



OPEN ACCESS

EDITED AND REVIEWED BY
Kristy A. Nielson,
Marquette University, United States

*CORRESPONDENCE
Ondrej Bezdicek
✉ Ondrej.Bezdicek@lf1.cuni.cz

SPECIALTY SECTION
This article was submitted to
Neurocognitive Aging and Behavior,
a section of the journal
Frontiers in Aging Neuroscience

RECEIVED 08 February 2023
ACCEPTED 27 February 2023
PUBLISHED 20 March 2023

CITATION
Bezdicek O, Ferreira J, Fellows R and
Liepelt-Scarfone I (2023) Editorial: Activities of
daily living and everyday functioning: From
normal aging to neurodegenerative diseases.
Front. Aging Neurosci. 15:1161736.
doi: 10.3389/fnagi.2023.1161736

COPYRIGHT
© 2023 Bezdicek, Ferreira, Fellows and
Liepelt-Scarfone. This is an open-access article
distributed under the terms of the [Creative
Commons Attribution License \(CC BY\)](#). The use,
distribution or reproduction in other forums is
permitted, provided the original author(s) and
the copyright owner(s) are credited and that
the original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Editorial: Activities of daily living and everyday functioning: From normal aging to neurodegenerative diseases

Ondrej Bezdicek ^{1*}, Joaquim Ferreira², Robert Fellows³ and
Inga Liepelt-Scarfone^{4,5}

¹Department of Neurology and Centre of Clinical Neuroscience, First Faculty of Medicine and General University Hospital in Prague, Charles University, Prague, Czechia, ²Laboratory of Clinical Pharmacology and Therapeutics, Faculdade de Medicina, Universidade de Lisboa, Lisbon, Portugal, ³Department of Psychiatry, University of California, San Diego, San Diego, CA, United States, ⁴German Center for Neurodegenerative Diseases (DZNE) and Hertie Institute for Clinical Brain Research, Eberhard Karls University Tübingen, Tübingen, Germany, ⁵IB-Hochschule, Stuttgart, Germany

KEYWORDS

activities of daily living, cognition, mild cognitive impairment, neurodegeneration, functional ability

Editorial on the Research Topic

Activities of daily living and everyday functioning: From normal aging to neurodegenerative diseases

Activities of daily living (ADLs) are a wide-ranging psychological construct to designate and measure individuals' independence and range of everyday functioning in a social environment. Populations in developed countries are aging and estimates of those over the age of 85 who will need assistance with ADLs have tripled. An even steeper decline in ADLs can be expected in people at risk of developing neurodegenerative or other types of diseases (Buchman et al., 2009; Gill et al., 2013). Deficits in ADLs due to cognitive impairment are increasingly discussed as a risk factor for dementia in older age and neurodegenerative diseases (Verlinden et al., 2016; Becker et al., 2022; Jang et al., 2022; Ng et al., 2022), indicating a need for sensitive assessments, especially in mild stages of ADL difficulty. ADLs are affected by multiple factors such as physical fitness, cognitive ability, and mental health (Cahn et al., 1998; Tam et al., 2008; Christensen et al., 2013). Thus, basic and applied research on ADLs is highly necessary as any psychological, medical, or technological intervention that helps to promote or preserve ADLs in later adulthood is of the utmost importance to preserve social independence and goes far beyond this: it helps to diminish the caregiver burden in each family, it decreases healthcare costs, and it creates an existential perspective that life is worth living.

Thus, the current *Research Topic on Activities of Daily Living and Everyday Functioning: From Normal Aging to Neurodegenerative Diseases* is dedicated to different areas of basic and applied research.

Gait disturbances and falls constitute a major reason for disability in older age as fall incidence can result in fractures and other injuries (Lord and Close, 2018). Cerebral small vessel disease (CSVD) has been related to gait disturbances (Markus and De Leeuw, 2023); however, the role of enlarged perivascular spaces in the basal ganglia on these disabilities is still in debate. Data from Yang S. et al. identified that a greater number of enlarged

perivascular spaces in the basal ganglia were independently related to gait disturbances in older people with CSVD. Fear of falling (FoF) is associated with poorer physical and cognitive functions and decreasing ability to perform ADLs; it has been identified as a potential risk factor for falls in older age and neurodegenerative diseases (Bryant et al., 2013; Schoene et al., 2019). The article by Atrsaei et al. evaluates the influence of FoF on mobility in patients with Parkinson's disease (PD), highlighting the importance of monitoring different environments and assessment strategies. In a meta-analysis, Kim et al. found that task-specific reactive balance exercise training may be an optimal intervention in preserving reactive balance to prevent falls in older age. Taken together, these studies identify brain morphological and multimodal clinical risk factors for decreased mobility, as well as targeted strategies for reducing falls and improving functioning. All contributions underline the importance of vascular, psychological, and prophylactic factors in falls and in their monitoring for a better prediction of treatment strategies.

