The Herczeg Institute on Aging

Tel Aviv University

Bulletin No. 24 – December 2024

The Herczeg Institute on Aging

Contents

Contact information

The Herczeg Institute on Aging, the Naftali Building for Social Sciences, Tel Aviv University, P.O.B. 39040, Tel Aviv 6997801, Israel

Tel: (972) 3-6409544

Institute website: www.herczeg.tau.ac.il

E-mail: herczeg@tauex.tau.ac.il

Painting on front page courtesy of **Marco Ventura**, resident of Mishan Ramat Efal. As Marco says: "Painting has been part of my life over the last decade. I like to become immersed in the world of color and paint landscapes and people".

Letter to the Readers

Dear readers,

A year ago, in the first paragraph of my letter to readers of the Herczeg Institute's bulletin, I wrote: "Many of the citizens who were abducted from their homes are still in captivity, our soldiers are fighting in Gaza and on the northern border, and the news headlines throughout the day open with tragic announcements about fallen and wounded soldiers". These words remain true today, over 400 days from the beginning of the war, with 101 abductees still captive, alive or dead, and our brave soldiers defending us on the different fronts. We send words of strength to the soldiers and their families, the relatives of those abducted, express our condolences to those who lost dear ones, and wish the wounded physical and mental health.

The Herczeg Institute on Aging operated throughout the year, adapting its activities to the current state of war. Research activities took place as planned, even when the schedules of the various studies had to be adapted to meet the instructions of the Home Front Command. The monthly sessions of the institute's researcher seminar continued throughout the academic school year, constituting a framework for meetings between new and veteran researchers, students and professionals who study old age. The wide range of studies carried out both at Tel Aviv University and in other research institutions accentuates the importance of promoting research in all fields of science as a means of achieving and ensuring good health, functioning, and quality of life among older adults and the oldest old.

This year, as previously, we awarded grants to three doctoral students at Tel Aviv University for their research on aging and old age. In this bulletin you can read about the studies of PhD students Nitzan Trainin, titled "I remember what you said, so what?: Age effects on following conversation", supervised by Professor Einat Shitrit; Tali Sagiv, titled "Golden spiny mice: A unique model for the research of healthy aging", supervised by Professor Noga Kronfeld-Schor; and Yonatan Brand, entitled "The future of gait analysis studies: How technology helps assess the health of older adults", supervised by Professor Jeffrey Hausdorff and Dr. Or Perlman. A list of articles on research findings uncovered by faculty of the Herczeg Institute and members of the institute's scientific committee is available on pages 16-20.

We have also included in the bulletin two articles on the effects of the war, from its beginning on October 7, 2023, to the present. The coping of Israel's elderly population and the effects of the massacre and war from a therapeutic perspective are discussed in an article by Dr. Sharon Avidor, a faculty member at the Ruppin Academic Center, while the effect of the war on the continuity of care provided to older adults with dementia is described in an article based on the research of Dr. Mor Saban from the Department of Nursing at Tel Aviv University and colleagues.

I hope that you will enjoy the bulletin and I invite you to share your responses to its contents by e-mail to: herczeg@tauex.tau.ac.il.

On my own behalf and that of the institute's staff, we wish our readers good health, calm days, and good tidings.

Prof. Silvia Koton
Head of the Herczeg Institute on Aging

How is Israel's elderly population coping with the October 7th attack and the Iron Swords war? The effects of the massacre and war in old age from a therapeutic perspective / Dr. Sharon Avidor

Program for Clinical Psychology of Adulthood and Aging, Ruppin Academic Center

The terrorist assault and the war of October 7th, 2023, led to intense consequences for survivors of the attack and for Israeli society in general. Reactions and coping of people in general and of the elderly in particular cover a wide spectrum. Nonetheless, some reactions are typical of this age group, particularly among those who personally experienced the effects of the massacre and war. It is important to be familiar with these reactions to allow adaptation of new alongside traditional therapeutic tools, providing a response to the psychological needs that have arisen since then. The aim of the current article is to concisely describe the unique challenges and reactions typical of old age manifested since the attack of October 7, together with recommendations for an adapted therapeutic approach for working with the elderly population during this period.

In my therapeutic work with elderly individuals who either they themselves or their family members were victims of the terror attack perpetrated on October 7, 2023, I see before me Odysseus, the protagonist of Homer's epos, *The Odyssey* (Homer, 7th century BC/1994). I am reminded in particular of his long voyage home after the lengthy Troyan War. In this voyage, in addition to the war years, he had to undergo another lengthy and challenging 10-year journey until reaching home in Ithaca.

A large number of elderly people suffered the negative consequences of October 7th. Many of those who survived are now undergoing a continuous experience that involves dealing with the implications of multiple losses and disaster on the personal and systemic level. They too are currently embroiled within a lengthy voyage with no predictable end. In contrast to the King of Ithaka in Greek mythology, they are in the last chapter of their life, and it is not clear how many years they have left to live, which could allow them to experience a sense of completion or return to their former home that is no more. Due to the dimensions of the attack and its consequences for many elderly individuals, therapists specializing in work with the elderly population are in an "unfamiliar domain" during the last year, both regarding typical expected reactions and the recommended therapeutic and social response to these reactions.

