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Active Ageing in the Right Place

Contributions from the RELOC-AGE programme

FRIDA NORDESTRÖM
DEPARTMENT OF HEALTH SCIENCES | FACULTY OF MEDICINE | LUND UNIVERSITY

Active Ageing in the Right Place

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Contributions from the RELOC-AGE programme

Frida Nordeström

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DOCTORAL DISSERTATION

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Abstract:

Perceptions of the home significantly relate to health in later life, with retirement prompting reflection on housing choices and potential relocation. On the individual level, active ageing can be defined as an individual's pursuit of well-being, aligned with one's goals, abilities, and opportunities. However, there is a lack of research on how housing and relocation relate to active ageing and well-being.

In this thesis, a multi-method approach was employed. The first paper was a study protocol outlining a comprehensive research programme using several methods, encompassing various projects, including those represented in this thesis. The second paper, involved translation and evaluation of psychometric properties of a self-assessment of active ageing. Using survey data, the third paper explored the relationship between active ageing and perceived aspects of home. In the fourth paper, a web-based housing counselling service was examined for the ease of use, efficiency, and user satisfaction through interviews.

The main findings were as follows:

- The self-assessment of active ageing demonstrated sufficient psychometric properties for use among persons aged 55 and older in Sweden (Paper 2).
- Higher active ageing was associated with higher satisfaction, meaning, and control in the home (Paper 3). Among people aged 55 and older in Sweden considering relocation, women, those with higher education, and individuals with higher self-rated health reported higher levels of active ageing.
- The web-based Ageing in the Right Place (ARP) housing counselling service demonstrated acceptable usability and has potential to support older adults in making proactive, informed residential choices (Paper 4).

These findings are relevant for further research into the relationship between active ageing, home, and health. The thesis contributes to proactive housing planning for older adults and offers valuable insights for professionals, such as health care staff, and policymakers.

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Active Ageing in the Right Place

Contributions from the RELOC-AGE programme

Frida Nordeström

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MADE IN SWEDEN

“There’s no place like home. And I’m going to prove it.”
Captain Janeway, Star Trek: Voyager

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Abstract

Perceptions of the home significantly relate to health in later life, with retirement prompting reflection on housing choices and potential relocation. On the individual level, active ageing can be defined as an individual's pursuit of well-being, aligned with one's goals, abilities, and opportunities. However, there is a lack of research on how housing and relocation relate to active ageing and well-being.

In this thesis, a multi-method approach was employed. The first paper was a study protocol outlining a comprehensive research programme using several methods, encompassing various projects, including those represented in this thesis. The second paper involved translation and evaluation of psychometric properties of a self-assessment of active ageing. Using survey data, the third paper explored the relationship between active ageing and perceived aspects of home. In the fourth paper, a web-based housing counselling service was examined for the ease of use, efficiency, and user satisfaction through interviews.

The main findings were as follows:

- The self-assessment of active ageing demonstrated sufficient psychometric properties for use among persons aged 55 and older in Sweden (Paper 2).
- Higher active ageing was associated with higher satisfaction, meaning, and control in the home (Paper 3). Among people aged 55 and older in Sweden considering relocation, women, those with higher education, and individuals with higher self-rated health reported higher levels of active ageing.
- The web-based Ageing in the Right Place (ARP) housing counselling service demonstrated acceptable usability and has potential to support older adults in making proactive, informed residential choices (Paper 4).

These findings are relevant for further research into the relationship between active ageing, home, and health. The thesis contributes to proactive housing planning for older adults and offers valuable insights for professionals, such as health care staff, and policymakers

Populärvetenskaplig sammanfattning på svenska

Miljön, och särskilt hemmet, spelar en avgörande roll för att äldre personer ska kunna bibehålla ett aktivt och självständigt liv. Trots att hemmet är en viktig faktor för att stödja ett aktivt åldrande har få studier använt aktivt åldrande som en central ram för att förstå de långsiktiga effekterna av bostadsbeslut och flytt. Mycket av den tidigare forskningen fokuserar istället på sköra äldre och deras behov av vårdboenden i livets slutskede. Därutöver ställs ofta äldre personer inför komplexa bostadsbeslut allteftersom deras preferenser och behov förändras över tid. Bristen på individanpassad boenderådgivning kan leda till försenade beslut och mindre optimala boendelösningar vilket kan påverka självständigheten och välbefinnandet negativt.

På individuell nivå kan aktivt åldrande förstås som en strävan efter välmående utifrån en persons målsättning, förmågor och möjligheter. För att kunna studera mer om detta skapades en självskattning för aktivt åldrande: University of Jyväskylä Active Ageing Scale (UJACAS). Till skillnad från tidigare skattningsskalor, tar UJACAS inte bara hänsyn till en persons förmåga utan även vilka möjligheter som finns i omgivningen, personens målsättning och vilja att agera. Med andra ord förankras det aktiva åldrandet i den miljö som personen vistas i, både genom vilka möjligheter som miljön kan erbjuda till aktivitet, men också genom att påverka personens motivation och vilja. Det betyder att om vill vi förstå aktivt åldrande på individnivå, behöver vi också förstå vilka möjligheter som finns i personens miljö. Men innan UJACAS kan användas i Sverige krävs det att skattningsskalan genomgår en noggrann utvärdering av trovärdighet och tillförlitlighet, eftersom självskattningens kvalitet är avgörande för hur vi kan tolka och använda resultaten.

I studier om miljöns påverkan på åldrandeprocessen riktas ofta uppmärksamhet till hemmet eftersom allt mer tid tillbringas där ju äldre vi blir. Hemmet utgör också en naturlig bas för all aktivitet. Dessutom vet vi sedan tidigare att hemmet har en stark koppling till hälsa. Men för att förstå hur hemmet påverkar välbefinnandet hos äldre personer är det viktigt att undersöka hur hemmet upplevs. Den upplevda aspekten av hemmet såsom tillfredsställelse, användbarhet, meningsfullhet och känsla av kontroll i hemmet, handlar om de unika känslomässiga kvaliteterna baserade på personliga preferenser och känslor som utvecklas över tid. Det är särskilt viktigt att förstå hur vi upplever våra hem eftersom faktorer som bestämmer den övergripande tillfredsställelsen med hemmet ofta är baserade på upplevelse snarare än fysiska attribut i en bostad, såsom till exempel antal rum och höjd på trösklar. Litteratur om upplevda aspekter om hemmet har fokuserat framförallt på de allra äldsta, och färre studier beskriver hur personer strax runt pensionsåldern upplever sina hem. Studier som beskriver kopplingen mellan aktivt åldrande på individuell nivå och hemmiljö är ännu färre.

Kvarboendeprincipen bygger på antagandet att äldre personer vill bo kvar i samma hem även efter en olycka eller vid ohälsa. Denna princip fungerar som en riktlinje

för både hälso- och sjukvårds- och samhällsinsatser som syftar till att stödja möjligheten att stanna kvar i sitt nuvarande hem senare i livet. Vanliga åtgärder, som hjälpmedelsförskrivning och bostadsanpassningar, syftar till att upprätthålla självständighet och stödjer möjligheten att bo kvar. Även om dessa insatser är viktiga för att öka självständigheten och tillgängligheten, är det reaktiva insatser som erbjuds först när begränsningar eller funktionsnedsättningar redan har uppstått.

För att förstå kopplingen mellan aktivt åldrande och hemmiljö, är det är också viktigt att förstå den medvetna processen av överväganden som äldre personer gör när de fattar beslut om sin boendesituation, inklusive val av bostad. Dessa överväganden handlar om huruvida det är bäst att flytta eller stanna kvar i sitt nuvarande hem eller närområde. Aktuell forskning fokuserar främst på flytt till särskilda boendeformer, men det finns en kunskapslucka kring när och hur människor börjar överväga och agera på sina bostadsval när de blir äldre.

Denna avhandling har till syfte att: (1) föreslå metoder och design för en större forskningsansats som kan fördjupa förståelsen av hemmets roll i aktivt åldrande bland personer 55 år och äldre, (2) bidra till vidareutvecklingen av en självskattning som instrumentaliserar aktivt åldrande, (3) undersöka sambandet mellan upplevt boende och aktivt åldrande, samt (4) bistå i utvecklingen av en bostadsrådgivningstjänst för att stödja resonemang och beslutsfattande om boendesituationen.

Studier i avhandlingen

I avhandlingen ingår fyra studier, alla kopplade till forskningsprogrammet RELOC-AGE, vilket bygger på hypotesen att bostadsval och flyttbeslut påverkar möjligheterna till ett aktivt och hälsosamt åldrande. Hypotesen är att sådana beslut inte bara påverkar individens hälsa utan också deras delaktighet och välbefinnande i åldrandet. Samtidigt som sociala, miljömässiga och närmiljöfaktorer spelar en viktig roll.

Studie 1 var ett studieprotokoll som beskrev metoderna för den större forskningssatsningen RELOC-AGE-programmet, inklusive planeringen av en web-enkät och utvecklingen av en intervention för äldre personer. Detta protokoll beskrev också de grundantaganden för hur bostadsval påverkar aktivt åldrande, vilket är centralt för forskningsprogrammet.

Det var inom ramen för RELOC-AGE programmet som avhandlingens studie 2–4 bedrevs. Studie 2 fokuserade på att validera och översätta skattningsskalan University of Jyväskylä Active Ageing Scale (UJACAS) till svenska. När ett frågeformulär översätts och används i en ny grupp, är det avgörande att pröva reliabilitet och validitet för att säkerställa att formuläret är stabilt och tillförlitligt. Denna prövning är en nödvändig grund för att säkerställa att studier om aktivt åldrande i Sverige håller hög kvalitet. Studie 3 undersökte sedan skillnader i aktivt åldrande med avseende på ålder, kön, utbildningsnivå och självskattad hälsa, samt utforskade sambanden mellan aktivt åldrande och hur det egna hemmet upplevs. Att

förstå detta samband ger värdefull information till beslutsfattare, bostadsmyndigheter och yrkesverksamma inom hälso- och sjukvård samt socialtjänst, särskilt för insatser som är inriktade på boendemiljö. Studie 4 var en användbarhetsstudie av en prototyp för en digital boenderådgivningstjänst. Efter att ha testat prototypen intervjuades användare om deras upplevelser av innehåll, utformning, funktioner och användbarhet.

Eftersom studie 2 visade att UJACAS på svenska var robust för personer 55 år och äldre, användes det sedan i RELOC-AGE web-enkäten, tillsammans med andra frågeformulär. I enkäten visade det sig att kvinnor, personer med högre utbildning och de som skattade sin hälsa som bättre, också skattade sitt aktiva åldrande högre. Dessutom hade högre tillfredsställelse med hemmet, högre meningsfullhet och hög känsla av kontroll i hemmet ett samband med högre aktivt åldrande. Med andra ord, för att förbättra möjligheterna till aktivt åldrande behöver hemmet vara meningsfullt, tillfredsställande och kontrollerbart och därmed främja känslomässiga och psykologiska band. Det indikerar att genom att skapa trygga och engagerande miljöer samt stödja hälsa och lärande, främjas ett mer aktivt åldrande. Den digitala boenderådgivningstjänsten beskrevs som informativ och användbar för att stötta resonemang om hem och boende.

Avhandlingens slutsatser kan bidra till att påverka hur vi ser på aktivt åldrande och boendefrågor för äldre personer.

Den svenska versionen av UJACAS visade sig vara ett pålitligt och holistiskt verktyg för att beskriva den personliga strävan efter ett välmående och aktivt åldrande. Vilket gör UJACAS användbart i framtida studier och interventioner.

Slutsatser från tredje manuset indikerade på ett samband mellan aktivt åldrande och upplevelsen av hemmet, vilket är betydelsefullt för beslutsfattare, bostadsplanerare och yrkesverksamma inom hälso- och sjukvård. Dessa insikter kan ligga till grund för riktade åtgärder som syftar till att förbättra äldre personers välbefinnande genom att optimera deras boendemiljö. Vidare kan digitala boenderådgivningstjänster vara ett viktigt verktyg för att hjälpa äldre att göra informerade boendeval, vilket kan komplettera reaktiva åtgärder och istället ge stöd genom proaktivt beslutsfattande. Samt stötta äldre personer i beslutsfattandet att bo kvar, bostadsanpassa eller flytta för att hitta ”rätt” boende.

Genom att inkludera flera olika metoder för att studera hur bostadsval och flyttbeslut påverkar möjligheterna till ett aktivt och hälsosamt åldrande, samt att inkludera personer som är 55 år och äldre, har RELOC-AGE programmet potential att generera kunskap över tid. På så sätt kan programmets slutsatser även möjliggöra en övergång från sjukdomshantering till ett mer proaktivt och hälsofrämjande angreppssätt, med fokus på förebyggande insatser.

Proaktivitet är genomgående i RELOC-AGE programmet genom att inkludera personer från 55 år och äldre och därmed följa hälso- och boendeförlopp över tid från tidig ålder. Med bättre förståelse för hur aktivt åldrande och upplevelsen av

hemmet, kan riktlinjer och stödinsatser utvecklas i preventivt syfte. Dessutom kan den digitala boenderådgivningstjänsten fungera som ett proaktivt stödverktyg, som kompletterar de mer traditionellt reaktiva åtgärderna från hälso- och sjukvård samt socialtjänst, och därmed stötta äldre personer fatta beslut om sitt framtida boende baserat på informerade val.

Med kunskap om hemmets betydelse för ett aktivt åldrande, och en boenderådgivningstjänst som kompletterar dagens hälso- och sjukvård, bör framtida forskning fortsätta att undersöka hur dessa verktyg kan användas brett för att stötta olika grupper i samhället och bidra till att skapa hållbara lösningar för ett aktivt åldrande på rätt plats.

Popular science summary

The environment, and particularly the home, plays an essential role in enabling older people to maintain an active and independent life. Despite the home's importance in supporting active ageing, few studies have used active ageing as a central framework to understand the long-term effects of housing decisions and relocation. Much of the earlier research has instead focused on frail older adults and their need for care homes at the end of life. However, the impact of the home environment on well-being and social participation throughout the ageing process for a broader group has often been overlooked. Additionally, older people frequently face complex housing decisions as their needs and preferences change over time. The lack of support in this reasoning process often leads to delayed decisions and less optimal housing solutions, which can negatively affect independence and well-being.

On an individual level, active ageing can be understood as the striving for well-being based on a person's goals, abilities, and opportunities. To study this further, a self-assessment for active ageing was created: the University of Jyväskylä Active Ageing Scale (UJACAS). Unlike previous scales, UJACAS not only considers a person's abilities but also the opportunities present in their environment, the person's goals, and their willingness to act. In other words, active ageing is anchored in the environment, both through the opportunities it offers for activity and by influencing a person's motivation and willingness. This means that to understand active ageing on an individual level, we also need to understand the opportunities available in a person's environment. However, before UJACAS can be used in Sweden, the requires through assessment as the quality of self-assessment is critical for how we can interpret and use the results.

In studies on how the environment influences ageing, attention is often directed towards the home, as older adults spend increasing amounts of time there. The home also serves as a natural base for all activities. Additionally, we know from previous research that the home is closely connected to health and makes up a large part of our environment. To understand how the home influences the well-being of older adults, it is important to understand how the home is perceived. Perceived home includes satisfaction, usability, meaningfulness, and a sense of control in the home, which relate to unique emotional qualities based on personal preferences and feelings that develop over time. It is particularly important to understand how we perceive our homes, as the factors determining overall satisfaction with the home are often based on perception rather than physical attributes, such as the number of rooms or the height of thresholds. While more studies describe how older adults perceive their homes, the literature mainly focuses on the oldest old. Few studies describe the perceived aspects of home for people closer to the beginning of retirement age.

The ageing-in-place principle is based on the idea that older adults have the desire and tendency to stay in their current dwellings for as long as possible. This principle serves as a guideline for healthcare interventions. Common measures, such as the provision of assistive devices and home modifications, aim to maintain independence and the possibility of staying in place despite functional limitations. Although these interventions are important for increasing independence and accessibility, they are often reactive and offered only when limitations or impairments have already occurred.

To understand the connection between active ageing and the environment, it is also important to understand the conscious process of considerations that older people make when deciding on their housing situation, including the choice of residence and housing quality. These considerations involve whether it is best to move or stay in one's current home or neighbourhood. Current research mainly focuses on moves to specialised housing, leaving a gap in knowledge about when and how people begin to reflect on and act on their housing choices as they age.

This thesis aims to: (1) propose methods and design for a larger research project to deepen the understanding of the home's role in active ageing among people aged 55 and over, (2) contribute to the further development of a scale that evaluates active ageing, (3) examine the relationship between active ageing and perceived home, and (4) assist in the development of a housing counselling service to support decision-making and reflection on housing situations.