PD is a multicomplex neurodegenerative disease comprising both motor and non-motor symptoms affecting ADLs. For the identification of ADLs impairment indicative of dementia in PD, valid ratings of motor and cognitive sources primarily affecting ADLs are essential (Dubois et al., 2007). The article by Becker et al. focuses on the agreement between self- and informant-reported ADLs and their association with cognitive performance in patients with PD. Of note, motor severity showed a high impact on both self- and informant-reported functioning. Their research indicates a need for objective ADLs measures because the agreement of patient and informant ratings of ADLs function showed only moderate agreement. The contribution of Rehman et al. applies modern machine learning methods to the analysis of gait in PD and controls in real-world and laboratory characteristics. Another line of research in PD is dedicated to non-motor effects and ADLs in patients undergoing deep brain stimulation of the subthalamic nucleus. The study by Bezdicsek et al. shows a positive effect of the treatment on instrumental ADLs in the post-surgery phase. In sum, these contributions highlight novel approaches to evaluate the validity of assessments and monitor the effects of treatment on ADLs in neurodegenerative diseases such as PD.

Psychiatric diseases are known to affect patients' behavior and everyday life. Depression is common in older age, especially in patients with mild cognitive impairment (MCI; Ismail et al., 2017). The article by Numbers et al. revealed that patients' self- and caregiver ratings of ADLs are associated with the severity of depression in a community-dwelling older group. In contrast, objective measures seem to be more robust against the influence of depression and personality and might therefore be a suitable alternative to differentiate between cognitive and psychiatric effects on ADLs disabilities. Similarly, Yang D. et al. show that a certain time and proportion per week of vigorous to moderate physical activity in men over 45 years of age lowers the risk of depression. These studies emphasize the importance of preventive measures in preserving ADLs in relation to neuropsychiatric symptoms such as depression.

In addition to the identification of risk and modulating factors of ADLs in older age and neurodegenerative diseases, treatment strategies are essential to prevent the progression of ADLs

impairment. In their systematic review and meta-analysis, Han et al. concluded that combined cognitive and physical intervention enhances cognition in older adults in the short term irrespective of patients' cognitive status. However, to get insight into long-term treatment effects in older adults, additional high-quality studies are needed. The effects of multimodal exercise on health outcomes in community-dwelling older adults are the focus of the article of Vogel et al. Their data support the assumption that the training outcome depends on factors like sleep duration, movement biography, and activity profile. Therefore, the identification of factors maximizing the treatment outcome of specific therapies is crucial for patients' differential treatment indication.

To date, the pathological mechanisms leading to ADLs impairment are only partly understood. The work of Fellows et al. concluded that larger white matter hyperintensity and smaller hippocampal volumes are correlates for poorer everyday function. They also identified unique contributions of cognitive measures to a newly developed index of pathological functional impairment and neuropsychiatric symptoms to functional reserve in MCI and healthy older adults. Frailty is associated with lower health-related quality of life (Solfrizzi et al., 2019; Chen et al., 2022) and increases the risk of disability, dementia, and mortality (Yi and Yoon, 2023). Most interestingly, abnormalities in the integrity of the left anterior thalamic radiation seem to be associated with frailty in patients with cardiometabolic diseases as shown by Tamura et al. Also, the prevalence of MCI, which is a risk factor for lower ADLs functioning (Perneckz et al., 2006), according to the study of Liu et al., is higher in women than in men of older age. This group of studies uncovers the pathological and demographic factors at play in the development of ADLs impairment.

In conclusion, the Research Topic gives an overview of the state-of-the-art research on ADLs in healthy aging and different clinical conditions. It highlights the key areas of contemporary research into ADLs so that individuals can participate in social life events even at an older age.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Funding

This work was funded by the National Institute for Neurological Research, Czech Republic, Programme EXCELES (ID Project No. LX22NPO5107) and the European Union - Next Generation EU.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated

organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

- Becker, S., Bode, M., Brockmann, K., Gasser, T., Michaelis, K., Solbrig, S., et al. (2022). Cognitive-driven activities of daily living impairment as a predictor for dementia in Parkinson disease: a longitudinal cohort study. *Neurology* 99, e2548–e2560. doi: 10.1212/WNL.000000000000201201
- Bryant, M. S., Rintala, D. H., Hou, J.-G., and Protas, E. J. (2013). Relationship of falls and fear of falling to activity limitations and physical inactivity in Parkinson's disease. *J. Aging Phys. Activ.* 23, 187–193. doi: 10.1123/japa.2013-0244
- Buchman, A. S., Boyle, P. A., Wilson, R. S., Fleischman, D. A., Leurgans, S., and Bennett, D. A. (2009). Association between late-life social activity and motor decline in older adults. *Arch. Intern. Med.* 169, 1139–1146. doi: 10.1001/archinternmed.2009.135
- Cahn, D. A., Sullivan, E. V., Shear, P. K., Pfefferbaum, A., Heit, G., and Silverberg, G. (1998). Differential contributions of cognitive and motor component processes to physical and instrumental activities of daily living in Parkinson's disease. *Arch. Clin. Neuropsychol.* 13, 575–583. doi: 10.1016/S0887-6177(98)00024-9
- Chen, B., Wang, M., He, Q., Wang, Y., Lai, X., Chen, H., et al. (2022). Impact of frailty, mild cognitive impairment and cognitive frailty on adverse health outcomes among community-dwelling older adults: a systematic review and meta-analysis. *Frontiers in Medicine (Lausanne)* 9, 1009794. doi: 10.3389/fmed.2022.1009794
- Christensen, K., Thinggaard, M., Oksuzyan, A., Steenstrup, T., Andersen-Ranberg, K., Jeune, B., et al. (2013). Physical and cognitive functioning of people older than 90 years: a comparison of two Danish cohorts born 10 years apart. *Lancet* 382, 1507–1513. doi: 10.1016/S0140-6736(13)60777-1
- Dubois, B., Burn, D., Goetz, C., Aarsland, D., Brown, R. G., Broe, G. A., et al. (2007). Diagnostic procedures for Parkinson's disease dementia: recommendations from the movement disorder society task force. *Mov. Disord.* 22, 2314–2324. doi: 10.1002/mds.21844
- Gill, D. P., Hubbard, R. A., Koepsell, T. D., Borrie, M. J., Petrella, R. J., Knopman, D. S., et al. (2013). Differences in rate of functional decline across three dementia types. *Alzheimer's Dementia* 9, S63–S71. doi: 10.1016/j.jalz.2012.10.010
- Ismail, Z., Elbayoumi, H., Fischer, C. E., Hogan, D. B., Millikin, C. P., Schweizer, T., et al. (2017). Prevalence of depression in patients with mild cognitive impairment: a systematic review and meta-analysis. *JAMA Psychiatry* 74, 58–67. doi: 10.1001/jamapsychiatry.2016.3162
- Jang, S., Numbers, K., Lam, B. C. P., Sachdev, P. S., Brodaty, H., and Reppermund, S. (2022). Performance-based vs informant-reported instrumental activities of daily living in predicting dementia. *JAMDA* 23, 1342–1347. doi: 10.1016/j.jamda.2021.09.020
- Lord, S. R., and Close, J. C. T. (2018). New horizons in falls prevention. *Age Ageing* 47, 492–498. doi: 10.1093/ageing/afy059
- Markus, H. S., and De Leeuw, F. E. (2023). Cerebral small vessel disease: recent advances and future directions. *Int. J. Stroke* 18, 4–14. doi: 10.1177/17474930221144911
- Ng, T. P., Lee, T. S., Lim, W. S., Chong, M. S., Yap, P., Cheong, C. Y., et al. (2022). Functional mobility decline and incident mild cognitive impairment and early dementia in community-dwelling older adults: the Singapore Longitudinal Ageing Study. *Age Ageing* 51, afac182. doi: 10.1093/ageing/afac182
- Perneczky, R., Pohl, C., Sorg, C., Hartmann, J., Tosic, N., Grimmer, T., et al. (2006). Impairment of activities of daily living requiring memory or complex reasoning as part of the MCI syndrome. *Int. J. Geriatr. Psychiatry* 21, 158–162. doi: 10.1002/gps.1444 PMID: 16416470
- Schoene, D., Heller, C., Aung, Y. N., Sieber, C. C., Kemmler, W., and Freiberg, E. (2019). A systematic review on the influence of fear of falling on quality of life in older people: is there a role for falls? *Clin. Interv. Aging* 14, 701–719. doi: 10.2147/CIA.S197857
- Solfrizzi, V., Scafato, E., Lozupone, M., Seripa, D., Schilardi, A., Custodero, C., et al. (2019). Biopsychosocial frailty and the risk of incident dementia: the Italian longitudinal study on aging. *Alzheimer's Dement.* 15, 1019–1028. doi: 10.1016/j.jalz.2019.04.013
- Tam, C. W. C., Lam, L. C. W., Lui, V. W. C., Chan, W. C., Chan, S. S. M., Chiu, H. F. K., et al. (2008). Clinical correlates of functional performance in community-dwelling Chinese older persons with mild cognitive impairment. *Int. Psychogeriatr.* 20, 1059–1070. doi: 10.1017/S1041610208007345
- Verlinden, V. J. A., Van Der Geest, J. N., De Bruijn, R. F. G., Hofman, A., Koudstaal, P. J., et al. (2016). Trajectories of decline in cognition and daily functioning in preclinical dementia. *Alzheimer's Dement.* 12, 144–153. doi: 10.1016/j.jalz.2015.08.001
- Yi, J., and Yoon, J. Y. (2023). Cognitive frailty increases the risk of long-term care dependency in community-dwelling older adults: a nationwide cohort study in South Korea. *Geriatr. Gerontol. Int.* 23, 117–123. doi: 10.1111/ggi.14534