The first stages in survivors' coping efforts consist of maintaining a "war routine". Many of them were evacuated and removed from their homes, compelled to deal with a reality that has changed beyond recognition. The natural inclination is to focus on technical issues such as residential arrangements and finding a response to their health problems, more than on emotional issues. Our initial orientation as therapists is to focus on the need for a sense of home and security, with no availability for emotional processing at this stage. However, the distress, despair, and mental pain are significant, and they exist as undercurrents that accompany one daily. In contrast to younger people who experienced traumatic

events and tend to voice the distress one way or another, the elderly are inclined to internalize the pain instead of externalizing it. Make no mistake – the pain exists, but the cry is internal. At times, highly sensitive elderly people (for instance in a state of chronic illness or at the beginning of cognitive decline) who experienced the horrors of the massacre may experience a type of "internal disintegration": They tend to converge inwards and withdraw into themselves and sometimes there will be a sharp and sudden deterioration that cannot be explained only by their physical or cognitive state.

As therapists, we do not encourage deep work with the losses, designated in general "grief work". Although at the time these lines are being written more than a year has passed, it is still too early to intensively address grief. We do not encourage exposure or reconstruction of traumatic experiences as a means of coping, although some people openly share their stress experiences. Instead, current coping is accentuated, reflection of the structuring and formulation that arise in every therapeutic session and the strengths that each person brings to this coping. The support anchors of the elderly, even of the oldest old, are significant. These often include the close family, the community, healthy habits such as exercise, reading, listening to music, art, and nature outings. One major aspect of psychotherapy with elderly people recovering from massive lengthy trauma is stressing the ability of many to continue growing, without belittling the difficulties of life alongside traumatic grief.

However, this is a unique therapeutic task that requires a balance between emphasizing strengths, support, and accommodation on one hand and a shared presence in the undercurrents of pain, distress, and terror on the other. Hence, in psychotherapy that deals with traumatic events, similar to therapy with young people, we as therapists cannot lean back on the therapist's couch and talk to the clients from a comfortable distance. It is very important that we be with them, in their quest towards the end of their life. For the therapy to be authentic and significant, it is not possible to deny the sensation that we too are in pain, and sometimes we will even feel subconsciously that we are being attacked or experience the stormy feelings and rage of the elderly survivors one way or another. Because also the rage, although not heard at a distance, is part of the post-traumatic picture in old age. Its manifestations in therapy can be an experience of guilt, helplessness, or failure as therapists. These experiences are a natural and inevitable part of the therapist's work, and this is the window that allows us to become immersed in the clients' experiences and be shaken by them.

References

Homer (1994). *The Odyssey* (translated by J. Hauben Nevo). Yaron Golan publication. (originally authored in the seventh century BC).

Effects of the war on the continuity of care provided to older adults with dementia / Dr. Mor Saban

Department of Nursing, School of Health Professions, Tel Aviv University

Collaborators: Dr. Zorian Radomyslsky (Maccabi Healthcare Services), Sarah Kivity (Maccabi Healthcare Services), Yaniv Alon (Tel Aviv University)

When referring to dementia, the disease is identified primarily with impaired memory and cognitive abilities, but for people living with dementia the reality is much more complex. Beyond the daily challenges, their experiences in times of crisis such as war become even more complex and hazardous. A study recently conducted in Israel examined the effects of the October seventh war on care provided to people with dementia, presenting a dismal picture of increased vulnerability in this population group.

The study, conducted with the collaboration of Maccabi Healthcare Services and the Tel Aviv University Faculty of Medical and Health Sciences, focused on a research group of some 23,733 adults aged 65 and older diagnosed with dementia, comparing them to a control group of 249,749 adults without dementia. The data were gathered over three time periods: before the onset of the war (March-October 2023), a first period after the beginning of the war (December 2023), and a second period after the war (February 2024). During this time span, participants experienced a significant decline in the continuity of medical care, leading to an aggravation of their health condition and a change in health behaviors.

How has the conflict affected the provision of healthcare services?

The study revealed that following the outbreak of the war on October 7, 2023, a sharp drop was evident in the use of healthcare services among people with dementia. The rate of doctor visits, hospital admissions, and telephone consultations declined significantly. For example, the number of visits to geriatric clinics diminished from 0.586 visits on average per participant in the initial period to only 0.056 visits in the second period. A similar decline was evident in visits to general practitioner clinics, which plummeted from 15.039 on average per participant in the initial period to only 1.424 during the second period.

This trend was not limited to clinic visits. A sharp decline was also evident in hospital admissions. The number of days in hospital dropped from 5.349 on average during the initial period to only 0.015 in the second period. These data indicate a concerning trend of avoiding medical care by people with dementia and their caregivers.

The effect on patients' health and psychological state

The declining use of healthcare services has had direct effects on the health and psychological state of people with dementia. During the study, a sharp rise was observed in weight gains among the research group. The rate of overweight patients increased from 30.74% during the initial period to 54.92% in the second period, attesting to a decline in physical activity and nutritional changes.

In addition, a decline was observed in the diagnosis rates of depression among people with dementia. While at the beginning of the study some 28.07% of the patients had been diagnosed with depression, this rate dropped to only 19.2% during the second period. Although this seems to indicate an improvement, the drop in diagnoses may reflect a graver problem of lack of access to suitable diagnoses and treatment rather than a real improvement in patients' psychological state.