Papers included in the thesis

This thesis includes four papers, all connected to the overarching RELOC-AGE programme, which is based on the hypothesis that housing choices and relocation decisions affect opportunities for active and healthy ageing. The hypothesis suggests that such decisions not only influence an individual's health but also their participation and well-being during ageing, while social, environmental, and neighbourhood factors play an important role.

Paper 1 was a study protocol that described the methods for the larger RELOC-AGE programme, including the planning of a web-based survey and the development of an intervention for older adults. This protocol laid the foundation for further research and was central to understanding housing choices and active ageing.

Paper 2 to 4 were conducted within the framework of RELOC-AGE programme. Paper 2 focused on translating and validating the University of Jyväskylä Active Ageing Scale (UJACAS) into Swedish. When a questionnaire is translated and used with a new group, it is crucial to ensure that it is stable and reliable. Since Paper 2 showed that the Swedish version of UJACAS was reliable for people aged 55+, it was then included in the RELOC-AGE web-based survey along with other questionnaires. This validation is an essential basis for ensuring that future studies on active ageing in Sweden maintain high quality. Paper 3 explored differences in active ageing with regard to age, gender, educational level, and self-rated health,

and the relationships between active ageing and perceived home. Understanding this connection provides valuable information to decision-makers, housing authorities, and professionals in health and social care, particularly for interventions focused on the home. Paper 4 was a usability study of a prototype for a digital housing advisory service. After testing the prototype, users were interviewed about their experiences regarding content, design, features, and usability.

Since paper 2 demonstrated that UJACAS in Swedish was robust for people aged 55 and older, it was subsequently used in the RELOC-AGE web survey, together with other questionnaires. From paper 3 the findings indicated that women, people with higher education, and those who rated their health as better also rated their active ageing higher. Additionally, higher satisfaction with the home, higher meaningfulness, and a greater sense of control in the home were associated with higher active ageing. In other words, to improve opportunities for active ageing, the home must be satisfying, meaningful, and controllable. This suggests that by creating safe and engaging environments and supporting health and learning, a more active ageing process is promoted. In paper 4, the digital housing counselling service was described as informative and useful for supporting reasoning about housing and living. By offering information and guidance on housing options, the service enabled older people to make decisions about their future housing based on informed choices.

The conclusions of this thesis could influence how we view active ageing and housing issues for older adults. The Swedish version of UJACAS proved to be a reliable and holistic tool for describing the personal effort towards well-being and active ageing, making UJACAS useful in future studies and interventions. Further conclusions from paper 3 indicated a link between active ageing and the perceived home, which is important for decision-makers, housing planners, and professionals in health and social care. These insights can form the basis for targeted interventions aimed at improving the well-being of older adults by optimising the living environment. Furthermore, the digital housing counselling service could be an important tool to help older adults make informed housing choices, complementing reactive interventions and instead providing support through proactive decision-making. This can help older individuals in deciding whether to remain, adapt their home, or move to find the “right” housing.

By including several different methods to study how housing choices and relocation decisions affect opportunities for active and healthy ageing, and by involving people aged 55 and older, the RELOC-AGE programme has the potential to generate knowledge over time. The conclusions of the programme can also enable a shift from disease management to a more proactive and health-promoting approach, with a focus on preventive measures. Proactivity is central to the RELOC-AGE programme by including people from the age of 55 and following health and housing developments over time from an earlier age. With a better understanding of how active ageing and the perception of home are related, guidelines and support

measures can be developed with a preventive aim. In addition, the digital housing counselling service can function as a proactive support tool, complementing the more traditionally reactive measures from healthcare and social services, thus supporting older people in their housing planning in a more preventive way.

With knowledge of the importance of home for active ageing, and a housing counselling service that complements today's healthcare, future research should continue to explore how these tools can be widely used to support different groups in society and contribute to creating sustainable solutions for active ageing in the right place.

List of papers

Paper 1

Zingmark, M., Björk, J., Granbom, M., Gefenaite, G., **Nordeström, F.**, Schmidt, S. M., … & Iwarsson, S. (2021). Exploring associations of housing, relocation, and active and healthy ageing in Sweden: protocol for a prospective longitudinal mixed methods study. *JMIR Research Protocols*, *10*(9):e31137, https://doi.org/10.2196/31137

Paper 2

Nordeström, F., Slaug, B., Zingmark, M., Granbom, M., Rantanen, T. & Iwarsson, S. (2024) Translation and psychometric evaluation of the University of Jyväskylä Active Ageing Scale (UJACAS) for use in Sweden. *J Cross Cult Gerontol*, *39*: 17–34, https://doi.org/10.1007/s10823-024-09496-8

Paper 3

Nordeström, F., Slaug, B. Granbom, M., Zingmark, M. & Iwarsson, S. Perceived aspects of housing and associations with active ageing among persons aged 55+ considering relocation. [Submitted August 2024]

Paper 4

Nordeström, F., Granbom, M., Iwarsson, S., & Zingmark, M. (2023). Ageing in the right place—usability of a web-based housing counselling service. *Scandinavian Journal of Occupational Therapy*, *31*(1), https://doi.org/10.1080/11038128.2023.2294777

Additional publication, not included in thesis

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Thesis at a glance

Paper 1	Study protocol Exploring associations of housing, relocation, and active and healthy ageing in Sweden: protocol for a prospective longitudinal mixed methods study
Aim	To study housing choices and relocation and explore effects on active and healthy ageing among men and women aged 55 years and older in Sweden considering relocation.
Method	The study protocol describes mainly the Prospective RELOC-AGE project with an estimated sample of *n* = 2,800, including people aged 55 years and older being listed with interest in relocation. Prospective RELOC-AGE has a two-level longitudinal mixed methods design and includes quantitative surveys for baseline data collection in 2021, with follow-ups in 2022 and onwards. The survey included questions related to present housing and neighbourhood, relocation plans and expectations, perspectives on active and healthy ageing, and demographics. Linking to national registers will provide additional data on home help and healthcare use, objective housing, and neighbourhood characteristics. A discrete choice experiment will be implemented (2024) with a subsample. Further, a grounded theory study will involve participants who have moved to another dwelling.
Results	As of submission of this protocol (June 2021), recruitment had commenced with approximately 960 respondents to the survey and ongoing telephone interviews, to be completed during 2021.
Conclusion	Prospective RELOC-AGE has the capacity to generate new policy-relevant knowledge on associations of housing, relocation, and active and healthy ageing. Such knowledge is relevant for the development of proactive approaches to housing in old age on the individual, group, and societal levels.
Paper 2	Psychometric study Translation and psychometric evaluation of the University of Jyväskylä Active Ageing Scale (UJACAS) for use in Sweden.
Aim	To translate the University of Jyväskylä Active Ageing Scale (UJACAS) to Swedish, establish semantic equivalence and evaluate psychometric properties for use among persons aged 55 years and older in Sweden.
Method	UJACAS comprised 17 items for self-assessment regarding goals, abilities, opportunities, and activities. Different samples were utilised in three distinct phases of the study. Phase 1 focused on establishing semantic equivalence following professional translation. This involved iterative discussions within the research team and data collection on content validity with an external panel (*n* = 6). Phase 2 involved a test–retest (*n* = 63), and Phase 3 included evaluating data quality, floor and ceiling effects, test–retest reliability, internal consistency, and construct validity. Phase 3 used a sub-sample from the Prospective RELOC-AGE survey (*n* = 820).
Results	Semantic equivalence was established, and content validity was assessed as high. Test–retest reliability was moderate, internal consistency was high, and construct validity hypotheses were confirmed.
Conclusion	Results indicate that the Swedish version of UJACAS is reliable and valid.
Paper 3	Active ageing study Perceived aspects of housing and associations with active ageing among persons aged 55 + listed with an interest in relocation
Aim	To (1) examine differences in active ageing regarding age, sex, education level, and health, and (2) to explore relationships between active ageing and perceived aspects of home.
Method	Cross-sectional analysis was performed using data from the first follow-up (2022) of the Prospective RELOC-AGE survey (*n* =1,509). One way ANOVA was used to examine differences in active ageing regarding age, sex, education level, and health. Linear regression (OLS) was used to explore relationships between active ageing and perceived aspects of home.

Results	Women and those with higher self-rated health and education levels rated their active ageing higher. Housing satisfaction, meaning of home, and external housing-related control beliefs had significant relationships with active ageing after adjusting for confounders, while usability had not.
Conclusion	A positive and meaningful home seems to contribute to overall opportunities and possibilities for active ageing.
Paper 4	Usability study Ageing in the Right Place (ARP) – usability of a web-based housing counselling service.
Aim	To (i) assess usability in relation to how users experienced content, design, specific functions, and the self-administered use of the ARP web-based housing counselling service, and (ii) prepare for further optimisation.
Method	Nine women and five men (aged 66–82) completed a series of tasks using the ARP web service. Qualitative and quantitative usability data were collected through online interviews. Data were analysed using qualitative content analysis and descriptive statistics.
Results	Experiences of the specific functions, content and design of the ARP web service were mainly positive. Additions to the content and optimisation of the navigation of the web service were suggested. The participants disagreed regarding preferred mode of delivery, indicating a need for selectable options. System Usability Scale data indicated acceptable usability.
Conclusion	After improvements to clarify misunderstandings and improve navigation, refine the wording of questions, and ensure inclusion across the heterogeneous ageing population, the ARP web service appears to be sufficiently user-friendly for further testing in municipal settings.

Abbreviations and definitions

Augmentative and Alternative Communication (AAC)	Refers to various communicative systems or strategies used to supplement existing speech or serve as a primary alternative to speech (Beukelman & Light, 1998).
Active Ageing Index (AAI)	An assessment for evaluating older people's participation in the labour market, social life, independence, and their capacity for active ageing in society at the national population level. (UNECE, 2018).
Active ageing	The striving for wellbeing at an individual level, aligned with one's personal goals, abilities, and possibilities (Rantanen et al., 2019).
Ageing in place	Theoretical concept that describes the desire and tendency of older adults to stay in their current dwellings for as long as possible (Bigonnesse & Chaudhury, 2019; Pynoos et al., 2007).
Ageing in the right place	Theoretical concept that describes the importance of ensuring that an individual resides in the right place, and receives the right services, at the right time, from the right provider(s) (Golant, 2015b; Hoh et al., 2022).
Ageing in the right place (ARP)	The name of a web-based housing counselling service.
Ageing in place policy	Polices that aim to create supportive environments and services for older adults so that they can maintain their independence and quality of life in their own home and community. In Swedish, *Kvarboendeprincipen* (Government Offices of Sweden, 2008).
CASE	Centre for Ageing and Supportive Environments, founded at Lund University in 2007.
CI	Confidence interval
CITC	Corrected total-item correlation

ETA	Ecological Theory of Aging, suggests that behaviour is a function of the competence of the individual and the environmental press of the situation (Lawton & Nahemow, 1973).
EU	European Union
GDPR	General Data Protection Regulation
ICC	Intraclass Correlation Coefficient
Model Of Human Occupation (MOHO)	An occupational therapy framework used in occupational therapy that focuses on how a person's motivation, habits, and abilities interact with their environment to enable meaningful participation in activities (Kielhofner, 2008; Taylor, 2017).
OLS	Ordinary Least Square
Older adults	In this thesis, persons aged 65 or more (National Library of Medicine, 2024).
Very old adults	In this thesis, persons aged 80 or more (National Library of Medicine, 2024).
RELOC-AGE	Acronym of the research program of which this thesis project is a part.
Relocation	Moving home between dwellings, within ordinary housing stock (i.e., need-based residential care facilities excluded).
Residential reasoning	The often long and complex decision-making process of older adults when considering relocation in relation to ageing in place (Granbom, Himmelsbach, et al., 2014).
T1/2	Time of data collection (first/second data collection point)
SD	Standard deviation
SEM	Standard Error of Measurement
SUS	System Usability Scale
UJACAS	University of Jyväskylä Active Ageing Scale
UNECE	United Nations Economic Commission for Europe

Usability	In this thesis, used both as a perceived aspect of home (Oswald et al., 2006) in the regression study (Paper 3) and in terms of user interaction in the usability study (Paper 4), where it refers to the efficiency, effectiveness, and satisfaction in using a product or service (Tullis & Albert, 2013).
Younger older adults	In this thesis, persons closer to retirement age (usually around 60–79 years).
WHO	World Health Organization

Thesis context

This thesis, conducted within the Active and Healthy Ageing research group at the Department of Health Sciences, Faculty of Medicine, Lund University, focuses on understanding relationships between housing, relocation, and active ageing among older adults. The research group is affiliated with the interdisciplinary Centre for Ageing and Supportive Environments (CASE), and the author, the main supervisor, and one of the co-supervisors are members of the Proactive Ageing Profile Area at Lund University.

The thesis work is embedded in the RELOC-AGE research programme, which consists of four projects: Register RELOC-AGE, Prospective RELOC-AGE, Intervention RELOC-AGE, and Theory RELOC-AGE. The overarching goal of the programme is to study housing choices, relocation, and health patterns in later life within the Swedish population aged 55 and older, while also examining how these factors affect active and healthy ageing. This thesis is based on data from Prospective RELOC-AGE and Intervention RELOC-AGE, which explore how housing decisions and interventions such as a web-based housing counselling service can support active ageing.

Active ageing involves optimising opportunities for well-being, health, and social participation (Rantanen et al., 2019; WHO, 2002). The environment, particularly the home, plays a critical role in enabling older adults to maintain active and independent lives. However, much of the previous research on housing in later life has concentrated on frail older adults and their needs for residential care towards the end of life (Roy et al., 2018), overlooking the dynamic influence of the home environment on well-being and social participation in earlier phases of the ageing process.

Despite the importance of home in supporting active ageing, few studies have focused on it as a central element for understanding the long-term effects of housing decisions and relocation. Furthermore, existing assessments of active ageing often fail to capture individuals' evolving goals and opportunities, which limits research and interventions. As their needs and preferences change over time, older adults frequently face complex housing decisions (Granbom, Himmelsbach, et al., 2014). However, the lack of personalised housing advice often results in delayed decisions and suboptimal housing solutions, negatively impacting their independence and well-being.

This thesis addresses these knowledge gaps in three studies that each explore key aspects of housing, relocation, and active ageing. The first paper in the thesis is the study protocol for the Prospective RELOC-AGE project, which provides a framework for investigating housing options and relocation decisions using a longitudinal mixed-methods approach. The RELOC-AGE research programme aims to capture how such decisions evolve over time and their long-term impacts on active ageing. The first empirical study (Paper 2) focused on the translation, adaptation, and psychometric validation of the University of Jyväskylä Active Ageing Scale (UJACAS), originally developed in Finnish (Rantanen et al., 2019). The study ensures that the Swedish version is reliable for assessing active ageing across a wide range of older adults. The second study (Paper 3) explored relationships between active ageing and perceived home in a cross-sectional design, focusing on how active ageing was associated with perceived housing satisfaction, meaning, and housing-related control beliefs. The third study (Paper 4) evaluated the web-based housing counselling service Ageing in the Right Place (ARP), which was developed to support older adults in making informed, proactive housing decisions, thereby promoting autonomy and active ageing. Thus, this thesis offers a comprehensive description of the relationship between housing and active ageing, contributing both methodological insights and empirical findings. To fully grasp the role of the home in active ageing, key concepts such as residential reasoning, ageing in place, and ageing in the right place must be considered. These concepts will be discussed in the following sections, together with a closer examination of the central focus of this thesis: the older adult. But who is the older adult?

Background

Who is the older adult? – The complexities of ageing

Ageing is a dynamic and continuous process, influenced by a range of physical, psychological, and social factors. It is not a fixed stage, but a progression that involves adaptation to changes over time, shaped by individual life choices, health status, and environmental conditions (Stenner et al., 2011). This perspective aligns with contemporary gerontology, which views ageing as a process of growth and adaptation, focusing on how individuals navigate both the opportunities and the challenges of later life, rather than seeing ageing as inevitable decline (Lassen & Moreira, 2014).

Understanding the diverse experiences and stages of later life requires careful consideration of how we categorise different age groups. Throughout this thesis, terms based on chronological age are used to describe the older individuals who are in focus. For instance, "younger older" and "very old" differentiate between age groups. According to the National Library of Medicine, "older adults" refers to individuals aged 65 and above (2024). In this thesis, unless otherwise specified, those closer to retirement age (typically 60–79 years old) are referred to as younger older adults, while those aged 80 or older are described as very old.

