilii muscle, activity which is known to decrease during positive emotions and increase during negative ones.

Results showed no significant association between marital strain and emotional recovery from negative images. However, those with less marital strain over the 10 years of the study experienced longer intervals of positive emotions in response to pleasant images, compared to those with high marital strain, who showed shorter periods of positive response. The findings suggest that having a good marriage and a spouse with whom one can share experiences may promote the neural ability to relish positive events longer and thus improve well-being.

Source: Lapate, R. C., van Reekum, C. M., Schaefer, S. M., Greischar, L. L., Norris, C. J., Bachhuber, D. R., Ryff, C. D., & Davidson, R. J. (2014). Prolonged marital stress is associated with short-lived responses to positive stimuli. *Psychophysiology*, 51(6), 499-509. doi:10.1111/psyp.12203

Anger Expression Varies by Culture and Social Status

Anger has been found to be more frequent among low status individuals. This may be due to frustration related to limited resources and blocked opportunities to pursue personal goals. In Western cultures, fulfilling individual goals is particularly important given the emphasis on individualism and independence. MIDJA investigators asked if social status is linked to anger in the same way in Eastern cultures where group belonging and interdependence with others is more highly valued than independence. Stronger prohibitions in Eastern cultures against disrupting social harmony and jeopardizing interpersonal relationships may limit expressions of anger to those of higher social status. Their ability to express this emotion may serve as a display of power and authority.

Researchers compared data from MIDUS, a national study in the U.S., to data from MIDJA, a parallel study in Japan. Anger was assessed by asking how often subjects expressed their anger outwardly through verbally or physically aggressive behaviors (such as slamming doors) when they felt angry or furious.

Social status was assessed in two ways. The first measured subjective social status (how one sees oneself) by asking participants to place themselves on a ladder corresponding to their perceived standing in their community. Objective social status (how others see you) was measured in terms of educational level and occupational status.

Results showed that Americans with lower subjective social status (they saw themselves lower on the ladder) expressed more anger. As expected, levels of frustration (self-reported during the last 30 days) were found to explain this relationship. That is, those of lower social status reported being more frustrated, which in turn led them to express more anger.

In contrast, among Japanese respondents, it was those with higher objective social status (who had more education and better jobs) who expressed more anger. This link was explained by level of authority, assessed with questions about decision authority on the job, such as "How often do you have a choice in deciding what tasks you do at work?" Those with higher status had more authority, which in turn led them to more expressions of anger.

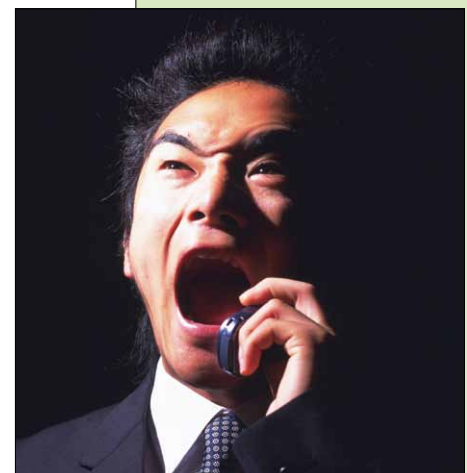
These results indicate that cultural context should be taken into consideration to fully understand who may be more prone to anger expression. Venting frustration and using power and authority to display dominance may be universally recognized facets of anger, but different cultures may emphasize one over the other and thus influence who is likely to more often express their anger outwardly.

Source: Park, J., Kitayama, S., Markus, H. R., Coe, C. L., Miyamoto, Y., Karasawa, M., Curhan, K. B., Love, G. D., Kawakami, N., Boylan, J. M., & Ryff, C. D. (2013). Social status and anger expression: The cultural moderation hypothesis. *Emotion*, 13(6), 1122-1131. doi:10.1037/a0034273



In independent Western cultures, those of low social status are more likely to express anger.

In interdependent Eastern cultures, those of high social status are more likely to express anger.



affiliate news

For more information on the work of IOA Affiliated Faculty and Researchers at UW-Madison, see: www.aging.wisc.edu/research/affilindex.php

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IOA DIRECTOR

Carol D. Ryff, PhD

Professor of Psychology

IOA ASSOCIATE DIRECTOR

Neil Binkley, MD

Professor of Medicine-Geriatrics

AGING NEWS

EDITING & LAYOUT

Theresa Berrie

berrie@wisc.edu

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A new treatment shows promise in stabilizing memory and the ability to perform normal daily activities among those with Alzheimer's.