Long-term effects and recommendations for improvement

The study emphasizes that the effects of the war are not limited to the time of the actual combat but rather continue in the long term as well. A drop in the use of essential healthcare services might lead to an aggravation of existing health conditions and the emergence of new conditions that are not properly treated. The findings indicate a need to develop more flexible and easily available solutions, such as mobile clinics and medical telephone consultations, which patients can access in times of emergency as well.

It is also important to provide support to family caregivers who bear the burden of daily care and encounter many challenges in times of emergency. Providing caregivers with psychological support and tools can help improve the quality of life of people with dementia as well as of the caregivers themselves.

Insights for the future: How to improve responses provided in times of emergency?

The study provides important insights about possible ways of improving care provided to vulnerable populations in times of emergency. First and foremost, it is necessary to arrange for a system of healthcare services capable of rapidly and efficiently responding to changes in the security and social situation. Constructing a rapid response ability, such as opening improvised clinics in alternate residential sites or operating medical telephone consultations around the clock, can provide considerable assistance in such situations. In addition, it is necessary to examine the possibility of establishing designated aid centers for patients with dementia that will provide them and their families with all the information and support needed in times of emergency. These centers can serve as a point of contact for the families, preventing a situation where patients do not receive the necessary response.

In conclusion

The recent conflict between Israel and the terrorist organizations has had a significant detrimental effect on people with dementia and their ability to receive routine medical care. The study stresses the need for better preparation of the healthcare system for states of emergency, particularly regarding vulnerable populations such as people with dementia. Only through early planning and flexible response can we ensure that those in need will receive the best care even in times of uncertainty.

References

Radomyslsky, Z., Kivity, S., Alon, Y., & Saban, M. (2024). Conflict-related breakdowns in routine medical care-Longitudinal outcomes for civilians with pre-existing cognitive ompairment. *Aging and Disease*.

Poems

קמטים- טוביה ריבנר

כַּמָּה יָפִים הַקְּמָטִים בְּפָנַיִךְ!
בְּאֵיזֶה סֵדֶר מוּפְתִי נִשְׁכְּבוּ זֶה בְּצַד זֶה.
מְלֵאֵי חַיִּים עַל טוּבָם וְסִבְלָם,
כַּמָּה זִכְרוֹנוֹת שָׁמַעוֹלָם לֹא פָּתְחוּ פֶּה,
שַׂחַר נְעוּרִים כְּפַס אוֹר דַּק בָּאֹפֶק,
אֲהָבוֹת שָׁהָיוּ, שֶׁיִּשְׁנָן, אַכְזָבוֹת, יָגוֹן,
כַּמָּה שִׂמְחָה כְּבוּשָׁה, כַּמָּה חֵמָרָה,
שְׁאִיפוֹת שֶׁנִּתְמַמְּשׁוּ וְכָאֵלֶּה שֶׁלֹּא.
פָּנַיִךְ מַסְלוּל כּוֹכָבִים מְקֻטָּע
וְעֵינַי מְלַטְּפוֹת.

מתוך "עוד לא עוד" סדרת כבר, מוסד ביאליק.
טוביה ריבנר, (ינואר 1924- יולי 2019). משורר, מתרגם (לעברית ולגרמנית), עורך וצלם. כיהן כפרופסור לספרות באוניברסיטת חיפה, חתן פרס ישראל לשירה עברית (תשס"ח).

כל אדם - נעם חורב

כל אדם נלחם באיזה קרב
כל אדם סוחב חתיכה של איזה סתיו
כל אדם בסוף הוא זר
ואין לדעת מאיזו מלחמה חזר
המעט שנדרש - לברור כל מילה
לגלות רגישות, לנהוג בחמלה
כמו שהיינו רוצים שינהגו בנו
כשאנחנו נלחמים את הקרב שלנו.

Articles by doctoral students, recipients of the Herczeg Institute 2024 grant

"I remember what you said, so what?": Age effects on following conversation

By **Nitzan Trainin**, recipient of the Herczeg Institute grant for doctoral student research proposals on old age

Research supervisor: **Prof. Einat Shitrit**

Department of Linguistics, Faculty of Humanities and Sagol School of Neuroscience, Tel Aviv University

Older adults are usually perceived as experiencing greater difficulties with managing efficient interactions. Among other things, they have been found to be less adept at following a conversation than younger adults. One aspect of this competency is mapping variations between speakers, namely, remembering who said what and how. This mapping can have immediate benefits, such as predicting or synchronizing use of language (for example, by using the same words) or "out-of-context" benefits, such as including speaker-specific information that might be useful in other interactions (for instance, social information).

To illustrate, a person who follows the words used by his interlocutor might use the same words and thus increase communication efficacy. This commonly studied phenomenon is called "lexical alignment". In addition, learning the language preferences of a certain speaker can help predict linguistic absorption from that speaker (namely, what words she may use). This can be beneficial within the same interaction, in the form of "adaptation" (i.e., more accurate prediction of the next word), or in future interactions through generalization. Indeed, it has been found (among other things, in our department) that young people deduce considerable social information based on language usage.