This dual classification of old age, separating the younger older from the very old, was first introduced by Neugarten in 1974 (Kafkova, 2016). This categorisation recognises the different stages of old age and provides a clearer depiction of the diverse conditions within this broad demographic. However, older adults are a heterogeneous group, with substantial differences in age, health, education, economic circumstances, family structures, and social contexts, all of which shape unique experiences. Consequently, dualistic descriptions can be problematic as they tend to overlook these individual differences, leading to oversimplification and, at times, reinforcing stereotypes and ageism (Iversen et al., 2012). Similarly, unrealistic or exaggerated portrayals of older adults in the media perpetuate ageism (Loos & Ivan, 2004; Makita et al., 2019; Markov & Yoon, 2020; Xu, 2020). For instance, a 90-year-old person may have more in common with a 60-year-old in terms of health, education, and social conditions than with another 90-year-old. Still, for statistical purposes, it is sometimes necessary to simplify analyses by categorising individuals based on age. Also, because chronological age is often used for political and administrative reasons to determine eligibility for various social benefits and services, such as state pension (Pensionsmyndigheten, 2024),

specialised healthcare, subsidised public transport, and access to certain housing options (Boverket, 2024b), there are reasons to compare age groups. However, it is crucial to recognise that such simplifications can result in over-generalisations and may overlook individual variations within age groups.

Health and functional capacity are key factors in the ageing process and vary greatly among older adults, influencing their well-being. In Sweden, nearly three-quarters of those aged 60–69 rate their health as good or very good (Statistics Sweden, 2022). However, this figure declines with age, dropping to about 60% for those aged 70–79, and less than half for those over 80, reflecting the gradual decline in perceived health with age.

Of the 2.6 million people aged over 60 in Sweden (Statistics Sweden, 2022), most live in standard housing (Boverket, 2024a), with only a small proportion receiving social services, mainly personal alarms and home care (Socialstyrelsen, 2024). This indicates that older adults in Sweden are generally a relatively healthy group, at least objectively speaking, living in regular housing rather than in care-based accommodation and requiring formal assistance.

Mental health plays an important role in older adults' quality of life. Depression, a common issue, affects between 1% and 29% of those aged 60 and older in Sweden, with variations depending on the study and period (Horackova et al., 2019; Karlsson et al., 2016; Sweden., 2021; Wiberg et al., 2013). According to WHO, depression is often underdiagnosed in the very old, and untreated cases can exacerbate physical health problems and increase mortality (WHO, 2021). Symptoms of depression include chronic illness, pain, and cognitive decline (Horackova et al., 2019).

There are also socio-economic differences among older adults in Sweden (Statistics Sweden, 2022). About one-third of men and one-quarter of women aged 60 and older are still employed, with significant income disparities within this age group. Education levels also vary, with many individuals in this age group having completed secondary or post-secondary education (Statistikdatabasen, 2024). However, generational differences are evident, as younger cohorts tend to have higher education levels than older ones, reflecting broader societal changes in education over time (Statistics Sweden, 2022).

Given the diversity among older adults, it is essential to understand how active ageing differs within this group. This thesis specifically examines active ageing in relation to housing and well-being across those considering relocation. By studying active ageing at an individual level, the thesis provides insights into the varied strategies that older adults use to maintain health, engage socially, and foster independence, which is central to the focus of the empirical studies.

As older adults navigate the complexities of ageing, they are often confronted with evolving health needs, shifting social roles, and the challenge of maintaining independence. These changes can affect not only their physical well-being but also their ability to remain actively engaged in society. Addressing these multifaceted

issues requires a holistic approach – one that focuses not only on health but also on social inclusion, autonomy, and participation. This is where the concept of active ageing becomes crucial.

Active ageing

The concept of active ageing emphasises growth and challenges the traditional view of old age (Lassen & Moreira, 2014). It embraces the idea that ageing is flexible and can take many forms. However, despite the emphasis on flexibility and individual growth, much of the literature and policy surrounding active ageing remain narrowly focused on health and physical functioning (Walker, 2002). This health-centric approach, particularly as promoted by WHO (WHO, 2002, 2015), often overlooks the importance of environmental and social factors, which are critical for fostering autonomy and participation in older adults. Thus, the concept has faced criticism for being overly health-centred. Critics argue that the definition of active ageing focuses primarily on physical activity, employment, and healthcare access, thereby excluding older individuals who, due to poor health or disability, have limited capacity for activity (Foster & Walker, 2015). This perspective risks creating a narrow view of active ageing, where only the healthiest older adults are included, overlooking the diverse conditions and capabilities of individuals (Boudiny, 2013).

Timonen (2016) critiques WHO's definition of active ageing for promoting a rigid, outcome-focused model centred on health, which overlooks the personal experience of ageing as a process. A more effective approach would recognise active ageing as a personal journey, shaped by individual circumstances and choices, rather than a uniform state of health to be achieved. This perspective better captures the diversity of how older adults engage with ageing, as it includes personal growth and subjective well-being, beyond physical health.

Timonen (2016) also highlights that the health-centric approach promotes a one-size-fits-all model, which neglects socio-economic inequalities and the different ways in which older people can participate meaningfully in society. As a result, the definition does not fully account for the varied pathways to well-being and social participation that many older people experience, nor does it address the structural barriers that some face (Laliberte Rudman, 2006; Timonen, 2016). By centring only on health-related aspects, there is a risk of neglecting other essential dimensions of well-being, such as the role of housing, social relationships, and opportunities for engagement in meaningful activities (Walker, 2002).

A broader understanding of active ageing – one that includes social participation, autonomy, and environmental adaptations – can ensure that the concept remains relevant for all older adults, regardless of their health status. As defined by Rantanen and colleagues, inspired by International Classification of Functioning, Disability and Health (ICF) terminology (WHO, No date), occupational therapy (Law et al.,

2019), and the theory of affordance (Withagen et al., 2012), active ageing at the individual level can be seen as a personal process involving choices and engagement in activities that enhance well-being (Rantanen et al., 2019). This agentic approach reflects a dynamic understanding of ageing, recognising the individual's capacity to find subjective meaning and interest in activities (Stenner et al., 2011). The focus here is on continuous growth and change, rather than inevitable decline (Lassen & Moreira, 2014).

The individual perspective on active ageing, particularly the striving for well-being, is closely related to the theory of affordance (Withagen et al., 2012) and the principles of occupational therapy (Law et al., 2019). Affordance theory highlights how the environment offers opportunities for action, which individuals can engage with based on their abilities and motivations. Affordances refer to opportunities for action provided by the environment, whether or not they are perceived by the individual (Jamone et al., 2018; Withagen et al., 2012). Affordance theory, which is fundamental to ecological psychology, highlights the dynamic relationship between the environment and the individual. The environment offers possibilities for action, and the individual has the ability to utilise them. This perspective shows how the environment actively invites behaviour, shaping individual actions through interaction.

Occupational therapy focuses on enabling participation in meaningful activities that promote well-being, despite age-related challenges (Law, Baum & Dunn, 2017). The Model of Human Occupation (MOHO) (Kielhofner, 1985) illustrates how motivation, habits, and abilities interact with the environment to support engagement in life. From the MOHO perspective, active ageing is a dynamic process shaped by this interaction, enabling meaningful participation in activities (Taylor, 2017). This involves adapting to age-related changes while maintaining engagement in activities that promote well-being. Volition, or motivation, drives the desire to remain active, while habits and roles structure daily life, which may need adjustment as one ages. Performance capacity, both physical and cognitive, can be supported through health promotion and environmental modifications. A supportive environment fosters independence and enhances quality of life (Kielhofner, 2008; Taylor, 2017).

From the perspective of Lawton & Nahemow's Ecological Theory of Ageing (ETA) (1973), active ageing can be understood as a balance between an individual's competencies and the demands of their environment (Lawton & Nahemow, 1973). ETA highlights how ageing is not solely a decline in abilities but a dynamic interaction between the person and their surroundings. When environmental demands exceed an individual's competencies, stress may occur, potentially limiting engagement in activities. Conversely, when the environment is supportive and aligns with an individual's capabilities, it fosters autonomy, participation, and well-being.

Building on Lawton and Nahemow's Environmental Press Model (1973), Wahl et al. (2012) propose an Integrative Model of Aging Well, emphasising the dynamic interaction between personal and environmental factors. This model underscores that ageing well is not just about personal abilities but also about how environments – home, public spaces, and technology – facilitate or hinder well-being.

Their model introduces two key processes: belonging and agency. Agency refers to the capacity of older adults to actively shape their environment, modifying it to meet their needs and maintain autonomy. Belonging, on the other hand, captures the emotional and cognitive connections individuals form with their environment, creating a sense of attachment and identity. Together, these processes explain how older adults navigate their environments, maintain autonomy, and sustain their quality of life, emphasising the critical role of person–environment fit in ageing well.

Chaudhury and Oswald (2019) further elaborate on these concepts, describing agency and belonging as central to the person–environment (P–E) interaction process. Agency refers to a person's capacity to actively shape their environment through goal-directed actions, including adapting and modifying their surroundings to maintain autonomy. By contrast, belonging encompasses the emotional and cognitive connections individuals form with their environment, reflecting a sense of attachment and identity with places. Together, these processes explain how older adults navigate and interact with their physical and social environments.

Thus, from the perspectives of environmental gerontology, active ageing involves both personal adaptation and environmental modification. This ensures that older adults can continue to engage in meaningful activities despite physical or cognitive changes.

In the RELOC-AGE programme, Rantanen et al.'s (2019) definition of active ageing is applied, encompassing a wider range of experiences than the original WHO definition. Recognising the limitations of earlier theories, Walker (2002) advocated for expanding the concept of active ageing to include both frail and fit older individuals. This broader definition has been adopted in the RELOC-AGE programme and in this thesis. However, much of the current literature favours more health-focused definitions, often influenced by WHO. This discrepancy has important implications, as the chosen definition can shape policies and interventions, potentially influencing older adults' expectations and experiences. Acknowledging and addressing these differing interpretations is therefore crucial to ensure clarity and consistency in both research and practice.

Assessing active ageing

The Active Ageing Index (AAI) seeks to address inequalities in key determinants of active ageing, as identified by WHO (2002), by tracking demographic trends and shaping policy discussions (UNECE, 2013, 2018). Operating at the societal level,

the AAI ranks countries based on indicators such as workforce participation among older adults and life expectancy. It provides a broad, demographic overview, assisting professionals in identifying profiles either at risk of, or more conducive to, active ageing (Paúl et al., 2017). To better reflect diverse contexts and needs, several adaptations of the AAI have been developed, including national, regional, and gender-specific versions (Zaidi et al., 2012; Zaidi & Stanton, 2015). These versions capture context-specific differences, informing more targeted policy interventions (Zaidi et al., 2017). While active ageing assessments across countries and regions share common features, they are also influenced by cultural differences (Thanakwang et al., 2014). Moreover, the AAI does not fully account for how personal factors like sex, education level, and health influence active ageing.

By contrast, the University of Jyväskylä Active Ageing Scale (UJACAS) focuses on the individual, assessing personal goals, functional capacities, and autonomy (Rantanen et al., 2019). Developed as a self-assessment tool, UJACAS provides insights into active ageing at the individual level. The Finnish original was based on the hypothesis that active ageing promotes well-being, defining it as *"the striving for elements of well-being through activities related to a person's goals, functional capacities, and opportunities"* (p. 1003). This definition incorporates four core elements: goals, ability, opportunity, and activity. Thus, UJACAS evaluates not only whether an activity has occurred, but also the individual's goals and available opportunities, offering a nuanced view of active ageing. By considering both objective measures of activity and subjective aspects such as personal aspirations and perceived autonomy, UJACAS provides a more holistic perspective on active ageing.

However, to ensure that a questionnaire has good measurement properties, a thorough examination of criteria such as validity, reliability, responsiveness, floor and ceiling effects, and interpretability is essential (Terwee et al., 2007). Psychometric evaluations are necessary both during development and when introducing an instrument to a new population, as psychometric properties are sample-dependent and require validation in each group (Hobart & Cano, 2009; Streiner et al., 2015). Comparisons of results between different populations help to increase understanding of the instrument itself and the concept at target (Davidov et al., 2014). When adapting an assessment for a different language, addressing translation and semantic equivalence is crucial before evaluating the assessment properties (Streiner et al., 2015). Despite the growing interest in active ageing, when the RELOC-AGE project was initiated, there was no instrument available in Swedish that had been evaluated in a Swedish context. This gap highlights the need for rigorous psychometric testing and adaptation to ensure the meaningfulness and reliability of results within the Swedish population. With an increasing number of language versions, cross-national comparisons can be made, potentially contributing to a European perspective on individual active ageing. Ultimately, the overall quality of an instrument determines the quality of the results, whether they

provide meaningful insights about the population, and what kinds of inferences can be drawn (Hobart & Cano, 2009).

Home and health

The home plays a central role in the daily lives of older adults, offering a crucial setting for managing everyday tasks and maintaining independence. In Sweden, the majority of older adults continue to live and age within the ordinary housing market, with only 4–5% of individuals aged 65 and above residing in need-based assisted living. Over time, the number of assisted living units has declined, suggesting that most older adults will remain in ordinary housing throughout the ageing process (Boverket, 2024a). As a result, it is increasingly vital to understand how housing conditions influence older adults' well-being, as ordinary dwellings are the primary environment where independence is maintained.

A supportive home environment is essential for both physical and emotional well-being. Building on this, Baltes et al. (1990) stressed that older adults adapt to age-related changes by focusing on key strengths, compensating for losses, and optimising the use of available resources. Similarly, Almevall et al. (2022) highlighted the importance of tailoring homes to individual needs, fostering both physical activity and emotional comfort. Gripko and Joseph (2024) also emphasised that a well-designed built environment can encourage both physical and social engagement, allowing older adults to use compensatory strategies effectively. Housing has been globally recognised as having major implications for health (WHO, 2018), underscoring the need to address housing issues for different sub-groups of the ageing population (Chatterji et al., 2015). Consequently, the home becomes a vital factor in enabling older adults to maintain their independence and overall well-being.

Perceived aspects of home

To better understand individual emotions and preferences regarding housing, Oswald et al. (2006) developed a model of perceived home, encompassing four domains: housing satisfaction, usability of home, meaning of home, and housing-related control beliefs. Housing satisfaction refers to how individuals evaluate their relationship with their home environment. The usability aspect, rooted in occupational theory and ecological models, captures how well the home enables daily activities. Meaning of home reflects the emotional bonds and attachment individuals form with their living space, transforming it from a mere place into a meaningful setting. Housing-related control beliefs focus on how individuals perceive their ability to control events in their home, either through their actions or through external forces such as luck or fate.

Research highlights the intricate relationship between home and health, indicating that how older adults perceive their home environment can substantially impact their ability to perform daily activities. Accessible and adaptable homes enable older adults to manage routines more effectively, even if the home does not fully meet their evolving needs and preferences (Gitlin, 2003). Moreover, Amian et al. (2021) emphasise that the meaning of home and housing-related control beliefs are interconnected. A home that feels meaningful can enhance the sense of control, and when a strong sense of control is present, a deeper emotional connection to the home can be experienced. The emotional connection to home plays a critical role in well-being. Remaining in one's home while ageing ("ageing in place", as discussed further below) can either enhance or diminish life satisfaction, depending on the home environment and individual adaptability (Oswald, Wahl, Schilling, et al., 2007).

Research has further illustrated how the interaction between housing accessibility and individual health plays a crucial role in maintaining autonomy and participation in very old age. Findings from a meta-synthesis (Iwarsson et al., 2016) suggest that good accessibility at home, along with perceiving the home as useful and meaningful, enhances autonomy and reduces depressive symptoms. The synthesis also shows that accessibility problems are primarily driven by the complexity of functional limitations rather than changes in the home environment itself. These insights highlight the need for interventions that not only address physical barriers but also consider functional limitations and perceived control over living conditions. Furthermore, such interventions should be proactive, addressing housing challenges before frailty or disability sets in, to promote long-term independence and activity.

Tomsone et al. (2013) found that usability and meaning of home were rated lower in more ADL-dependent groups, and that external housing-related control beliefs (i.e., the perception that control over the home lies with powerful others or is subject to chance, rather than the individual) were higher among very old adults. Similarly, Oswald, Wahl, Schilling, and Iwarsson (2007) showed that for very old adults in Europe, living in a more accessible home and having a sense of control over the housing situation were associated with increased independence in daily activities and improved well-being. Higher external housing-related control beliefs have been associated with poorer health outcomes in both younger older adults (Kylén et al., 2017) and very old adults (Oswald, Wahl, Schilling, & Iwarsson, 2007). Conversely, adults with higher levels of disability perceive homes as less usable and meaningful, with diminished control over the environment (Tomsone et al., 2013; Wahl et al., 2009).

More recently, research focusing on a younger cohort (67–70 years) has found that housing-related control beliefs partially mediate the relationship between housing accessibility and independence in daily activities, emphasising the importance of perceived control in maintaining autonomy (Gefenaite et al., 2019). This is particularly relevant, as individuals begin reflecting on housing decisions and relocation earlier in life, affecting their long-term opportunities for active ageing.