Stabilizing Memory Decline in Alzheimer's Disease

IOA Affiliate **Craig Atwood** (Assoc. Prof., Dept. of Medicine-Geriatrics, UW-Madison) is co-author of an upcoming article about the clinical trial of a drug that shows promise for stabilizing memory decline in those with Alzheimer's disease (AD). A total of 109 postmenopausal women from five U.S. sites who were diagnosed with mild to moderate AD were included in the study. Participants were randomly assigned to groups that received either low (11.25 mg) or high (22.5 mg) doses of Lupron Depot® or a placebo, received through intramuscular injections every 12 weeks for nearly a year.

Lupron has been primarily used to treat prostate cancer. Previous studies have shown that men who take it are less likely to develop AD. Lupron is composed of leuprolide acetate, which works like a gonadotropin-releasing hormone, one of the reproductive hormones of the hypothalamic-pituitary-gonadal axis (HPG axis). Age related elevations in gonadotropin hormones of the HPG axis have previously been suggested as a cause of AD.

Lupron's effect on memory and cognition was measured several times throughout the study using primarily two tests: the *Alzheimer's Disease Assessment Scale- Cognitive Subscale* and the *Alzheimer's Disease Cooperative Study*

Clinical Global Impression of Change (ADCS-CGIC). These cognitive tests assess ability to name objects, recall words, follow commands, and use other thinking skills. A third test, the *Alzheimer's Disease Cooperative Study- Activities of Daily Living Inventory* assessed ability to perform daily activi-

ties such as dressing, bathing, making meals, and answering the phone. A decline in these capabilities often necessitates a transfer to a long-term care facility.

Some participants were already taking memory enhancing drugs, such as an acetylcholinesterase inhibitor (AChEI). They were included in the trial only if their dosage had been stable in the months prior to the study and was likely to remain stable throughout.

Results showed that decline in cognition was slowed among the high dose Lupron group, but the trend was not statistically significant. However, in the group who were also taking AChEI drugs, there was a statistically significant benefit in the high dose Lupron group on both cognitive tests. Results from the ADCS-CGIC test showed that only 9% of patients taking both drugs exhibited cognitive decline, compared to 63% in the placebo group. Notably, those taking both drugs also showed a significant stabilization in their ability to perform activities of daily living.

All drugs currently in use for AD create an initial improvement in memory followed by a decline that is similar to not taking any medications. In contrast, Lupron & AChEI treatment provided no initial improvement, but did stabilize cognition for a year. This preservation of cognitive function suggests that the combination of Lupron and AChEI may be modifying the disease rather than simply improving its symptoms. There is currently no other treatment that shows such promise in stabilizing memory in AD patients.

Source: Bowen, R. L., Perry, G., Xiong, C., Smith, M. A., Atwood, C. S. (in press). A clinical study of Lupron Depot in the treatment of women with Alzheimer's disease: Preservation of cognitive function in patients taking an acetylcholinesterase inhibitor and treated with high dose Lupron over 48 weeks. *Journal of Alzheimer's Disease*.



Why are Older People More Susceptible to Flu & Pneumonia?

IOA Affiliate **Keith Meyer** (Prof., Dept. of Medicine- Pulmonary Medicine, UW-Madison) recently authored and co-authored two book chapters about lung infections and aging-related decreases in immunity. Changes in the immune systems of older adults can contribute to flu and pneumonia, which continue to be leading causes of mortality among those 65 and older. However, the molecular mechanisms of immunity that fight these lung infections are still poorly understood.

Both the innate & adaptive immune systems help fight off infections in the lungs and elsewhere. Innate immunity involves a nonspecific response to infectious agents. Harmful microorganisms are recognized, protective inflammation is initiated, and damaged cells are destroyed. Although the innate system is generally believed to retain its effectiveness as we age, there is debate on this topic. One study showed that subjects over 85 with an impaired innate immune response had a twofold increase in overall mortality.

Adaptive immunity, in contrast, is known to decline with age. This type of immunity is characterized by a more targeted response to distinct viruses, bacteria, or other pathogens that can cause lung infections. When T cells in this system are exposed to a new pathogenic agent, they become memory cells that can fight only that specific pathogen in the future. T cells mature in the thymus gland, the functional part of which is normally replaced by fat by the age of 50. As a result, T cells in older adults have mostly converted to memory cells and the number of new T cells that can be produced to respond to new infections is limited. A similar pattern is seen with B cells, which develop in bone marrow and produce antibodies that target infections. Aging is associated with a decrease in both new and memory B cells, as well as a decrease in their ability to produce the beneficial antibodies that vaccinations promote.

Studies have also suggested that aging in the immune system is associated with hyperinflammation. Although inflammation is a natural part of healing, chronic inflammation has been shown to increase risk of mortality.