Most of the research on this subject has focused on young people; hence the need for a study that focuses on older adults, whose ability to map variations between speakers is interesting due to the cognitive changes that occur with age. For instance, a decline in memory functioning and learning abilities with age has been well documented. In addition, it has been claimed that abilities such as "theory of mind" (the ability to represent another's consciousness) and "inhibitory control" (the ability to "repress" an undesirable automatic action) diminish with age. Recently, we have shown that these competencies play a role in speaker-specific generalizations. Hence, older adults might encounter difficulties in this area.

The ability of older adults to hold a conversation has not received considerable systematic and empirical research attention. Nonetheless, several studies indicate that although adults follow conversation well, they use different cognitive resources for this purpose. Since cognitive resources are limited, their use in interactions might prevent older adults from storing information that is not

immediately useful, such as speaker-specific information. While learning this information has not been studied to date among older adults, there are several findings on the effect of aging on people's ability to adjust their manner of speech to the demands of interlocutors. Several studies have suggested that the ability to "take the perspective" of the addressee diminishes with age, but others suggest that older adults adapt their language to their interlocutors even better than do younger adults.

Our lab-based study strives to explore the ability of older adults to map variations between speakers, adapt to the naming preferences of their various interlocutors, and generalize speaker-specific information based on these preferences. The respondents perform a task of choosing a picture, where in the first stage those providing the description are pre-programmed "bots" (unknown to the respondents), such that one uses common words and the other uncommon words (in turn). In the second stage, the roles are reversed and the respondents must describe the same pictures to their "partners" (once again, in turn). Then, we directly examine the mapping ("who said what"), measure synchronization with the speaker (did the respondent use the words previously used by the specific speaker), and examine the generalization of speaker-specific information to future interactions in two respects – linguistic (for example, does the "partner" too tend to use uncommon structures) and social (for instance, is the "partner" sociable).

The study is in the data collection process, but according to the initial results it seems that older adults manage to efficiently map the variations between speakers (although less efficiently than younger adults). Nonetheless, unlike our findings among young adults, older adults do not appear to use this knowledge to become synchronized with their interlocutors. Moreover, it seems that despite the efficient mapping, older adults do not generalize social and linguistic features of speakers based on their naming preferences.

What does this mean? The answer is not unequivocal, but there are several interesting hypotheses. First, we showed that although older adults do not match their naming preferences by the partner's identity and do not generalize concerning the partner's linguistic/social features, the ability to map the variations between speakers is maintained in older adults despite the many findings concerning the decline in memory and learning competencies. Namely, synchronized use of language and generalizations are unconnected to mapping ability. And what about the (lack of) synchronization? Perhaps older adults, who are more experienced in use of language than younger adults (many years of experience), have a lower likelihood of changing naming preferences depending on the addressee, because their preferences are more "engraved in stone". Alternately, older adults may find it more difficult to use the speaker's identity as a "cue" for retrieving a word. Regarding generalizations – here too there are many possible explanations, but based on our prior findings the most probable explanation seems to be that generalizations require use of the "theory of mind" and "inhibitory control", abilities found to diminish with age. Nevertheless, it is important to remember that the study is still in the data collection stages and the conclusions may change.

Golden spiny mice: A unique model for the research of healthy aging

By **Tali Sagiv**, recipient of the Herczeg Institute grant for doctoral student research proposals on old age

Research supervisor: **Prof. Noga Kronfeld-Schor**

Department of Zoology, Faculty of Life Science, Tel Aviv University

With the rise in life expectancy, the topic of aging is becoming more important than ever as it opens options for discovering the secrets of longevity and developing new solutions to prevent illnesses and phenomena related to old age. The health, social, and economic consequences of these phenomena are considerable and they affect the well-being of individuals and of society at large.

As the model animal in my study I chose to use the golden spiny mouse (Acomys russatus), which is unique to the study of aging. The golden spiny mouse is a small rodent common in desert areas of the Middle East, including Israel, Jordan, and the Sinai. In Israel it is found mainly in the Judean Desert and Dead Sea area. These mice are considered unique among rodents due to their long life expectancy relative to mice. Unlike other rodents, the golden spiny mouse has several biological features that resemble those of humans, such as a more similar hormone composition and day rather than night activity, considered unusual in rodents. All these make it an efficient model for aging research, as they allow examination of the time effects on various aspects explored in the lab, such as the biological clock system, healing wounds, cognitive and behavioral functioning, fertility, and others. We managed to raise golden spiny mice in the lab who lived for more than 5 years, while among lab mice two years is considered old.

In the study, physiological and behavioral experiments were conducted, as well as experiments on the molecular level. These included periodic assessments of daily activity, behavior tests, exploring the level of tissue preservation and of fertility preservation. Each mouse received a unique electronic identifying tag to follow it over the years and its activity was explored consistently by special activity sensors, analyzing activity and rest cycles. In addition, the mice were subjected to various types of behavioral tests, examining physical qualities such as muscle power, balance, and tolerance, as well as cognitive features such as spatial learning and memory. Also explored was the mice's wound healing ability, using a test that includes perforation of the ear and measuring its healing rate over time. Regarding fertility, we are now exploring procreation processes between males and females in different age groups, following procreation ability, pregnancies, and parturition, the number of mouse pups, and their chances of survival.