Using data from the same sample group, previous studies by Haak et al. (2015) and Kylén et al. (2017) also indicated that perceived home plays a significant role in well-being, with those reporting higher meaning of home and stronger housing-related control beliefs experiencing fewer symptoms of depression. Thus, older adults with a strong emotional bond to their home and a sense of control over the home environment are less likely to experience depression and more likely to have better mental health. Moreover, satisfaction with the home environment is linked to overall life satisfaction. In other words, the home is not only a place to live but a crucial factor in maintaining mental health and life satisfaction throughout the ageing process.

Oswald et al.'s (2006) model offers a comprehensive understanding of how older adults perceive their home environment, integrating emotional attributes shaped by personal preferences and evolving sentiments. However, much of the existing research has focused on the very old, highlighting a significant gap in understanding how housing impacts younger older adults and their trajectory towards active ageing. Recent research on active ageing and the home has shown that although senior housing may provide a supportive environment, residents' opportunities for active ageing can be compromised, leading to unmet activity needs (Siltanen et al., 2023). Additionally, homes with more personal meaning attached offer greater ability and opportunities for meaningful activities, even with functional limitations (Slaug et al., 2024). This highlights the importance of designing and providing home environments that not only meet the physical needs of older adults but also foster opportunities for active engagement and well-being throughout the ageing process.

As individuals age, they spend increasing amounts of time at home, making it the focal point of their daily activities (Spalt et al., 2016). The importance of home environments in promoting well-being and independence among older adults is evident across various studies (Amian et al., 2021; Aplin et al., 2022; Baltes & Baltes, 1990; Gitlin, 2003; Oswald et al., 2006; Slaug et al., 2024; Tomsone et al., 2013). As the home plays a pivotal role in the everyday lives of older adults, it becomes essential to understand the factors that influence residential satisfaction, particularly within the context of active ageing. Despite growing awareness of the importance of home environments, research remains limited on how these environments affect older adults, especially those experiencing shifting preferences and needs earlier in the ageing process. Previous studies have predominantly focused on the very old or those with significant disabilities (Roy et al., 2018; Sixsmith et al., 2014; Zimmermann et al., 2021), leaving a gap in understanding the broader impact of home environments on well-being and independence, particularly from a holistic perspective with active ageing as a central focus.

Residential reasoning

Residential reasoning refers to the cognitive process through which older adults contemplate and make decisions regarding their housing choices, including whether to relocate or remain in their current home or neighbourhood (Granbom, Lofqvist, et al., 2014; Koss & Ekerdt, 2017). This deliberative process typically extends over several years and involves weighing up factors such as housing preferences, future needs, and practical considerations like accessibility and affordability (Nygren & Iwarsson, 2009). It is a forward-looking process aimed at preparing for the challenges associated with ageing, which become increasingly pertinent in later life stages. Research underscores the complexity of these decisions, influenced by factors such as personal preferences for stability and familiar environments, as well as practical considerations related to housing maintenance and accessibility (Andersson et al., 2018). However, beyond rational decision-making, residential reasoning also involves emotional elements and anticipatory concerns about future needs.

The perception of later life as a period of increased vulnerability and loss can significantly influence housing decisions among those in the earlier stages of older adulthood (Koss & Ekerdt, 2017). Anticipating potential future declines in health and independence, as both a personal concern and a societal expectation, can impact how older adults approach their housing choices. This anticipation often drives individuals to plan and make decisions based on the possibility of future challenges related to their well-being and living conditions.

Moving house among adults aged 65 and older can be categorised into four types, which highlight diverse motivations behind relocation: moving from renting to owning, moving from owning to renting, trading up in housing size or quality, and trading down for financial reasons (Angelini et al., 2013). So how is relocation different for an older adult compared to moving when younger? To some extent, it is the same, but several distinctive features characterise moving house later in life, such as preparatory moves aimed at planning for future needs, whether financial or social (Clough et al., 2004). Additionally, these relocations often address current challenges, such as declining physical capabilities or changes in health, marital status, or economic conditions, seeking housing that better meets their evolving needs and circumstances (Abramsson & Andersson, 2012; Clough et al., 2004).

Older adults often relocate due to a mix of pull and push factors. *Pull factors* attract them to new housing options, such as anticipated future needs for amenities and support services (Franco et al., 2021). These include access to helpful services and a supportive environment, which can improve quality of life. *Push factors*, however, are usually related to declining health and functionality, prompting a move to supportive housing (Franco et al., 2021). Research comparing housing options in the US shows that policy-related pull factors are key motivators for relocation, while personal issues, such as health, drive the move (Hou & Cao, 2021). In Australia,

studies highlight that older adults often relocate to maintain independence, stay in control, and avoid loneliness. Being proactive in making relocation decisions and having control over the process are important for a smooth adjustment to new living arrangements (Walker & McNamara, 2013).

While research provides some understanding of the reasons why older adults relocate (e.g., for health reasons, for proximity to family, or due to accessibility issues (Andersson et al., 2018; Angelini et al., 2013; Li et al., 2021), and much of the research focuses on life transitions (Vrkljan et al., 2019) or health-related moves (Bekhet et al., 2009; Franco et al., 2021), or moving to care facilities or senior communities (Chaulagain et al., 2021; Spang et al., 2022). This leaves a gap in understanding the residential reasoning process in a more gradual context. And there is limited knowledge about the timing and process by which older adults begin reflecting on and making housing decisions, particularly among those who move within ordinary housing forms.

Ageing in place

Ageing in place refers to staying in one's home despite increasing support needs, often through environmental modifications (Scharlach & Moore, 2016). The concept, grounded in theory, is often viewed through the ecological systems perspective, particularly the Competence-Press Model (Lawton & Nahemow, 1973), which sees older adults as dynamically interacting with their environments (Bigonnesse & Chaudhury, 2022; Pani-Harreman et al., 2020; Wahl, 2015).

Ageing in place in policy aims to support older adults in maintaining autonomy and the possibility of remaining living in their current home in later life (Bigonnesse & Chaudhury, 2022; Rowles, 2018; Scharlach & Moore, 2016). The policy goal encompasses different implications for policy debates, urban planning activities, and development approaches, and influences the choices available to individuals when it comes to healthcare initiatives and interventions (Forsyth & Molinsky, 2020). It is well known that most older adults want to stay in their homes as they age (Ahn, Kwon, & Kang, 2020; Golant, 2011; Löfqvist et al., 2013), and ageing in place can offer a sense of familiarity and autonomy as well as enabling control in later life (Ahn, Kang, & Kwon, 2020; Bigonnesse & Chaudhury, 2019; Wiles et al., 2012). The home is recognised as a place of comfort and safety (Ahn, Kang, & Kwon, 2020; Löfqvist et al., 2013; WHO, 2015), and ageing in place is therefore supported when healthcare and social services are centralised around the home (Government Offices of Sweden, 2008; WHO, 2015). Assistive devices and/or environmental modifications are common interventions aimed at supporting walking (indoors and outdoors), self-care, and social contact (Zingmark et al., 2020). As part of environmental modifications, housing adaptations can allow a person to age in place despite disability (Ninnis et al., 2018). However, ageing in place can either support or hinder the independence of older adults, depending on the context (Sixsmith & Sixsmith, 2008). While assistive devices and housing

adaptation are common interventions intended to enhance independence in daily activities, improve housing accessibility, and support ageing in place (Lien et al., 2015; Zingmark et al., 2020), these interventions are reactive and are implemented once activity limitations have emerged. While housing adaptations and assistive devices remain relevant intervention components for some older adults, an alternative approach is needed to address the consequences of the demographic shift towards a more aged population (Pestieau & Ponthiere, 2016). It is therefore appropriate for policy and interventions to enable independence and participation as a prerequisite for health.

Ageing in the *right* place

The concept of "*ageing in the right place*" (Golant, 2015a) focuses on finding the best housing solutions for older adults, rather than just emphasising staying in one's current home or neighbourhood. This approach highlights the importance of the living environment, and the quality of care received. The main idea behind ageing in the right place is to ensure that older adults live in settings that best meet their needs, with access to appropriate services from the right providers at the right time (Hoh et al., 2022). Ageing in the right place expands on the idea of ageing in place by including various housing options that support independence, social connections, competence, comfort, and personal control in later life (Golant, 2015b). It encourages relocation to housing options that require less upkeep, such as assisted living communities or senior apartments.

This extension of ageing in place is particularly important when maintaining independence and autonomy in the current home becomes more challenging. In Sweden, many older adults express a preference to remain in the homes where they have lived for a long time, even as they age, while navigating the housing market if relocation becomes necessary (Boverket, 2024a). Despite this preference, those looking to relocate often find few suitable options available, potentially leading to few older adults relocating, partly because they prefer their current homes but also because they struggle to find appealing, accessible, and affordable alternatives. The availability of specialised housing has also decreased (Boverket, 2024b). To effectively meet the housing preferences and needs of older adults, housing dynamics must be understood thoroughly (Boverket, 2024a). Planning housing specifically for older adults is crucial, ensuring well-being and giving older adults better choices beyond limited housing options. Since Sweden's municipalities are legally responsible for housing provision (Government Offices of Sweden, 2000), this becomes highly problematic.

The concept of ageing in the right place considers broader factors such as community, healthcare access, and social opportunities, acknowledging that the ideal living environment varies from person to person. (Golant, 2015a). Decisions often involve ambivalent emotions (Nygren & Iwarsson, 2009). Decisions may be pushed into the future, and are sometimes precipitated by a sentinel event (e.g., a

fall, hospitalisation, a change in functional status) or pushed to a point in time where it may be 'too late to move' (Löfqvist et al., 2013).

While current interventions – such as housing adaptations and assistive devices (Lien et al., 2015; Zingmark et al., 2020) – take a reactive approach by addressing challenges after they arise, the concept of "ageing in the right place" aligns with a more proactive strategy (Iwarsson et al., 2023). This proactive approach is essential for promoting active ageing, where the goal is not only to manage disability or frailty but also to prevent their onset. By empowering older adults to make informed, early decisions about their housing situation – before a crisis or functional decline occurs – interventions can support long-term autonomy and well-being. In contrast to reactive measures, which often come too late to fully restore independence, proactive housing interventions foster the capacity for older adults to remain active, engaged, and in control of their lives, thereby enhancing their quality of life in later years. This shift from reactive to proactive strategies is vital for enabling independence and participation, which are prerequisites for well-being in older age.

The need for housing counselling services is highlighted by the fact that many older adults live in inaccessible dwellings with environmental barriers (Granbom et al., 2016), which can increase dependence and reduce quality of life (Iwarsson et al., 2007). A counselling service could help older adults make informed, proactive decisions about their future housing, improving their ability to age in the right place. Evidence suggests that such services, if delivered systematically and with best practices, can support independent living and reduce the costs associated with health and social care (Granbom et al., 2016; Szanton et al., 2016). However, there is a lack of evidence-based housing counselling services (Burgess & Morrison, 2016) and the services that exist are fragmented, making decision-making difficult. A web-based intervention has the potential to fill this gap by providing easily accessible, tailored information and support to a wider audience at a lower cost (Elbert et al., 2014).

Thorough usability testing is key to ensuring effectiveness, as outlined in Skivington et al.'s framework for complex interventions (2021). Once a prototype for a service has been developed, the next essential step is to conduct usability testing. This aligns with the framework's iterative approach, where ongoing refinement and evaluation are necessary to ensure the intervention is both practical and effective. By assessing usability, insights from the target group about their experiences with the content, design, and functionality allow any necessary adjustments to be made before the final launch. This step ensures that the prototype is optimised to meet users' needs and expectations while improving the potential for successful implementation.

Study aims

The overarching purpose of this thesis was to deepen the understanding of the role of home in active ageing among adults aged 55+ in Sweden living in ordinary housing. This purpose was addressed by designing a longitudinal cohort study on this topic, contributing to the development of an instrument to capture active ageing, investigate the relationship between active ageing and perceived home, and assist in the development of a housing counselling service that supports active ageing.

The specific aims were to:

- ✓ Present the study protocol for a project targeting housing choices and relocation, and explore effects on active ageing among people aged 55 years and older who were considering relocation.
- ✓ Translate UJACAS into Swedish, establish semantic equivalence, and evaluate psychometric properties (i.e., content validity, data quality including floor and ceiling effects, test–retest reliability, internal consistency, and construct validity) for use in Sweden among persons aged 55 years and older.
- ✓ Investigate active ageing among people aged 55 years and older who are considering relocation. Specifically, to examine differences in active ageing with regard to age, sex, education level, and health, and to explore relationships between active ageing and perceived home.
- ✓ Assess usability in terms of how users experienced content, design, specific functions, and the self-administered use of the ARP web-based housing counselling service, and prepare for further optimisation.

Methods

Research design

Based on the hypothesis that housing choices and relocation influence opportunities for active and healthy ageing, the RELOC-AGE programme was designed to explore the relationship and interplay between housing choices, relocation, and active ageing among individuals aged 55 and older in Sweden. The programme focuses on understanding how housing decisions affect health, participation, and overall well-being as people age, while also considering the roles of social, environmental, and neighbourhood factors. By incorporating both quantitative and qualitative methods into a multi-level longitudinal study design, the programme aims to investigate not only the reasons behind relocation but also the effects on health outcomes and active ageing. The target population includes individuals who are actively considering relocation, representing diverse socio-economic backgrounds and housing types. The research will provide valuable insights into the complex dynamics of housing and ageing, contributing to future housing policies and interventions that support older adults in maintaining independence and quality of life.

The programme encompasses three empirical projects: Register RELOC-AGE, which utilises extensive data from national registers to examine broader demographic trends and health outcomes related to housing and ageing; Prospective RELOC-AGE, which includes web surveys and interviews to capture longitudinal data on housing decisions; and Intervention RELOC-AGE, focused on developing and evaluating a web-based housing counselling service tailored to the needs of older adults. In addition, Theory RELOC-AGE aims to contribute to the theoretical development of the research field.

The papers included in this thesis employed a variety of study designs and samples, derived from the Prospective and Intervention RELOC-AGE projects. Figure 1 below illustrates how the papers included in this thesis connect with the overall RELOC-AGE programme.

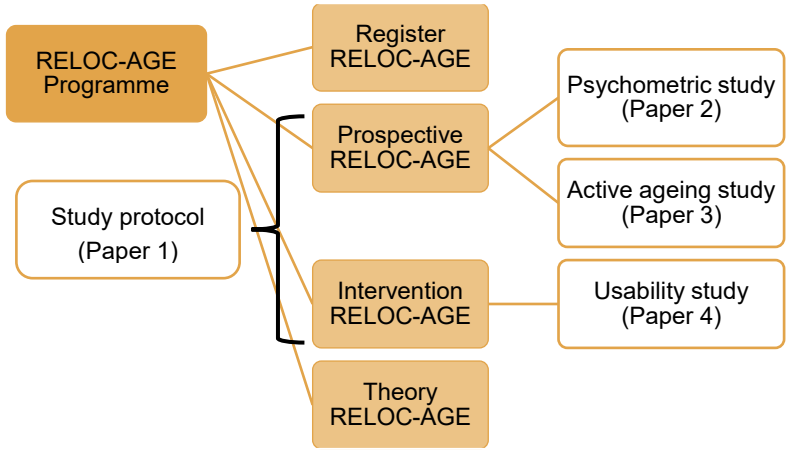

Figure 1. Illustrative representation of the study's interconnections within the overall RELOC-AGE programme

In Figure 1, the RELOC-AGE programme is depicted as comprising four projects: Register RELOC-AGE, Prospective RELOC-AGE, Intervention RELOC-AGE, and Theory RELOC-AGE. My contributions are connected to Prospective RELOC-AGE and Intervention RELOC-AGE, utilising samples from the Prospective RELOC-AGE study. The overall design, detailed in the study protocol (Paper 1), provided the foundation for both the psychometric analysis using a subsample (Paper 2) and the active ageing study based on the full sample (Paper 3). The usability study (Paper 4) was conducted using data specifically collected within Intervention RELOC-AGE.

The integration of insights from Prospective RELOC-AGE and Intervention RELOC-AGE has been instrumental in addressing the research questions posed in this thesis. Table 1 provides an overview of the study designs and methodologies employed in the three empirical studies included in this thesis.

Table 1. Overview of the empirical studies included

	Psychometric study	Active ageing study	Usability study
Study design	Psychometric assessment	Explorative, cross-sectional	Usability study
Methods	Quantitative	Quantitative	Qualitative and quantitative
Participants/sample	*n* = 6 *n* = 63 *n* = 820	*n* = 1,509	*n* = 14
Data collection	Telephone survey	Digital survey	Semi-structured online interview, and questionnaire

Procedure

The psychometric study (Paper 2) was carried out in three phases, with the first phase addressing the translation, semantic equivalence of the Finnish UJACAS to the Swedish version, and content validity. The research group engaged in an iterative discussion to refine the phrasing and underlying meaning of the UJACAS items in both Swedish and English. This discussion included the instrument's creator, who provided clarifications of conceptual intent. Following this, a panel rated the understandability and relevance, and provided written feedback which was categorised to guide further refinement of item phrasing. Semantic equivalence was deemed to be achieved when both the research team and the panel were satisfied with the revised version, following documented iterative discussions.