Those with increased levels of interleukin-6, one of the proteins that promote inflammation, have a higher risk of developing pneumonia and tend to have more severe symptoms when they are hospitalized for it.

Strategies that can help prevent lung infections in the face of declining immunity include not smoking, optimizing nutrition, and avoiding hospitalization. Vaccines are available for flu and some types of pneumonia, but better vaccines that overcome age-blunted immune responses are needed.

Currently, the risk of death while hospitalized for pneumonia is 1.5 times higher than the 10 other most frequent causes of hospitalization among older adults. Although not everyone's immune system declines, a better understanding of age-associated defects in immune response is needed in order to develop better treatments and lower the mortality rate associated with lung infections.

Sources: Kruser, J. M., & Meyer, K. C. (2014). *Lung infections and aging*. In M. Rojas, S. Meiners, & C. Jourdan LeSaux (Eds.), *Molecular Aspects of Aging: Understanding Lung Aging* (pp.185-200). Hoboken, NJ: Wiley-Blackwell and Meyer, K. C. (2014). *Immunity, inflammation, and aging*. In I. Rahman & D. Bagchi (Eds.), *Inflammation, Advancing Age, and Nutrition* (1st ed., pp. 29-38). Amsterdam: Elsevier.



As people age, their bodies are less able to handle environmental hazards, including air pollution, which can aggravate lung disease. In 2000, 64% of people aged 65 or older lived in counties with poor air quality, but that percentage dropped to 36% by 2010.

— *Older Americans 2012: Key Indicators of Well-being* at agingstats.gov



IOA affiliate grants & honors

Most older adults spend 60-70% of their time sitting, and evidence indicates that even among those who exercise, too much sitting can increase risk of chronic disease and even lead to premature death. IOA Affiliates **Kelli Koltyn** (Prof., Kinesiology) & **Jane Mahoney** (Prof., Dept. of Medicine-Geriatrics, both UW-Madison), along with co-investigator Prof. Diane Lauver, received funding from the Greater Wisconsin Agency on Aging Resources to test a *Sit Less, Live Better* intervention to help older adults strategize ways to break up extended sitting time.



IOA Director **Carol Ryff** (Prof., Psychology) has been named as one of four new Hildale professors at UW-Madison recognized for their excellence in scholarly activity. Prof. Ryff was acknowledged for her studies in psychological well-being that focus on the importance of having purpose and meaning in life, and for directing MIDUS, one of the major national studies of aging in the US. The five year Hildale appointment includes extra research funding and may be indefinitely renewed.

institute on aging

University of Wisconsin–Madison
Room 2245 Medical Sciences Center
1300 University Ave.
Madison, WI 53706-1532

www.aging.wisc.edu

aging@ssc.wisc.edu

(608) 262-1818

ADDRESS SERVICE REQUESTED



*A man is not old
as long as he is
seeking something.*

— Jean Rostand

Finding a Purpose May Add Years to Your Life

Studies of adults over 60 have linked having a purpose in life to living longer. This MIDUS study asked whether having purpose benefits longevity across all the adult years. Older, retired adults may benefit more from a sense of purpose because it can help combat the loss of structure they previously gained through their jobs. In younger people, purpose may affect longevity differently, because it may lead them to pursue different types of goals or because they face different types of mortality risks.

This study used a sample of over 6000 people aged 20-75. Purpose was measured by asking subjects to indicate, on a scale of 1 to 7, how strongly they agreed or disagreed with three statements: “Some people wander aimlessly through life, but I am not one of them;” “I live life one day at a time and don’t really think about the future;” and “I sometimes feel as if I’ve done all there is to do in life.” Fourteen years later, researchers investigated whether having a sense of purpose was tied to whether or not subjects had died.

Results supported previous findings that purposeful older individuals live longer than their counterparts, but also showed that this was true at all ages. Having a sense of purpose lessened mortality risk at

relatively the same proportion for younger, middle aged, and older adults. With every standard deviation increase in purpose above the mean the risk of dying over the next

14 years decreased by 15%. Additional results showed that the benefits of purpose were not explained by other indicators of well-being, such as having positive relations with others, or experiencing more positive or fewer negative emotions. Finally, results indicated that the benefits of purpose were not conditional on retirement status.

Being purposeful implies that one has committed to a set of clear goals that give one’s life direction. These

results show that having such a sense of purpose can be as significant at younger ages as it is at older ages and suggest the importance of establishing a direction for life as early as possible.

Source: Hill, P. L., & Turiano, N. A. (2014). Purpose in life as a predictor of mortality across adulthood. *Psychological Science*, 25(7), 1482-1486. doi:10.1177/0956797614531799