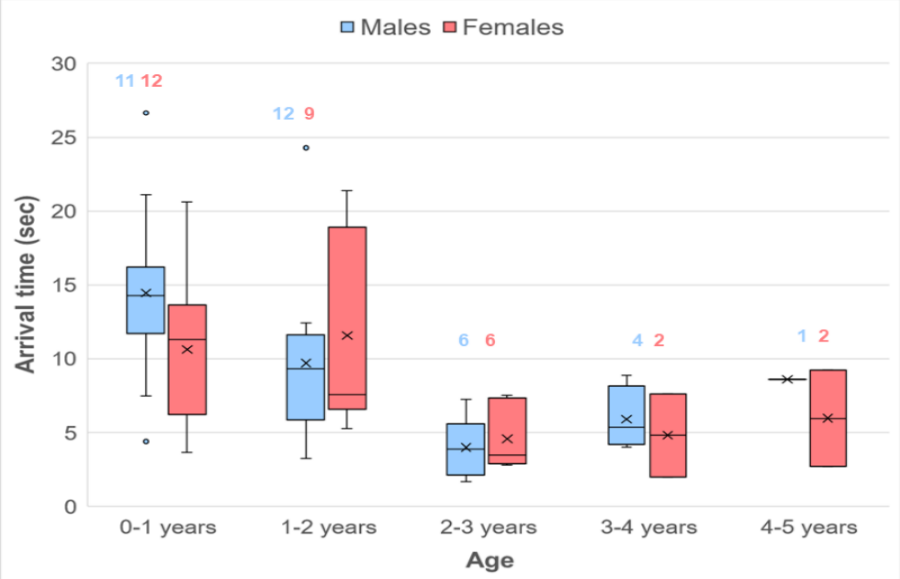
The molecular part of this study was conducted in collaboration with the lab of Prof. Vishwa Deep Dixit of Yale University, with the aim of understanding the molecular mechanisms that maintain the functioning of body parts and tissue at an older age and comparing golden spiny mice with standard lab mice, such as Black6 lab mice. Prof. Dixit's lab focuses on understanding the interactions between the metabolic systems and immune system, seeking to identify molecular aims of controlling aging-related

inflammation and immune problems. As part of the collaboration, we are examining aging-related gene expression in different tissues among mice and golden spiny mice at various ages, comparing the tissue preservation state of older and younger golden spiny mice, with the aim of detecting features that contribute to healthy aging in these mice.

The initial results of the study indicate that golden spiny mice present unusual features relative to other rodents. For example, they were found to maintain high cognitive functioning in old age, as reflected by various behavioral tests such as the beam walking test and the open field maze. This ability may shed light on mechanisms involved in maintaining brain health over the years. In addition, the healing capacity of golden spiny mice has been proven very efficient, which might constitute a research foundation for new strategies to support healing processes among humans at an advanced age. In the molecular dimension as well, the tissue preservation of these mice was found to be better than that of lab mice.

The combined findings from the physiological, behavioral, and molecular experiments offer a possibility of developing new insights on healthy aging that cannot be learned from models of regular lab mice. Further research is expected to deepen our understanding of the time effects on physical and brain health and provide additional knowledge for developing prevention and treatment approaches that will help improve the quality of life of older adults.

The graph presents the performance of golden spiny mice in various age groups in a beam walking behavioral test. As evident, the mice in the older age groups (2-3, 3-4, and 4-5) managed to cross the beam in less seconds on average than the younger ones (aged 0-1 and 1-2) among both males (blue) and females (red). Namely, the older mice showed better performance in this test.



The future of gait analysis studies: How technology helps assess the health of older adults

By **Yonatan Brand**, recipient of the Herczeg Institute grant for doctoral student research proposals on old age

Research supervisors: **Prof. Jeffrey M. Hausdorff and Dr. Or Perlman**

Department of Biomedical Engineering, Tel Aviv University

In recent years, with the rise in life expectancy, there is a growing frequency of walking problems, falls, and degenerative diseases in the population. Aging processes are accompanied by changes in motor functioning, manifested in a decline in walking pace, reduced step size, and diminishing stability. Studies have shown that various gait measures, such as walking pace, can predict the development of degenerative diseases such as Alzheimer's and Parkinson.

Parkinson is a degenerative disease manifested in motor symptoms that limit movement ability and walking quality. At present, Parkinson is diagnosed mainly by reviewing symptoms, where walking constitutes a major component of the tests. However, these tests are usually carried out in the lab and provide a limited picture of the patient's condition in an artificial environment that does not reflect everyday life. In addition, possible biases may appear, such as the "observer effect" – a situation where respondents' performance improves in awareness of medical staff presence.

The need for objective and consecutive measurement solutions for following walking in the natural environment of older adults became particularly critical during the Covid-19 pandemic, when older adults avoided visiting clinics for fear of contagion. Here technology comes into the picture: smart watches, which are gaining wide popularity, include acceleration sensors that allow measurement of users' everyday activity, such as gait outcome measures. These sensors allow remote and accessible data monitoring even in the home environment and constitute an attractive alternative for assessing the health condition of older adults.

Nonetheless, the smart watches currently available are intended mainly for a young and healthy population, and therefore the algorithms they use to produce gait outcome measures are not always adapted to older adults. To cope with this problem, it is necessary to develop tools and technologies adapted to the special needs of older adults. This includes automatic detection of walking segments based on acceleration indicators received from the watch, while dealing with various everyday movements that may be misinterpreted as walking, such as washing dishes or brushing one's teeth. Automatic identification of walking among older adults and people with movement disorders is challenging, as hand movement while walking might be limited.