The second phase assessed test–retest reliability. Information about the study was sent out through senior citizens' organisations. Individuals who wanted to participate made contact, after which they received an envelope with two copies of the UJACAS questionnaire. After approximately 13 days, their answers were collected by a telephone call, and comparisons of participants' ratings were performed.

The third phase of the psychometric study (Paper 2) assessed the internal consistency of UJACAS in the Prospective RELOC-AGE study, which was launched in 2021. Clinical Studies Sweden Forum South – a professional organisation specialising in clinical and epidemiological research, with extensive expertise in conducting research surveys and handling data – was commissioned to deal with web survey data collection. After completing the web-based survey, participants were invited to answer additional questionnaires by telephone. They received an envelope containing the self-assessment UJACAS, as well as meaning of home and housing-related control beliefs (Zingmark et al., 2021). Responses were collected by telephone call and recorded on a secure, web-based platform facilitated by Clinical Studies Sweden Forum South.

For the active ageing study (Paper 3), participants from the follow-up questionnaire in the Prospective RELOC-AGE web survey completed the UJACAS questionnaire on active ageing. Invitations to participate were sent out during 2022. One year after the baseline survey, the web survey was expanded to include all items (including UJACAS) previously covered in the telephone interview. After cross-checking with the Swedish Tax Agency for deceased participants, invitation letters for the one-year follow-up were sent via postal mail in May (n = 973) and September (n = 979). A reminder was sent approximately one month after the initial invitation.

In the usability study (Paper 4), participants were recruited to test the housing counselling web service prototype ARP, with completion of predefined tasks and provide feedback via a logbook and interviews. The prototype version of the ARP was developed (Granbom et al., 2020) prior to launching the RELOC-AGE programme. The ARP prototype was designed with input from older adults and

housing sector representatives, following the British Medical Research Council's framework for complex health interventions (Skivington et al., 2021). Theories such as the MOHO (Kielhofner, 2008), the Model of Residential Normalcy (Golant, 2011), and the Transtheoretical Model of Behaviour Change (Prochaska & Velicer, 1997) were applied to tailor the service to individual needs.

The ARP web service prototype consists of three modules: Think, Learn, and Act. The Think module prompts users to reflect on their housing situation, providing personalised feedback based on their responses (see Figure 2 for an overview). The Learn module offers information on housing topics through a user-driven interface, while the Act module provides details on local services related to housing and relocation. Users can access and save information using a personal account, facilitating ongoing reflection and decision-making. This service aims to provide comprehensive information on available housing options, including accessibility features, cost, and location, as well as personalised advice and support to help users navigate the complexities of the housing market and find alternatives that meet their specific needs and preferences.

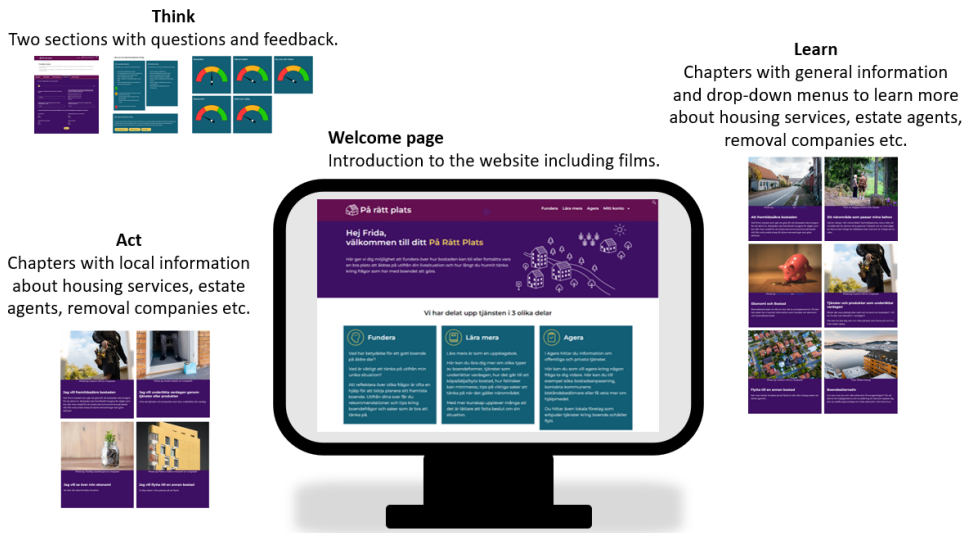

Figure 2. Overview of the Ageing in the right place prototype

Participants received a letter containing study information, instructions, testing materials for ARP usability, and a consent form in a prepaid envelope. The testing materials included a logbook specifically created for the study and the SUS questionnaire. The logbook featured task lists for participants, which included:

1. Initial impressions: Tasks involved logging in, watching three introductory films, evaluating content relevance, and responding to questions in the Think module.

2. Detailed functions: Tasks involved exploring chapters in the Learn and Act modules, using drop-down menus, and navigating hyperlinks.

Participants completed each task list and then took part in two semi-structured online interviews, approximately two weeks apart. During the second interview, the participants shared their SUS questionnaires responses. Based on the logbook tasks, a semi-structured interview guide was developed. Core questions focused on impressions of page content, design, functionality, and usability issues. The interview guide was specifically created for these interviews and was pre-tested for credibility. All interviews lasted 35–60 minutes, and used screen-sharing to jog memory and ensure consistency.

Recruitment and participation

Different recruitment strategies were used for the different studies.

For the psychometric study (Paper 2), phases 1 and 2 used convenience sample. In phase 1, personal networks were used to recruit a panel to assess content validity. Nineteen individuals were approached by email; six answered (n = 6; three men, three women) and were included (mean age = 73 years). In phase 2, 63 persons participated (n = 63). Two thirds were women (n = 42), the mean age was 75 years (range 61–92), and almost half of the respondents (47%) had a university education of three years or more.

For phase 3, a subsample (n = 820) of participants from the Prospective RELOC-AGE baseline web survey was used. Recruitment efforts involved distributing information about the Prospective RELOC-AGE project via information channels shared by the housing companies. To explore dynamics related to housing choices, relocation, and active ageing from an early stage, inclusion criteria required participants to be aged 55 or older and have a postal address in Sweden, as outlined in the study protocol (Paper 1). Those who were interested in participating registered via an online portal on the website of CASE, Lund University. Of the 1,964 individuals who participated in the web survey, 820 also participated in the telephone interview, representing 42%. Half were women (50.6%), with a mean age of 70 years (SD = 7.6). See Table 2 for detailed information.

Table 2. Participant descriptions for the psychometric and active ageing studies

	Psychometric study (Paper 2)	Active ageing study (Paper 3)
Characteristic	Phase 3 (*n* = 820)	(*n* = 1,509)
Age		
Range	54–92	55–93
Mean	70	70
Standard deviation	7.6	7.6
Sex, women (%)	50.6	55.7
Education level		
Compulsory (9 years)	56 (69)	114 (7.6)
Upper secondary (2–4 years)	183 (22.3)	363 (24.0)
University	577 (70.4)	1025 (67.9)
Missing	4	0
Dwelling type		
Apartment	407 (49.8)	801 (53.1)
Single-family house	407 (49.8	694 (46.0)
Collective housing, other	3 (0.3)	0
Missing	3	6
Dwelling ownership	694 (85.7)	1211 (80.3)
Missing	10	30
Self-rated health		
Poor	8 (1.0)	23 (1.5)
Fair	128 (15.6)	217 (14.4)
Good	286 (34.9)	418 (27.7)
Very good	264 (32.2)	562 (37.2)
Excellent	133 (16.2)	285 (18.9)
Missing	1	4

For the active ageing study (Paper 3) (see Table 2), data from the Prospective RELOC-AGE follow-up sample were used. Of the 1,964 individuals who completed the baseline web survey, 1,509 (77.3%) participated in this follow-up. The participants who responded were predominantly women (55.7%), with a mean age of 70 years (SD = 7.6). More than two-thirds had a university education (68%), 80% owned their dwelling, and 56% rated their health as excellent or very good (see Table 2).

Recruitment for the usability study (Paper 4) was based on convenience snowball sampling using personal networks, suggestions from previously recruited participants, senior citizens' organisations, and the CASE User Board. The User Board includes older adults who are representatives of non-governmental organisations such as senior citizens' associations, are interested in research, and provide input and ideas for various research projects. Inclusion criteria were being 65 years of age or older, living in ordinary housing, having access to a smartphone, tablet, or computer, ability to use the internet, having an active email address, and being able to communicate and read written instructions in Swedish. The usability

study involved 14 participants (nine women) aged 65–82 (median 75.5), with seven having at least three years of university education.

Assessment instruments

UJACAS (Papers 1, 2, and 3)

UJACAS comprises 17 items related to the four subscales (see Fig. 3 for example), addressing: Crafting or do-it-yourself (Crafting), Artistic pursuits (Artistic pursuit), Participating in events (Events), Enjoying nature (Nature), Keeping physically fit (Exercise), Exercising the mind (Cognitive training), Using a computer or a tablet (Digital technology), Supporting or helping others (Support others), Maintaining social relationships (Social relationships), Making new acquaintances (New acquaintances), Taking responsibility in one's own life (Promote own life), Taking responsibility for societal or communal matters (Public matters), Making one's days interesting (Interesting days), Maintaining or improving the cosiness of one's home (Make home cosy), Taking care of appearance (Appearance), Ensuring financial affairs are in order (Economic balance), and Furthering matters according to faith or world view (Faith or worldview).

Using a five-point Likert scale, respondents were asked to rate their answers based on the past four weeks. The response options were worded to suit each item, starting with the alternative representing the highest level of active ageing, in descending order. A composite score was calculated, ranging from 0 to 272, where a higher sum score indicated a higher level of active ageing (Hobart & Cano, 2009). Imputation for missing answers was applied using the following formula: (sum score/sub-questions responded to) × sub-questions offered (Rantanen et al., 2019). Analyses of UJACAS, subscale scores (range: 0–68), and a composite total score (range: 0–272) were calculated from the subscale scores. Missing data for each subscale were imputed using the following formula: (subscale score/subscale items responded to) x subscale items. A maximum of two missing items per subscale was allowed, and up to eight missing items for the total score.

The psychometric study was the foundation for integrating UJACAS in the Prospective RELOC-AGE web survey. Subsequently, UJACAS was used as the dependent variable in the active ageing study (Paper 3).

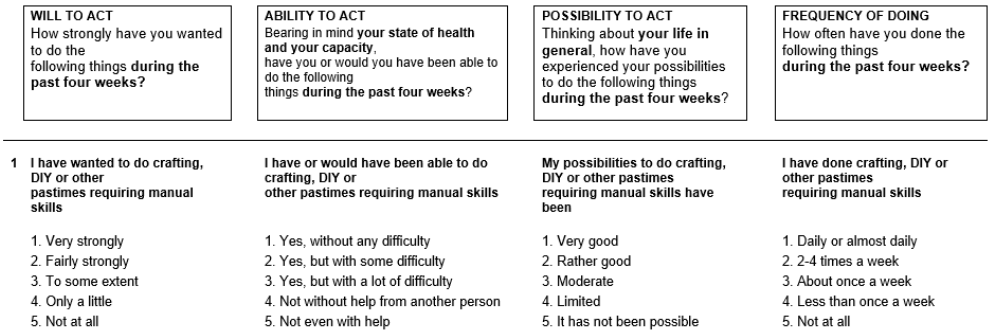

Figure 3. Example from the English version of UJACAS (item 1), with four subscales and response options (Rantanen et al., 2019)

Housing satisfaction (Papers 1 and 3)

Housing satisfaction encompasses an overall evaluation of the home's condition, incorporating multiple dimensions (Oswald et al., 2006; Oswald, Wahl, Schilling, et al., 2007). Respondents rated their satisfaction on a scale from 1 to 5, with a higher score indicating greater satisfaction, using a single question: "Are you satisfied with your dwelling?" To enhance residual distribution and adherence to homoscedasticity assumptions, response options of 1 and 2 were merged prior to analyses.

Usability (Papers 1 and 3)

The Usability In My Home instrument pertains to the individual's subjective assessment of how supportive or restrictive the home environment is in facilitating activity performance (Fänge & Iwarsson, 2005). To lessen participant burden, usability was assessed using four items from the Usability In My Home targeting activity (Fänge & Iwarsson, 2003). The respondents rated – on a scale from 1 to 5 – the extent to which they perceived the design of the home to be usable for managing personal hygiene, dressing, and bathroom visits; cooking or heating food; dishwashing, cleaning, and flower care; and laundry and other clothing care. A mean score was calculated, with a higher score indicating better/more usability.

Meaning of home (Papers 1 and 3)

The meaning of home questionnaire evaluates the subjective meanings older individuals associate with their homes across four dimensions: physical, behavioural, cognitive/emotional, and social (Boonyaratana et al., 2021; Oswald et al., 2006). It comprises 28 statements categorised into four subscales: Behavioural with six items, such as managing tasks independently; Physical, consisting of seven

items, such as residing in a well-designed space tailored to personal needs; Cognitive/Emotional, featuring ten items, such as feeling secure; and Social, containing five items, such as being able to host visitors. The statements were rated on a scale from 0 (strongly disagree) to 10 (strongly agree). As eight of the statements were phrased negatively, those responses were reversed before calculating a mean total scale score, where a higher mean score indicated a stronger meaning of home.

Housing-related control beliefs (Papers 1 and 3)

Housing-related control beliefs entail the notion that housing events are influenced by a person's own behaviour, or factors outside personal control (Oswald et al., 2006). The subscales of external control, including Powerful Others and Chance, were used (Oswald et al., 2003). The 16 items were rated on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree), and the item scores were used to calculate a mean score. Lower scores indicated higher perceived external control.

System Usability Scale (Paper 4)

The System Usability Scale (SUS) comprised ten statements, each rated on a five-point Likert scale of agreement, where 1 represented strong disagreement and 5 represented strong agreement (Brooke, 1995). The questionnaire has demonstrated acceptable reliability, with a Cronbach's alpha ranging from 0.83 to 0.97 (Bangor et al., 2008; Lewis, 2018). The individual ratings from each participant were summed to produce an overall usability score, which ranged from 0 to 100. A score above 70 was considered to meet the usability threshold (Bangor et al., 2008).

Data analyses

Quantitative analyses

For the active ageing study (Paper 2), multiple phases were employed and classical test theory was selected as the foundation for evaluating the psychometric properties of UJACAS in Swedish.

In the first phase, translation and content validity were addressed by refining the Swedish version of UJACAS, ensuring semantic equivalence. For the second phase, test–retest reliability was assessed with intraclass correlation coefficient (ICC) (Koo & Li, 2016). Based on the 95% confidence interval, ICC values were interpreted as follows: Poor: <0.5, Moderate: 0.5–0.75, Good: 0.75–0.90, and Excellent: >0.90.

ICC estimates and their 95% confidence intervals were calculated using a single rater, absolute-agreement, two-way mixed-effects model. Finally, the third phase addressed internal consistency using Cronbach's alpha and corrected item–total correlation, and construct validity using convergent and discriminant hypothesis testing. Cronbach's alpha values greater than 0.70 were considered acceptable, and corrected item–total correlations greater than 0.3 were deemed acceptable (Hobart & Cano, 2009; Streiner et al., 2015). Data quality and floor and ceiling effects were assessed for both the second and third phases. The standard error of measurement (SEM) was calculated and complemented with a 95% confidence interval (Hobart & Cano, 2009). To evaluate convergent and discriminant validity, three hypotheses were pre-defined based on previous research (Baker et al., 2003; Bombak, 2013; Rantanen et al., 2021; Rantanen et al., 2019) and clinical reasoning. For convergent validity, Pearson correlation was used (Streiner et al., 2015), with the expectation that higher active ageing would significantly correlate with: (1) Self-Rated Health, measured by a one-item SF-12 question (Jenkinson et al., 1997), and (2) Life-Space Mobility (Fristedt et al., 2016). Correlation values were defined as weak (0.1–0.3), moderate (0.4–0.6), or strong (0.7–0.9) (Akoglu, 2018). For discriminant validity, the Mann Whitney U test compared UJACAS scores between those diagnosed with clinical depression and those without. It was hypothesised that lower active ageing would be seen in those with a history of depression (Burcusa & Iacono, 2007; Luijendijk et al., 2008).