With the progress of technology, artificial intelligence and machine learning have become major tools for analyzing data from wearable sensors to detect gait patterns. These approaches, and particularly

supervised learning, require a large quantity of labeled data, where each example has a correct label that describes the action performed (for instance, whether the user walked or not). Based on these examples, the model learns to detect patterns characteristic of walking and to distinguish between walking and other activities.

But here a significant challenge arises: The process of gathering labeled data in the medical field is complex and expensive. Labeling data collected during an entire week of everyday activity requires intensive manual work by experts. In addition, there is a general dearth of extensive databases recording everyday activity of older adults, particularly since their varied and complex behavior makes it hard to reach precise labeling.

Recently, use is being made of a new method called self-supervised learning that suggests a unique solution to this challenge. In this method the model is trained in stages. In the first stage, called "pre-task", the model learns to represent the information in the data indicators while using a large quantity of unlabeled data and identifies recurring patterns or features of the data. Only in the second stage is the model updated, using a small quantity of labeled examples to teach the model to carry out the specific task – such as detection of gait. This method makes it possible to utilize the huge amount of unlabeled data accumulated from wearable devices and to deal with the lack of labeled data, while maintaining high accuracy.

Supervised by Prof. Jeffrey Hausdorff and Dr. Or Perlman, a model called ElderNet was developed, intended to detect gait and produce gait outcome measures such as speed, length of step, and walking pace. The model was trained based on a large database collected at the RUSH University in Chicago, which includes thousands of recordings from smart watches worn by older adults. A smaller database of labeled data was also used to fine tune the model.

Applying self-supervised learning made it possible to achieve impressive performances and even surpassed the performance of traditional models that required a large amount of labeled data. When we used ElderNet to calculate the number of daily minutes the respondent had walked, significant differences were revealed between respondents with no Parkinsonian signs (who walked more) and respondents with Parkinsonian signs (who walked less). The ability of ElderNet to identify these differences indicates the potential of serving as an auxiliary instrument for early diagnosis of degenerative illnesses and even to monitor the progress of existing illnesses.

The new model might serve as a foundation for building a digital profile of everyday activity, allowing expansion of the existing clinical assessment. Moreover, the technology can be applied as a tool for monitoring the progress of illnesses, providing second opinions, and assessing the risk of falls. Use of self-supervised learning and the ability to utilize huge amounts of unlabeled data open the door to a future where medical assessment is performed consistently, personally adapted, and based on data from real life. Through advanced technologies it is possible to lead to an improvement in the quality of life among older adults and to facilitate preventive and proactive medicine.

References

Brand, Y. E., Kluge, F., Palmerini, L. et al. (2024). Self-supervised learning of wrist-worn daily living accelerometer data improves the automated detection of gait in older adults. Sci Rep 14, 20854. https://doi.org/10.1038/s41598-024-71491-3

List of publications on old age by faculty and committee members at the Herczeg Institute

October 2023 – September 2024

Parizian-Steinberg, N., **Benyamini, Y**., & Weiss-Gal, I. (2024). Factors associated with the intention to work with older adults among first year social work students in Israel. *Journal of Gerontological Social Work,* 67(5), 588-604. DOI:10.1080/01634372.2024.2339972

Shidlo, N., Lazarov, A., & **Benyamini, Y.** (2024). Stressful life events and the occurrence of skin cancer. *Psycho-Oncology*, 33(5), e6343. DOI:10.1002/pon.6343

Shmotkin, D., & **Bluvstein, I**. (2024). Inquiry on threats of evil within the hostile-world scenario: Emerging content and mental health concomitants among Holocaust survivors. *Journal of Aggression, Maltreatment & Trauma,* 1–22. https://doi.org/10.1080/10926771.2024.2369068

Bluvstein, I., & **Koton, S**. (2023). P78: Complicated grief in the shadow of the COVID-19 pandemic among adults and the elderly. *International Psychogeriatrics,* 35(S1), 206-207.

Cohen-Mansfield, J., & **Golander, H**. (Aug. 2023) Bound in an imbalanced relationship: Family caregivers and migrant live-in care-workers of frail older persons in Israel. *Qualitative Health Research*, 32(12), 1116-1130. https://doi.org/10.1177/10497323231186108

Lewis, M., Heymann, A., Zacay, G., & **Justo, D**. (2024). Frailty and its association with long-term mortality among community-dwelling older adults aged 75 years and over. *Isr J Health Policy Res*. 13(1), 26.

Ann Peleg, D., & **Justo, D.** (2024). Functional independence measure scale scores in severely dependent older adults upon rehabilitation completion following stroke. *Harefuah*. 163(6), 359-364.

Berger, Y., Zelezetsky, M., Israeli, A., Shomsky, N., Nachmany, I., **Justo, D.**, & Gutman, M. (2024). The multidisciplinary geriatric surgery unit at the Chaim Sheba medical center - first year of activity. *Harefuah*. 163(4), 211-216.

Schroeder, H. S., Israeli, A., Liebergall, M. I., Or, O., Abu Ahmed, W., Paltiel, O., **Justo, D.**, & Zimlichman, E. (2024). Home versus hospital rehabilitation of older adults following hip fracture yields similar patient-reported outcome measures. *Inquiry*. 61, 469580241230293.