In the active ageing study (Paper 3), one-way ANOVA was used to test for differences in UJACAS subscale and total score across age groups, sex, education, and self-rated health. Based on social security information, age was categorised into four groups (55–64, 65–74, 75–84, and 85–93) to analyse differences in active ageing. Following post-hoc analyses, Bonferroni correction was applied to reduce the risk of Type I errors.

OLS regression was employed to investigate the association between the total score of active ageing and perceived aspects of home. Assumptions of linearity, normal distribution of residuals, and homoscedasticity were tested and confirmed, ensuring the appropriateness of the regression model. Model validation was carried out through visual inspection of residuals. Univariable analyses were followed by a multivariable model including all perceived home variables, and were adjusted for confounders. Confounders such as age, sex, education level, and self-rated health were selected based on previous research (Ekström et al., 2016; Kylén et al., 2017; Oswald, Wahl, Schilling, et al., 2007; Rantanen et al., 2021). Spearman's rho was used to check for multicollinearity among predictors, and correlations were found to be negligible.

In the usability study (Paper 4), an individual SUS sum score was calculated for each participant, with higher scores indicating better usability (Bangor et al., 2008; Brooke, 1995). These individual scores were used to compute a group median.

P-values <0.05 were considered statistically significant.

Qualitative analysis

The information collected during the interviews in the usability study (Paper 4) was analysed using a deductive content analysis approach (Lazar et al., 2010; Mayring, 2014), with predefined categories based on content, design, specific functions, and self-administration. Definitions, anchor examples, and coding rules were compiled into a study-specific coding guide (Mayring, 2014). The content within each category was summarised to describe variations in the material.

Ethics

The RELOC-AGE programme was conducted with a commitment to ethical principles, guided by the Declaration of Helsinki (World Medical Association, 2013). This declaration, a cornerstone of research ethics, emphasises the protection of human subjects and mandates that the interests and rights of participants must be protected. While the aim of research is to generate new knowledge, the interests and rights of participants must always take precedence (World Medical Association, 2013). The research process should adhere to good research practices, with ethics being a paramount consideration, especially when involving human participants (Swedish Research Council, 2017). Following the principles of the Declaration of Helsinki and current national legislation and policies on ethics for research involving humans, Prospective RELOC-AGE and Intervention RELOC-AGE were approved by the Swedish Ethical Review Authority (no. 2020-03457 and 2022-01287-02).

Respecting autonomy

Autonomy, the principle of respecting participants' right to make informed decisions about their involvement, was a key consideration throughout the research. For the psychometric study (Paper 2), formal ethical clearance was not required for phases one and two since the first phase (translation and equivalence) involved a panel of experts as co-researchers, and no sensitive personal data were collected in the second phase. However, in the third phase (Paper 2), the active ageing study (Paper 3), and the usability study (Paper 4), ethical clearance was needed and consent was acquired. All participants in the Prospective RELOC-AGE web survey provided informed consent by actively selecting a consent checkbox before proceeding with the survey, thereby confirming their understanding and willingness to participate. They were fully informed of their rights, including the option to withdraw from the study at any time without consequences.

For the usability study (Paper 4), participants provided written informed consent by signing a paper form before gaining access to the website they were evaluating. This ensured that participants understood the purpose of the study, their role, and their rights before interacting with the web-based housing counselling service. Their identities were pseudonymised to protect anonymity, and data were stored securely using LUSEC, a platform at Lund University's Faculty of Medicine.

Beneficence and non-maleficence

The principle of beneficence, which involves maximising potential benefits and minimising harms, was central to the research design. While there was no direct benefit to participants, the studies aimed to contribute valuable insights that could improve housing options and support services for current and future older adults. The research team took care to ensure participants fully understood each study's purpose and any associated risks, which were minimal, consisting mainly of answering questions and receiving follow-up calls. This includes all studies (Papers 2–4).

Non-maleficence, the obligation to do no harm, was rigorously adhered to throughout the Prospective and Intervention RELOC-AGE projects. During the 2021 launch of the Prospective RELOC-AGE web survey, a General Data Protection Regulation (GDPR)-related incident arose, impacting the recruitment strategy while the recruitment and data collection were already underway. A collaboration with two housing companies allowed for access to interest lists, but due to an internal GDPR issue caused by one of the housing companies, recruitment had to be revised. Instead of the research team sending information directly to individuals on the interest lists, participants were invited to sign up via an online portal set up by the research team. A third housing company was later included to further support recruitment. Despite these changes, the research team remained committed to ensuring participants were not exposed to harm or undue risk, and no data breaches occurred.

In the usability study (Paper 4), participants were offered the opportunity to read through the manuscript before publication to ensure their responses were properly anonymised.

Ensuring justice

The principle of justice, which requires that the benefits and burdens of research be distributed fairly (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979), was reflected in the inclusion and exclusion criteria across the studies. Exclusion criteria were necessary to ensure that participants were fully capable of understanding the study and providing informed consent, thereby upholding the ethical requirement that only those who are able to fully engage with the research were included. Individuals with severe cognitive impairments or insufficient language skills were excluded to ensure participants could take part effectively in telephone or digital interviews. While this may be seen as limiting inclusion, the decision was based on the ethical need to protect vulnerable individuals who may not fully grasp the study's purpose or their role in

it. This exclusion was crucial to gather reliable data and to ensure that participants fully understood the study's aim and their involvement.

Broader societal and research implications

The RELOC-AGE programme underscores the importance of adhering to ethical principles such as autonomy, beneficence, non-maleficence, and justice (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). By prioritising these principles, the programme not only safeguarded participant rights but also produced valuable insights into housing and active ageing. These ethical practices contribute to the overall credibility and impact of the research, offering valuable considerations for future research.

Results

Assessing active ageing

In phase 1 of the psychometric study (Paper 2), UJACAS was translated into Swedish, semantic equivalence was established, and content validity was tested.

Descriptions of all 17 items and related subscales in the Swedish version were fine-tuned to align with the underlying meanings, and to optimise linguistic expressions. For example, the item in the subscale Goals "I have wanted to use a computer or an iPad" was revised to "I have wanted to use digital technology" to encompass a broader range of devices. All items underwent a similar process of discussion and refinement, and comments from the user panel were incorporated.

The content validity of the Swedish UJACAS was generally assessed as high. The user panel found most items relevant and understandable. However, two items received lower overall scores. One was perceived as culturally misaligned, another was deemed irrelevant, and a third was considered judgmental in its phrasing. To address these issues, the items were revised based on feedback and re-evaluated by the panel, which then approved the new phrasing. Thus, the current version of UJACAS in Swedish was established.

In phases 2 and 3, data quality, test–retest reliability, and standard error of measurement (SEM) were assessed (see Table 3). Data quality in phases 2 and 3 was overall high, with no cases of missing data in phase 2 and 0.5% of cases in phase 3. Regarding floor and ceiling effects, ratings in phase 2 showed no apparent clustering towards minimum or maximum values except for in the subscale Ability. At T1 (Time 1, the first data collection point), the maximum subscale score was attained by 23 respondents (36.5%), and at T2 (Time 2, the second data collection point) by 21 respondents (33.3%). In phase 3, 177 respondents (21.6%) registered maximum scores in the subscale Ability.

Table 3. Descriptive UJACAS data from phases 2 and 3, and indicators of data quality

	Mean score of ratings (SD) Range			**Floor effect N (%)**			**Ceiling effect N (%)**			**Missing data N (%)**		
UJACAS subscale	Phase 2 (*n* = 63)		Phase 3 (*n* = 820)	Phase 2 (*n* = 63)		Phase 3 (*n* = 820)	Phase 2 (*n* = 63)		Phase 3 (*n* = 820)	Phase 2 (*n* = 63)		Phase 3 (*n* = 820)
	T1	T2		T1	T2		T1	T2		T1	T2	
Goals (17 items)	49.8 (7.4) 30–64	50.9 (7.5) 32–67	48.6 (8.5) 19–68	0	0	0	0	0	2 (0.2%)	0	0	1 (0.1%)
Ability (17 items)	64.1 (5.0) 47–68	63.5 (5.8) 43–68	62.1 (6.4) 26–68	0	0	0	23 (36.5%)	21 (33.3%)	177 (21.6%)	0	0	1 (0.1%)
Opportunity (17 items)	51.3 (7.3) 38–66	50.8 (8.7) 29–68	54.8 (9.5) 18–68	0	0	0	0	1 (1.6%)	48 (5.9%)	0	0	1 (0.1%)
Activity (17 items)	44.9 (7.2) 30–59	44.8 (7.2) 40–49	42.7 (8.4) 13–67	0	0	0	0	0	0	0	0	4 (0.5%)
Total score (68 items)	210.1 (19.0) 158–244	210.6 (19.8) 164–245	208.3 (24.9) 102–266									4 (0.5%)

Note. Min–max for each subscale is 0–68, and for the total score 0–272; a higher sum score indicates a higher level of active ageing.

On the total scale level, good test–retest reliability was indicated with a result of 0.88 (95% confidence interval 0.80–0.93). The subscales Goals, Ability, and Activity achieved good reliability, whereas Opportunity reached a moderate level (see Table 4). The analysis of standard error of measurement (SEM) showed that 7.47 points indicate a real change, while the corresponding subscale points ranged from 2.48 to 4.36.

Table 4. Results regarding reliability and SEM, phases 2 and 3

UJACAS subscale	ICC (CI 95%)	Cronbach's α	SEM (CI 95%)	CITC Median (range)
	Phase 2 (*n* = 63)		Phase 3 (*n* = 820)	
Goals	0.9 (0.8–0.9)	0.8	4.0 (40.8–56.4)	0.4 (0.2–0.5)
Ability	0.82 (0.7–0.9)	0.9	2.5 (57.2–67.0)	0.5 (0.2–0.6)
Opportunity	0.71 (0.5–0.8)	0.9	3.4 (48.1–61.5)	0.5 (0.3–0.7)
Activity	0.9 (0.8–0.9)	0.7	4.4 (34.2–51.3)	0.3 (0.0–0.5)
Total score	0.9 (0.8–0.9)	0.9	7.5 (193.7–223.0)	

Note. ICC = intra-class correlation; SEM = standard error of measurement; CITC = corrected item–total correlation

Active ageing and perceived housing

The mean values and standard deviation (SD) for housing satisfaction, usability, meaning of home, and external housing-related control beliefs were 4.7 (0.7), 4.8 (0.4), 8.0 (1.0), and 1.8 (0.5), respectively.

When exploring differences in active ageing, the subscale Ability received the highest mean rating (63.4), whereas Activity received the lowest (43.9) (see Table 5). Women rated their active ageing as significantly higher than men for the subscales Goals, Activity, and Total scale ($p < 0.001$, 0.004 and < 0.001). The younger age groups reported higher active ageing in comparison to older participants ($p < 0.001$), except for the 65–74-year-olds who rated their active ageing higher than 55–64-year-olds in the subscales Goals, Activity, and Total scale. Higher education was significantly associated with active ageing scores (Goals, Opportunity, and Total scale, $p < 0.001$; Ability and Activity, $p = 0.002$). Higher self-rated health was significantly associated with higher active ageing (p-value < 0.001).

Post-hoc analyses applying Bonferroni correction specified numerous pairwise significant differences, for example, between 55-64 and 75-84 year olds in subscale Goals (0.01), Ability (<0.001); Opportunity (<0.001), and total scale (<0.001) (see paper 3).

Regarding educational level, the differences were specifically between those with compulsory school and those with university education 3 years or more in subscale Goals, Opportunity, and total scale (<0.001), subscale Ability (0.009), and Activity (0.03).

For self-rated health, significant differences were specifically between poor and excellent, and between fair, very good, and fair and excellent (all sub-scales and total scale, <0.001).

Table 5. Distribution and differences of active ageing, subscales and total score (n = 1,509)

	Subscale range 0–68				
	Goals	**Ability**	**Opportunity**	**Activity**	**Total score range 0–272**
	Mean (standard deviation)				
UJACAS score					
Total sample (*n* = 1,509)	48.6 (8.8)	63.4 (6.7)	58.5 (9.2)	43.9 (9.5)	214.4 (27.3)
Missing	11	11	11	11	28
Age group, years					
55–64 (*n* = 421)	48.9 (9.0)	64.5 (5.7)	59.6 (8.9)	42.9 (9.9)	216.0 (25.4)
Missing	1	4	0	2	0
65–74 (*n* = 675)	49.7 (8.5)	63.9 (6.4)	59.4 (8.4)	45.0 (9.2)	218.0 (26.0)
Missing	6	4	7	5	13
75–84 (*n* = 380)	46.9 (8.4)	62.1 (6.9)	56.2 (9.5)	43.4 (9.5)	208.6 (28.0)
Missing	4	3	2	3	8
85–94 (*n* = 33)	44.9 (11.0)	54.9 (12.0)	49.1 (13.9)	40.6 (10.3)	189.4 (42.3)
Missing	0	0	1	1	1
p-value	<0.001	<0.001	<0.001	<0.001	<0.001
Sex					
Women (*n* = 834)	50.0 (8.5)	63.5 (6.8)	58.4 (9.6)	44.5 (8.5)	216.6 (27.7)
Missing	6	5	4	6	17
Men (*n* = 664)	46.9 (8.7)	63.3 (6.5)	58.5 (8.8)	43.1 (9.5)	211.8 (26.5)
Missing	5	6	7	5	11
p-value	<0.001	0.5	0.9	0.004	<0.001
Education level					
Compulsory (9 years) (*n* = 114)	44.1 (8.8)	61.7 (7.7)	55.3 (10.0)	41.8 (9.1)	202.8 (30.3)
Missing	0	0	0	0	0

Upper secondary (2 years) (*n* = 132)	46.2 (8.2)	62.1 (7.0)	57.6 (8.4)	41.9 (9.1)	207.69 (25.8)
Missing	1	2	1	1	3
Upper secondary (3–4 years) (*n* = 229)	47.9 (8.5)	63.6 (6.1)	58.2 (9.2)	43.2 (9.6)	213 (26.3)
Missing	1	3	2	0	4
University (<3 years) (*n* = 315)	49.1 (8.6)	63.6 (6.8)	58.5 (9.3)	44.4 (9.7)	215.5 (27.5)
Missing	5	2	4	4	9
University (3+ years) (*n* = 701)	49.9 (8.6)	63.9 (6.3)	59.3 (9.0)	44.6 (9.5)	217.8 (25.9)
Missing	4	4	4	6	12
p-value	<0.001	0.002	<0.001	0.002	<0.001
Self-rated health					
Poor (*n* = 23)	43. 9 (10.8)	42.6 (12.6)	36.7 (13.8)	30.5 (9.6)	153.9 (39.5)
Missing	0	0	0	0	0
Fair (*n* = 217)	46.0 (8.8)	56.9 (8.3)	50.0 (10.0)	39.5 (9.6)	192.4 (29.0)
Missing	2	2	2	1	4
Good (*n* = 418)	47.0 (8.5)	62.9 (5.6)	57.1 (8.2)	43.0 (8.9)	209.8 (23.7)
Missing	5	4	5	5	12
Very good (*n* = 562)	49.6 (8.4)	65.6 (3.9)	61.1 (6.9)	44.9 (9.1)	221.3 (21.6)
Missing	4	3	3	3	8
Excellent (*n* = 285)	51.7 (8.2)	66.5 (3.0)	63.6 (5.5)	47.7 (8.8)	229.6 (19.7)
Missing	0	2	1	2	4
p-value	<0.001	<0.001	<0.001	<0.001	<0.001

Note: Higher scores indicate higher active ageing (Rantanen et al., 2019). For results from Bonferroni post-hoc analyses, see manuscript (Paper 3)

All univariable analyses were statistically significant ($p < 0.001$). External housing-related control beliefs showed a negative relationship with active ageing, whereas housing satisfaction, usability, and meaning of home had positive associations. After adjusting for confounders (sex, age, education level, and self-rated health), the multivariable analysis revealed that higher meaning of home and lower external housing-related control beliefs remained significantly associated with active ageing ($p < 0.001$). The adjusted model explained 40% of the variance (R^2) (see Table 6).

Table 6. Relationships between active ageing and perceived home, *n* = 1,509

	Regression model β (95% confidence interval)		
Independent variable	**Univariable**	**Multivariable**	**Adjusted multivariable with confounders**
Housing satisfaction (ref. Very satisfied)			
Not satisfied	-18.1 (11.4–24.9)***	-7.0 (0.6–13.3)	-4.3 (-10.2–1.6)
Neither satisfied nor unsatisfied	-40.9 (28.5–53.3)***	-13.6 (1.9–25.3)	-17.8 (-28.6, -7.0)***
Somewhat satisfied	-9.8 (6.4–13.2)***	-2.3 (-1.0–5.6)	-2.0 (-5.1–1.1)
Usability	12.8 (9.7–16.0)***	1.1 (-2.1, 4.4)	-0.8 (-3.8, 2.2)
Meaning of home	9.0 (7.7–10.3)***	5.3 (4.1–6.6)***	4.6 (3.4–5.8)***
Housing-related control beliefs (external)	-24.9 (-27.3, -22.6)***	-21.1 (-23.6, -18.7)***	-14.6 (-17.1, -12.1)***
Confounders			
Age			0.2 (0.1–0.4)**
Men (ref. women)			-2.1 (4.4, -0.3)
Education level (ref. University 3 years or longer)			
Compulsory			-7.7 (-12.3, -3.2)*
Upper secondary 2 years			-6.5 (-10.6, -2.3)**
Upper secondary 3–4 years			-4.1 (-7.4, -0.8)**
University up to 3 years			-1.5 (-4.4, 1.5)
Self-rated health (ref. Excellent)			
Poor			-49.1 (-59.2, -39.0)*
Fair			-26.6 (-30.8, -22.3)*
Good			-13.3 (-16.8, -9.8)*
Very good			-5.0 (-8.2, 1.8)*
Intercept (95% CI)		204.4 (185.0–223.7)***	205.4 (185.9–224.9)***
No. of observations		1,379	1,371
R^2		0.29	0.40

Note: Ordinary least square (OLS) used as estimator; p ≤ 0.001***, ≤ 0.01**, ≤ 0.04*. VIF parameters: multivariable 1.1-1.3; multivariable with confounders 1.1-1.4.

Usability of the ARP housing counselling web service

The participants described a mainly positive experience regarding the content, design, and specific functions of the ARP web service. Most of them described the service as information-rich, although additions with respect to content and function were suggested. Some participants described navigation difficulties, but overall the satisfaction with content, design, and functions was high, both as described in the interviews and as rated via the SUS questionnaire.

Content

The content of the web service was described as relevant and practical, particularly the sections on personal finances due to their implications for housing choices. However, these sections were criticised for not addressing potential financial impacts of relationship changes or conflicts with current and former family members. Some participants also experienced challenges with the Think module, finding it difficult to respond to family-oriented questions when they were not part of a family, and vice versa. Additionally, some felt their needs as a couple were not adequately addressed in decision-making contexts.

While the content was deemed information-rich, suggestions were made to improve it by incorporating a variety of additional aspects such as information about (adult) children's perspectives, addressing loneliness, considerations when selecting an estate agent, and more detailed information about taxes and fees associated with selling and buying a home.

The opinions about the representation of older adults in films, illustrations, and photographs in the web service were varied. Some participants expressed that the portrayals were unrealistically helpless, while others thought they were overly healthy, ignoring those needing assistance. Additionally, conventional relationship depictions did not reflect today's diverse households. Participants stressed the importance of relatable portrayals and suggested greater age variation for future improvements.

Design

The initial impression after logging in to the web service was that the service was welcoming and positive. The colours were found to aid general navigation, and the combination of text with drop-down menus for further reading was viewed positively. However, some participants commented on the text size, and a function to enlarge the text was requested.

Specific functions

Creating a new user login, answering questions, saving responses, receiving feedback, navigating within the web service, viewing films and pictures, and moving between external webpages and the web service were discussed as specific functions, and were generally found to be easy to use. However, some issues were raised in the interviews, such as the site not loading properly, difficulty entering numbers into the input box, and difficulties locating all the questions, resulting in incomplete system-generated feedback that did not accurately reflect their responses. When navigating the web service most had no difficulties, but a few expressed the need for a table of contents or an overview of the web service structure to assist orientation, and a search function. Some experienced difficulties finding their way back to the web service after clicking on external hyperlinks.

Self-administration mode

Some of the participants expressed satisfaction with self-administration, as it facilitated autonomy. Others preferred to combine the web service with in-person support, for technical assistance as well as for reasoning guidance, and highlighted the value of face-to-face meetings, allowing for discussions with someone neutral and knowledgeable, focusing on their individual needs. Solicitors, legal advisors, or civil servants were suggested as potential discussion partners due to the complexity of the issues and the necessity for more extensive legal discussions and objective perspectives. Study groups and informal discussions within senior citizens' associations were also suggested, particularly for individuals living alone.

Usability ratings

The median SUS score among individuals was 84 (q1–q3; 78–95), with 12 out of 14 participants rating ARP >70 on the SUS questionnaire. Overall, the responses to the SUS questions suggested that users found the web service easy to navigate without the need for additional expertise or technical assistance.

Discussion

The overall contribution of the thesis lies in its comprehensive examination of the interplay between active ageing, home environment, and proactive decision-making related to housing among older adults. This thesis demonstrates that the home is not just a physical space but also a crucial factor influencing independence, well-being, and control over daily life, thereby facilitating active ageing. Through its exploration of how older adults perceive their homes and make informed housing choices, the research underscores the importance of both psychological and practical dimensions of housing for active ageing.

Specifically, the findings show that the self-assessment of active ageing demonstrates sufficient psychometric properties for use among persons aged 55 and older in Sweden (Paper 2). Using the self-assessment among people aged 55 and older living in ordinary housing in Sweden indicated that a higher housing satisfaction, meaning of home, and stronger sense of control in the home, are associated with active ageing (Paper 3). Additionally, women, individuals with higher education levels, and those with higher self-rated health report higher levels of active ageing. The ARP web-based housing counselling service demonstrates acceptable usability, supporting older adults in making proactive residential choices based on informed decisions (Paper 4).

The research highlights the significance of individual perceptions of home – such as satisfaction, meaning, and control – in promoting active ageing, providing a nuanced understanding of how the home environment supports or hinders ageing in place. Additionally, the thesis offers methodological advancements by validating a self-assessment for active ageing in the Swedish context and assessing the usability of a web-based housing counselling service, contributing to both academic knowledge and practical solutions. The findings pave the way for more proactive, informed approaches to housing choices, enabling older adults to maintain autonomy and engagement in life.

Together, these studies form a robust exploration of how housing and relocation decisions intersect with the process of ageing, offering empirical evidence and practical insights that can inform future policies, interventions, and research focused on supporting active ageing within diverse residential contexts.

Active ageing

In the RELOC-AGE programme and this thesis, a broader definition of active ageing is used, extending beyond WHO's (2002) definition. This expanded view highlights the importance of overall health, satisfaction, and quality of life (Rantanen et al., 2019). It was chosen for its comprehensive approach to understanding active ageing from an individual's perspective, aligning with the aims of the RELOC-AGE programme, as outlined in the study protocol (Paper 1) and the subsequent research included in this thesis.

Assessing active ageing

The translation and psychometric evaluation of UJACAS show that it is a reliable and valid instrument for assessing active ageing among older adults in Sweden. This finding is significant, as it provides a robust assessment for both researchers and practitioners to operationalise and understand core aspects of active ageing in a Swedish context. The test–retest reliability analysis demonstrated that the instrument maintains a high level of consistency over time, similar to other studies (Erbil & Hazer, 2019; Hinrichs et al., 2024; Rantanen et al., 2019), further supporting its reliability across different national and cultural contexts.

The internal consistency analysis shows that the UJACAS subscales effectively assess a shared underlying concept. While the internal consistency values were somewhat lower compared to those reported in other studies (Erbil & Hazer, 2019; Hinrichs et al., 2024; Rantanen et al., 2019), they still met acceptable standards (Hobart & Cano, 2009; Streiner et al., 2015). Higher internal consistency values might suggest redundancy among items (Taber, 2018), but the levels observed in Paper 2 were deemed appropriate, avoiding such redundancy. Item-level analysis revealed that most items contributed positively to the overall scale, with a majority meeting the acceptable cut-off value (Hobart & Cano, 2009; Streiner et al., 2015). However, two items (Digital technology and Economic balance) did not meet this standard across any of the subscales, indicating that these particular items may not fully align with the core properties (Hobart & Cano, 2009). Items in the subscale Activity (Crafting, Events, Exercise, and Cognitive training) also performed weaker, likely due to the impact of the COVID-19 pandemic on older adults' activities (Zingmark et al., 2022).

The construct validity (Streiner et al., 2015) of the Swedish version of UJACAS is robust, showing that active ageing is related to but distinct from other phenomena, such as self-rated health and mobility. The strong construct validity supports the effectiveness of UJACAS in capturing the multidimensional aspects of active ageing. Assessment of discriminant validity reveals a small but significant association between active ageing and depressive symptoms. Although the difference in depression scores was small, this facet of the findings suggests that

UJACAS possibly provides insights into related mental health aspects, adding value to its application.

Comparing active ageing between sub-groups

Turning to the active ageing study (Paper 3), participants in the 65–74 age group reported higher levels of active ageing compared to the older groups (75+ years). This suggests that active ageing captured by UJACAS may resonate more with the 65-74 year olds. It is important to consider that the concept of active ageing may evolve differently across the life course due to developmental and situational factors, rather than attributing these differences solely to age. Typically, individuals aged 65–74 years are in the life phase where they are transitioning into retirement or have already retired, allowing them more time and opportunities to engage in activities that contribute to a sense of active ageing.

Previous research shows that the transition from working life to retirement varies for individuals. For some, this transition involves concerns regarding financial situation, loss of social contacts, and a fear of loneliness (Djukanović & Peterson, 2016). For others, retirement can be a relief from a stressful work environment (Sohier et al., 2020). Nevertheless, retirement is often associated with increased engagement in leisure activities and volunteer work (Wang & Shultz, 2009), possibly enhancing perceptions of active ageing. Eriksson (2022) further highlights the role of relocation during this life transition, showing that the timing of retirement and relocation interacts with how individuals perceive their home, including aspects such as control, social relations, and usability. This suggests that the sequence of these transitions may influence older adults' ability to engage in activities that promote active ageing. Such life transitions may lead to higher ratings of active ageing among older adults compared to those who are still in the workforce. Conversely, those aged 55–64 might still be heavily involved in their careers and face different sets of responsibilities and stressors, such as supporting children or preparing for retirement. These factors may impact their perception of active ageing, as they might have less time or energy to engage in activities that the UJACAS scale includes. This notion is somewhat supported in our research note reflecting upon active ageing in the light of the COVID-19 pandemic (Zingmark et al., 2022), in which we found that working individuals had their social needs partially met during the COVID-19 pandemic but had limited energy for additional socialising outside work (UJACAS item: Maintaining friendships). By contrast, non-working individuals felt a stronger need to actively maintain friendships and social contacts, despite the pandemic situation. That is, whether respondents worked or not affected their desire to meet new people (UJACAS item: Getting to know new people); working individuals often had their social needs fulfilled through their job, reducing their need for new social interactions in their leisure time. Thus, individuals in different age range might prioritise different aspects of active ageing compared to

other age ranges. The UJACAS scale, while comprehensive, might not fully capture these priorities, which could affect how participants aged 55–64 perceive and rate their active ageing.

In the findings from the active ageing study (Paper 3), the largest difference between subscales in the age groups were found in the subscales Ability and Opportunity, compared to Goals and Activity. Potential reasons for these differences might be barriers to and facilitators for social participation, such as health issues, economic challenges, and shrinking social networks, which often increase with age (Townsend et al., 2021). Physical and cognitive abilities tend to decline with age, and the capacity to engage in activities and perform daily tasks can be affected by age-related health issues. Social networks can diminish with age due to retirement and the loss of friends and family, which impacts both the ability and the opportunity to engage in social activities. Additionally, differences in access to services and resources that support active ageing can affect UJACAS scores, as community structures and policies that support older adults vary, influencing the perception of available opportunities. Supportive environments, strong social networks, and personal motivations can help older adults stay engaged and active, highlighting the importance of policies and interventions to support these factors (Townsend et al., 2021). However, to understand and validly interpret the differences in UJACAS subscale scores in the active ageing study (Paper 3), further research should investigate the specific factors contributing to these variations. Further investigation into these factors could enhance the understanding of how individual-level assessments like UJACAS differ from broader, population-based assessments such as the Active Ageing Index (AAI).

Assessing active ageing: individual vs population-level perspectives

Evaluating active ageing can be approached from both individual and population levels, each offering distinct insights. At the population level, assessments like the AAI provide a broad overview by ranking countries based on key indicators such as workforce participation and life expectancy (UNECE, 2013). This macro-level approach is invaluable for identifying general trends and shaping policies that promote active ageing across entire populations. However, it may overlook the personal experiences and nuanced needs of individuals.

By contrast, individual-level assessments, such as UJACAS, delve into the subjective aspects of active ageing (Rantanen et al., 2019). By capturing personal experiences and attitudes towards ageing, these tools offer detailed insights that are essential for tailoring interventions to meet the specific needs of individuals. While population-level assessments guide large-scale strategies, individual-level approaches inform more personalised actions that enhance well-being at the personal level. Thus, the choice of perspective – population or individual – depends on the aim of the research or intervention. Both levels are critical for advancing our

understanding of active ageing, as they contribute complementary insights that are necessary for creating effective policies and programmes.

Another distinction between UJACAS and AAI lies in the definitions of active ageing that underpin the assessments and how each instrument operationalises the concept. The definition of active ageing has been debated in both the scientific and political arenas, with particular disagreement on the types of activities that constitute active participation in later life (Boudiny, 2013). Part of the policy literature adopts an exclusively economic framework, restricting the concept of activity in later life to paid employment (Boudiny, 2013; Foster & Walker, 2013). Critics like Timonen (2016) have argued against this perspective, noting its limitations in understanding the broader spectrum of activities in later life. They emphasise that this narrow focus disregards aspects of activity in older age beyond paid work. Additionally, there is a tendency to prioritise strategies aimed at prolonging retirement and maintaining workforce participation among older adults. However, focusing only on labour market participation overlooks a multiplicity of activities that produce social value, which is not monetised but is still significant (Boudini & Mortelmans, 2011). As a natural consequence of this, when comparing active ageing on the societal level as measured using the AAI, women generally fare worse than men in almost all countries, including the Nordic region (UNECE, 2013, 2018a). This could suggest that the index may reflect underlying societal norms and structures that disadvantage women in certain areas related to the concept of active ageing as defined in the AAI. For instance, addressing the economic factor in the index, women may face barriers in accessing employment opportunities and have lower overall lifetime earnings, which leads to Swedish women in general having lower total pension payouts (ISF, 2017). While one item in the UJACAS self-assessment addresses financial stability, the assessment also encompasses goals, ability, opportunity, and activity, providing a more comprehensive understanding of individuals' efforts to enhance their well-being. This underscores the multidimensional nature of active ageing and emphasises the importance of considering diverse aspects of well-being.

Theoretical implications and limitations of UJACAS

Using UJACAS with its definition of active ageing has its theoretical implications and limits. Firstly, UJACAS focuses on individual goals, ability, opportunity, and activity, which may overlook important social and environmental factors that influence older adults' opportunities to age actively, particularly those beyond the structural control of the individual. Bronfenbrenner's ecological model (Bronfenbrenner, 1994) highlights how the environment impacts individuals on multiple levels, a perspective that UJACAS does not fully account for and lacks the capacity to distinguish. While the subscale Opportunity touches on environmental factors, UJACAS falls short in capturing the nuances of how different layers of the

environment shape activity in various ways. This focus risks framing active ageing primarily as a matter of personal health and ability, rather than taking into account broader societal influences.

Developed with inspiration from the International Classification of Functioning, Disability, and Health (ICF) (WHO, No date), UJACAS reflects a focus on individual goals, abilities, opportunities, and activities (Rantanen et al., 2019). This aligns with ICF's emphasis on personal functioning and participation (WHO, No date), but UJACAS places less direct emphasis on the detailed role of environmental factors that shape an individual's capacity to engage in activities and participation. In the ICF framework, environment is seen as a element influencing both activity and participation, acknowledging that personal functioning cannot be fully understood without considering how physical, social, and attitudinal environments facilitate or hinder an individual's participation (WHO, No date). While UJACAS includes an Opportunity subscale that touches on these environmental factors, it lacks the depth of the ICF's approach, which delineates the role of environmental facilitators and barriers in shaping not only what individuals can do but also how they can actively participate in life. This potential limitation of UJACAS might frame active ageing primarily in terms of personal health and ability, without fully capturing how broader societal influences and environmental factors contribute to active ageing.

Secondly, calculating a UJACAS sum score does not account for or describe how the different subscales – Goals, Ability, Opportunity, and Activity – interact with each other. This limitation underscores the need for a more nuanced analysis that considers the dynamic interplay between the various dimensions assessed by UJACAS. Each subscale represents a distinct aspect of an individual's active ageing, yet their combined effect on overall agency may vary significantly depending on their interactions. Understanding these interactions is crucial for gaining a comprehensive understanding of how older adults interact with the environment in the striving for active ageing and well-being. Future research should use methods to better understand the complex factors that affect active ageing and personal agency. In addition, it would be helpful to include ideas from environmental gerontology (Wahl et al., 2012), and affordance theory (Jamone et al., 2018; Withagen et al., 2012), which explores how people perceive and interact with their surroundings. This approach could lead to more effective strategies for supporting active and healthy ageing by improving our understanding of how the environment affects individuals.