Schroeder, H., Israeli, A., Liebergall, M., Or, O., Abu Ahmad, W., Paltie,l O., **Justo, D.**, & Zimlichman. E. (2023). Utilising patient-reported outcomes for goal-directed therapy of hip fracture patients: A sequential controlled trial. *BMJ Open Qual*. 12(4), e002402.

Perelmutter, O., Waitzman, A., & **Justo, D**. (2024). Delirium in older adults with dementia: What is the role of electroencephalogram?. *J Clin Images Med Case Rep*. 5(5), 3051.

Mok. Y,, Dardari, Z., Sang, Y., Hu, X., Bancks, M. P., Mathews, L., Hoogeveen, R. C., **Koton, S.**, Blaha, M. J., Post, W. S., Ballantyne, C. M., Coresh, J., Rosamond, W., & Matsushita, K. (2024). Universal risk prediction for individuals with and without atherosclerotic cardiovascular disease. *J Am Coll Cardiol*. 83(5), 562-573. DOI: 10.1016/j.jacc.2023.11.028. PMID: 38296400.

Sloane, K. L., Gottesman, R. F., Johansen, M. C., Jones Berkeley, S., Coresh, J., Kucharska-Newton, A., Rosamond, W. D., Schneider, A. L. C., & **Koton, S**. (2024). Stroke subtype and risk of subsequent hospitalization: The atherosclerosis risk in communities study. *Neurology,* 102(3),e208035. DOI: 10.1212/WNL.0000000000208035. Epub 2024 Jan 5. PMID: 38181329; PMCID: PMC11023038.

Eswaran, S., Knopman, D. S., **Koton, S.**, Kucharska-Newton, A. M., Liu, A. C., Liu, C., Lutsey, P. L., Mosley, T. H. Jr, Palta, P., Sharrett, A. R., Sullivan, K. J., Walker, K. A., Gottesman, R. F., & Groechel, R. C. (2024). Psychosocial health and the association between cerebral small vessel disease markers with dementia: The ARIC study. *Stroke,* 55(10), 2449-2458. DOI: 10.1161/STROKEAHA.124.047455. Epub 2024 Aug 28. PMID: 39193713.

Groechel, R. C., Liu, A. C., Liu, C. , Knopman, D. S., **Koton, S.**, Kucharska-Newton, A. M., Lutsey, P. L., Mosley, T. H. Jr, Palta, P., Sharrett, A. R., Walker, K. A., Wong, D. F., & Gottesman, R. F. (2024). Social relationships, amyloid burden, and dementia: The ARIC-PET study. *Alzheimers Dement (Amst*). 16(2), e12560. DOI: 10.1002/dad2.12560. PMID: 38571965; PMCID: PMC10988116.

Levine, D. A., Whitney, R. T., Ye, W., Briceño, E. M., Gross, A. L., Giordani, B. J., Sussman, J. B., Lazar, R. M., Howard, V. J., Aparicio, H. J., Beiser, A. S., Elkind, M. S. V., Gottesman, R. F., **Koton, S.**, Pendlebury, S. T., Kollipara, A. S., Springer, M. V., Seshadri, S., Romero, J. R., Fitzpatrick, A. L., Longstreth. W. T. Jr, & Hayward, R. A. (2024). Associations between stroke type, ischemic stroke subtypes, and post-stroke cognitive trajectories. *medRxiv* [Preprint]. 2024 2024.04.29.24306600. DOI: 10.1101/2024.04.29.24306600. PMID: 38903102; PMCID: PMC11188123.

Elser, H., Pappalardo, L. W., Gottesman, R. F., Coresh, J., Diaz-Arrastia, R., Mosley, T. H., Kasner, S. E., **Koton, S.**, Schneider, A. L.C. (2024). Head injury and risk of incident ischemic stroke in community-dwelling adults. *Stroke,* 55(6), 1562-1571. DOI: 10.1161/STROKEAHA.123.046443. Epub 2024 May 8. Erratum in: *Stroke*. 2024 Aug;55(8):e245. DOI: 10.1161/STR.0000000000000472. PMID: 38716662; PMCID: PMC11126353.

Mok, Y., Lu, Y., Ballew, S. H., Sang, Y., Kucharska-Newton, A., Mediano, M. F., **Koton, S.**, Schrack, J. A., Palta, P., Coresh, J., Rosamond, W., & Matsushita, K. (2024). Premorbid physical activity and prognosis after incident myocardial infarction: The atherosclerosis risk in communities study. *Am Heart J.* 274, 75-83. DOI: 10.1016/j.ahj.2024.05.005. Epub 2024 May 7. PMID: 38723879; PMCID: PMC11168863.

Groechel, R. C., Liu, A. C., **Koton, S.**, Kucharska-Newton, A. M., Lutsey, P. L., Mosley, T. H., Palta, P., Sharrett, A. R., Walker, K. A., Wong, D. F., Gottesman, R. F. (2024). Associations between mid-life psychosocial measures and estimated late life Amyloid burden: The atherosclerosis risk in communities (ARIC)-PET study. *J Alzheimers Dis*. 97(4), 1901-1911. DOI: 10.3233/JAD-231218. PMID: 38339934.

Liu, A. C., Patel, M. D., Gross, A. L., Mosley, T. H., Schneider, A. L. C., Kucharska-Newton, A. M., Sharrett, A. R., Gottesman, R. F., & **Koton, S**. (2024). Occupation, retirement age, and 20-year cognitive decline: The atherosclerosis risk in communities neurocognitive study. *Neuroepidemiology,* 58(4), 292-299. DOI: 10.1159/000534791. Epub 2024 Feb 22. PMID: 38387450; PMCID: PMC11300158.

Rand, D., Khalil, S. A., Schaham, I., Doron, N., Peri, S., Zeilig, G., ... & Barel, H. (2024). U-Rate-UE; measuring perceived recovery of the affected upper extremity in adults post-stroke. *Archives of Physical Medicine and Rehabilitation*, 105, 1151-1157.

Givon Schaham, N., Buckman, Z., & **Rand, D**. (2024). TECH preserves global cognition of older adults with MCI compared with a control group: a randomized controlled trial. *Aging Clinical and Experimental Research,* 36(1), 1.

Khalil, S. A., Kim, G. J., **& Rand, D**. (2024). Comparison of upper extremity function and daily use in individuals with and without post stroke depression. *Neurorehabilitation and Neural Repair,* 38(2), 99.

Kirshenboim Bachar, Y., Weitzer, T., & **Rand, D**. (2023). Assessing upper extremity-cognitive dual-task ability in neurological populations: A systematic review. *Neurorehabilitation,* 53(4), 459-471.

Shamir, D., Loubani, K., Schaham, N. G., Buckman, Z., & **Rand, D**. (2024). Experiences of older adults with mild cognitive impairment from cognitive self-training using touchscreen tablets. *Games for Health Journal,* 13(1), 13-24.

Levin, C., Bachar-Kirshenboim, Y., & **Rand, D**. (2023). Daily steps, walking tests, and functioning in chronic stroke; comparing independent walkers to device-users. *Physiotherapy Research International,* e2035.

Maman, R., **Rand, D**., & Avrech Bar, M. (2023). How do older women perceive the occupations and activities within their maternal role? Findings from an exploratory survey. *PloS One,* 18(5), e0283992.

Shenkman, G., Ifrah, K., & **Shmotkin, D.** (2023). The contribution of couplehood and parenthood to the hedonic and eudaimonic well-being of older gay men. *Journal of Happiness Studies*, 24, 1419–1437. https://doi.org/10.1007/s10902-023-00645-3

Ifrah, K., Shenkman, G., & **Shmotkin, D.** (2024). Psychological flexibility in the face of potential adversity: Examining wellness among gay and heterosexual men. *American Journal of Orthopsychiatry*. https://dx.doi.org/10.1037/ort0000770

Petashnick, J. R., Hoffman, Y., Shrira, A., Palgi, Y., Kavé, G., **Shmotkin, D.**, & Cohn-Schwartz, E. (2024). Subjective age and personality traits in older adults: Reciprocal and indirect effects through positive and negative affect. *Canadian Journal of Behavioural Science*. https://doi.org/10.1037/cbs0000401

Shenkman, G., Ifrah, K., & **Shmotkin, D.** (2024). Evil-related threats and mental health concomitants among offspring of Holocaust survivors gay men. *Aging & Mental Health*. https://doi.org/10.1080/13607863.2024.2363342

About the Herczeg Institute

The Herczeg Institute on Aging was established in 1992 at Tel Aviv University. The Institute has a multidisciplinary orientation, manifested in joint supervision by the Faculty of Social Sciences and the Faculty of Medicine. The presence of this institute on campus signifies the expansion of research on aging-related topics at the university's different departments.

The Herczeg Institute conducts and promotes an array of studies related to aging and old age. These studies concern issues such as physical and mental health, health promotion, adaptation and coping in old age, well-being and quality of life along the life span, cognitive and emotional aging processes, old age in society, illnesses in old age, dementia, problems with attending to the old, traumatic life events, and the long-term impact of the Holocaust.

Additional goals of the institute include the dissemination of gerontological interest and knowledge in academia and in the community, stimulating researchers of aging and old age in various disciplines, with a particular emphasis on promoting young researchers in the field, and maintaining relationships with decision makers and policymakers in areas related to aging and old age.

The Herczeg Institute is headed by **Prof. Silvia Koton**.

Members of the Herczeg Institute's scientific committeeHerczeg Institute faculty (2023/4)

Prof. Dov Shmotkin - Chair
Prof. Silvia Koton – Head of the Herczeg Institute
Prof. Yael Benyamini
Prof. Hava Golander
Prof. Dan Justo
Prof. Dan Frenkel
Prof. Shulamith Kreitler
Prof. Debbie Rand

Prof. Silvia Koton, Head of the institute
Dr. Irit Bluvstein, researcher and head of public relations
Dganit Berkovich, administrative coordinator

Join us to remain updated

For updated information on contents, events, and activities at the institute, contact us and we will add you to our mailing list. **Please forward this bulletin to anyone interested in the field of aging.**

Contact Information

The Herczeg Institute on Aging, Tel Aviv University
P.O.B. 39040, Tel Aviv 6997801, Israel
Tel: (972) 3-6409544
Institute website: www.herczeg.tau.ac.il
E-mail: herczeg@tauex.tau.ac.il