Thirdly, UJACAS's focus on goals, ability, opportunity, and activity may unintentionally marginalise individuals with physical limitations or chronic illnesses, even if they wish to remain engaged in meaningful activities but cannot maintain high levels of physical activity. This was highlighted during the COVID-19 pandemic, when participants faced limited opportunities for social interaction and physical engagement, despite their desire to stay active (Zingmark et al., 2022).

Moreover, the length and complexity of UJACAS, which requires sustained concentration, could pose difficulties for individuals with cognitive or intellectual impairments. While the scale development included a range of participants, from assisted living residents to independently living older adults (Rantanen et al., 2019), the challenge of answering 68 items raises questions about its appropriateness for certain sub-groups of the ageing population. Given that approximately 1–3% of older adults in Sweden may have intellectual disabilities (Luna, 2024) and a significant proportion experience cognitive decline as they age (Viss.nu, 2023), simplifying UJACAS for these populations becomes even more critical. Utilising Augmentative and Alternative Communication (AAC) strategies – such as using visual aids or reducing the cognitive load of the questionnaire – could make UJACAS more accessible (Beukelman & Light, 1998; Light & McNaughton, 2014). However, as highlighted by Hobart and Cano (2009), reducing the number of items may impact the internal consistency and reliability of the assessment. Therefore, any modifications must be carefully validated to ensure that UJACAS continues to measure active ageing accurately for this broader group. By integrating such adaptations, UJACAS could evolve into a more inclusive tool, capturing a wider range of individual experiences and promoting active ageing for all older adults, including those facing significant cognitive or physical challenges.

Active ageing and perceived aspects of home

The findings of the active ageing study (Paper 3) suggest that active ageing is linked to perceived aspects of home – such as housing satisfaction, meaning of home, and housing-related control beliefs. The main results are from the adjusted multivariate model, showing that those who rated their active ageing as higher also perceived a higher satisfaction, meaning, and control in the home. These findings confirm the importance of the home environment in supporting active ageing among adults, as the home is a key factor in maintaining independence and overall well-being.

Previous research has shown that emotional attachment to the home plays a significant role for well-being, as homes that hold personal meaning provide a sense of comfort and stability (Oswald et al., 2006). A meaningful home is important not only for very old adults (Iwarsson et al., 2016), but also for 67-70 year olds (Haak et al., 2015; Kylén et al., 2017). The findings from the active ageing study (Paper 3) align with this, suggesting that older adults who perceive their home as meaningful are more likely to engage in activities that enhance their independence and well-being. These findings contribute new knowledge to theoretical reasoning within environmental gerontology, particularly frameworks including the concept of belonging (Chaudhury & Oswald, 2019) from the Integrating Model of Aging Well (Wahl et al., 2012). Captured by meaning of home, belonging considers the emotional aspects of the home and helps individuals feel rooted in their

environment, supporting both social and emotional well-being (Chaudhury & Oswald, 2019). This conclusion is further supported by Slaug et al. (2024). Using a subsample from the Prospective RELOC-AGE cohort, one year before the active ageing study (Paper 3), Slaug et al. examined how meaning of home moderates the relationship between functional limitations and active ageing. The results showed that those with higher meaning of home maintained higher levels of active ageing despite physical limitations. This reinforces the link between active ageing and meaning of home.

Regarding the housing-related control beliefs, the active ageing study (Paper 3) focused on external control beliefs – such as feeling that events in the home are governed by outside forces like luck or fate – and found that higher external control beliefs were negatively associated with active ageing. In other words, higher levels of active ageing was linked to perceiving a greater sense of personal control over one's housing-related issues. In the Integrative Model of Aging Well (Wahl et al., 2012), this is considered in the aspect of agency (Chaudhury & Oswald, 2019). The findings indicated that by having the capacity to actively shape the environment through goal-directed actions, including adapting and modifying the surroundings, autonomy could be maintained and thus higher active ageing. This finding aligns with previous research, which indicated that lower perceived control is associated with poorer health outcomes (Kylén et al., 2017; Oswald et al., 2007), and is consistent with Baltes et al.'s (1990) theory on compensatory strategies, which suggests that older adults who perceive greater control over their home environment are more likely to engage in daily activities that support their independence.

In a longitudinal study by Eriksson et al. (2024), *which involved* a random sample of relatively healthy older adults aged 65–76, the associations between the meaning of home and housing-related control beliefs with changes in various health symptoms and quality of life were examined. Eriksson et al. (2024) concluded that neither the meaning of home nor housing-related control beliefs played a significant role in preventing somatic or psychological symptoms, nor in maintaining or improving quality of life among this cohort. While these findings suggest that perceived home cannot reliably predict health outcomes, Slaug et al. (2024) – using cross-sectional data – demonstrated that the meaning of home moderates the relationship between functional limitations and active ageing. This underscores the value of fostering both emotional attachment to the home and housing-related control beliefs as key factors in supporting active ageing.

Although the findings suggest that housing satisfaction is positively associated with active ageing, the association is less pronounced than meaning of home or housing-related control beliefs. This suggests that while satisfaction with the home is important, the emotional and psychological aspects – such as feeling a sense of control and emotional connection to the home – play a more significant role in promoting active ageing. These findings are consistent with broader research, including Amian et al. (2021), which shows that housing satisfaction alone does not fully capture the complexity of how older adults experience their homes.

In one of the few studies on active ageing in relation to housing, findings from Siltanen et al. (2023) suggest that residents in senior housing may have fewer opportunities for active ageing despite living in supportive environments. Their study supports the idea that personalised home environments, where individuals feel in control and emotionally connected, are more likely to facilitate active ageing. This highlights the importance of not only improving physical accessibility but also enhancing emotional and psychological aspects of the home.

The active ageing study (Paper 3) fills a gap by also including younger older adults from the age of 55 and older. Even though more research has covered younger and healthier older adults in recent years, much of the existing research has centred on very old or frail adults (Roy et al., 2018; Sixsmith et al., 2014; Zimmermann et al., 2021), leaving a gap in understanding how home environments influence active ageing earlier in the ageing process. By involving younger older adults, this study demonstrates that perceived aspects of home remain important even in earlier stages of ageing, where proactive interventions (Iwarsson et al., 2023) can be more effective in maintaining independence and well-being.

These findings highlight the importance of a supportive, meaningful, and controlled home environment in fostering active ageing. Both the MOHO (Taylor, 2017) and the Integrating Model of Aging Well (Wahl et al., 2012) suggest that when older adults perceive their home as satisfying and meaningful, and when they experience a higher sense of control, they are better able to engage in activities that promote agency and belonging (Chaudhury & Oswald, 2019) through autonomy and well-being. Future research should continue to explore the complex interactions between individual capacities, environmental demands, and housing-related beliefs to better support active ageing across different stages of life. This also aligns with Eriksson et al. (2022), who found in an interview study that a strong sense of control over one's housing situation allows older adults to handle age-related changes more effectively, thus maintaining their well-being. Eriksson's findings reinforce the critical importance of understanding how the interaction between personal capacities, environmental demands, and housing-related beliefs can support active ageing throughout the lifespan.

Moreover, this ties into place attachment (Bigonnesse & Chaudhury, 2022) and the concept of ageing in the right place (Golant, 2015b). When older adults feel emotionally connected to their homes and experience a sense of agency and belonging, they are more likely to thrive in their environments. Golant's theory of residential normalcy underscores how older adults with enriched coping repertoires, who experience greater control over their living environments, are better equipped to adapt and maintain well-being. This highlights the need to design housing environments that support both physical and emotional needs. These insights are crucial for policymakers, housing authorities, and healthcare professionals, particularly as more older adults continue to age in place. Designing home environments that address both physical accessibility and emotional connection, as

well as promoting a sense of control, will be essential for fostering active ageing and enhancing overall well-being in older populations.

Reflections on the ARP housing counselling web service

According to the findings of the usability study (Paper 4), the ARP web service is overall considered relevant and useful for creating awareness and reflection about housing-related decision-making (residential reasoning). Based on interviews and SUS data, the content of ARP appears to be relevant.

While the ARP web service is unique to Sweden, similar housing counselling services exist in other countries, demonstrating the growing need for residential reasoning for older adults. For instance, Housing Options for Older People (HOOP) in the UK (Age UK, 2024) and the Senior Housing Assistance Services (SHAS) in the US (United States Department of Housing and Urban Development., 2020) provide guidance for older adults through housing decisions, reflecting the same focus on adapting housing environments to meet ageing needs (Age UK, 2024; United States Department of Housing and Urban Development., 2020). A Scandinavian example is the information campaign, created for the Centre for an Age-Friendly Norway (Senteret for et aldersvennlig Norge, No date.). These systems provide information about a range of support, guiding relocation decisions and housing needs assessments, and thus supporting ageing in the right place (Golant, 2015a).

In Sweden, some larger municipalities, offer housing counselling services that focus on assisting individuals with applications for residential care facilities and support for first-time renters within the municipal rental housing system (Municipality of Gothenburg, No date; Municipality of Malmö, No date). However, these services differ greatly from ARP's more comprehensive focus on residential reasoning, which provides structured, guided support to help older adults navigate complex housing decisions, contributing to more informed choices about ageing in place.

Although residential reasoning – the structured process of evaluating and choosing between housing options – remains underdeveloped in formal practice globally, ARP provides a valuable framework for this decision-making process. By providing guidance on factors such as housing adaptations, relocation considerations, and overall home suitability for older age, ARP offers a more holistic approach compared to traditional information web pages as described above. This highlights the need for systematic tools that guide older adults through complex housing choices, ensuring they have access to the necessary information and support to make informed choices. In particular, the structured, digital nature of ARP makes it a novel and accessible solution, filling a critical gap in supporting older adults to navigate complex housing decisions, and contributing to ageing in the right place (Golant, 2015a).

By situating the ARP web service in relation to these international examples, it becomes clear that ARP fills a critical gap in Sweden, offering a digital, evidence-based tool designed to be used in a local context (Granbom et al., 2020).

During the interviews, a concern was raised regarding whether the images, videos, and phrasing of some questions in ARP adequately represented the diversity of the target group. The use of unrealistic, exaggerated, stereotypical, or distorted portrayals of older adults is a well-documented issue related to ageism in the media (Loos & Ivan, 2004; Makita et al., 2019; Markov & Yoon, 2020; Xu, 2020). Given that older adults are a highly diverse group, a web-based housing counselling service must be relevant and appealing to individuals with varying ages, financial and social situations, health statuses, etc. Ensuring inclusivity and broad relevance in the design of ARP could enhance its effectiveness and usability, and revisions and adaptations may be necessary. Improving the relevance for the intended users is also likely to improve the overall usability of the service (Tullis & Albert, 2013).

Benefits and challenges of digital services

As the population ages, the pressure on welfare systems grows, leading to the exploration of digital solutions as potential remedies. However, while welfare technologies are often touted as the solution to the strain on the system, Frennert (2019) addresses significant criticisms that need to be considered. One of the main criticisms of relying on digital solutions for older adults is accessibility issues and digital literacy (Frennert, 2019). In the usability study, mixed opinions were expressed about the self-administrative mode, suggesting that the service should be supplemented with some kind of in-person advice or support. The Swedish Internet Foundation (2024) highlights the paradoxical situation in Sweden, where there is high internet connectivity among adults but also a significant proportion of older people experiencing digital exclusion. Factors such as age, education, income, and geographical location contribute to digital inequalities, with financial circumstances often limiting access to necessary technologies (Elena-Bucea et al., 2020; Ragnedda et al., 2019). Furthermore, Robinson et al. (2015) argue that digital inequalities exacerbate existing disparities in human capital and health outcomes, with digitally disadvantaged individuals facing additional barriers to accessing essential services. Moreover, there is a risk of oversimplifying the complexities of care by relying solely on digital solutions. An additional challenge involves how digital services and welfare technologies communicate with users through both language and visuals. The choice of images and phrasing in digital tools can inadvertently perpetuate ageist stereotypes or exclude certain groups by not reflecting the diversity of older adults' experiences (Ragnedda et al., 2019; Robinson et al., 2015). For example, using imagery that depicts older adults as universally frail or dependent can reinforce negative stereotypes, while more inclusive visuals can empower users and resonate with a wider audience. Likewise, the language

employed in digital platforms must be nuanced and accessible, avoiding assumptions about users' life circumstances, such as marital status or religious beliefs, which could alienate those who feel unrepresented (Elena-Bucea et al., 2020). Ensuring that digital services are free from ageist undertones and are inclusive in both design and language not only enhances the user experience but also improves the validity and effectiveness of the services (Robinson et al., 2015).

While there are undeniable benefits to integrating digital tools into welfare systems, their implementation must be approached with caution and consideration of the unique needs of older adults. As Tsertsidis et al. (2019) note, older adults often recognise the advantages of technology after its implementation, but acceptance factors can vary significantly between the pre- and post-implementation stages. However, it is essential to recognise that acceptance factors differ between pre- and post-implementation stages, and more research is needed to understand the readiness of older adults to adopt digital technologies fully. The ARP development phase was initiated using a study circle format (Granbom et al., 2020), which serves as a form of user involvement (Kylberg et al., 2018). This participatory approach ensures that the needs and perspectives of older adults are integrated from the beginning, enhances the relevance of the intervention, and can also foster a sense of ownership and empowerment (Brett et al., 2014). With user involvement in both development and the usability phase, the relevance of the web service was potentially increased, making it more effective in addressing the unique issues faced by the target group.

While digital solutions hold promise in terms of addressing the challenges of an ageing population's housing preferences, they are not without their drawbacks. It is crucial to acknowledge and address issues of accessibility, digital literacy, and the potential oversimplification of care provision. Involving older adults in ongoing policy and design decisions will ensure that welfare technologies are responsive to their needs and preferences, leading to more age-friendly and equitable solutions. For ARP, this means that continuous feedback and user involvement will be key in refining the service to remain effective and inclusive as it evolves.

A proactive approach

Proactive ageing involves anticipating and addressing future needs that may arise during the ageing process, rather than responding only after problems have occurred (Iwarsson et al., 2023). By including individuals from the age of 55 in the RELOC-AGE programme, the programme applies a proactive approach. This allows for the identification and understanding of housing-related issues and health aspects before functional limitations and care needs emerge, helping to strengthen preventive initiatives and inform policy solutions related to housing and health.

The Swedish version of UJACAS was found to be reliable and valid, providing a robust tool for both researchers and practitioners to operationalise and understand key aspects of active ageing in a Swedish context. Describing active ageing as striving for well-being offers a holistic perspective that takes into account both an individual's agency—their ability to make choices and act—and the environment's affordances—the opportunities it provides for action.

Findings from the active ageing study (Paper 3) indicate that when older adults perceive satisfaction, meaning, and experience a sense of control of their home, they are more likely to engage in active ageing, promoting well-being. The connection between these aspects emphasises the need for housing policy and interventions that foster emotional attachment and provide older adults with control over their home. By focusing on these perceived aspects of home, housing policy and interventions can align with a proactive strategy (Iwarsson et al 2023). This approach could identify and address housing preferences and needs before functional limitations or care needs arise, helping to create environments that support long-term active ageing.

Proactive ageing on an individual level can also involve early consideration on housing preferences and needs, instead of waiting until barriers in the home becomes evident (Iwarsson et al 2023). The ARP service, as explored in the usability study (Paper 4), offer support to decision-making related to ageing in the right place. It encourages older adults to consider whether their housing needs can be met by staying in their current home or by relocating. By enabling informed housing decisions, the ARP promotes a proactive strategy (Iwarsson et al., 2023), focusing on individual preferences and resources (Mahler et al., 2014). This service encourages residential reasoning and forward-thinking, helping individuals plan ahead for their future housing preferences and needs. It also aligns with findings from the active ageing study (Paper 3), which suggests that more educated individuals are better positioned to make proactive housing decisions, allowing them to anticipate their future needs before significant health declines occur.

A shift towards proactive approaches is essential, especially in health care, where the goal is to provide high quality, and coordinated care that strengthens health. Traditional interventions like housing adaptations and assistive devices often respond to existing limitations and primarily address disease management (Burgess & Morrison, 2016; Fakhfakh et al., 2023). While these interventions do enhance independence and improve housing accessibility (Lien et al., 2015; Zingmark et al., 2020), they are reactive, usually implemented after limitations have already emerged. In contrast, a proactive approach—focused on health promotion rather than disease management—is crucial for maintaining autonomy and well-being (Iwarsson et al., 2023).

Through proactive housing strategies, older adults can plan for future needs and maintain a sense of control over their environment, fostering autonomy and well-being during the ageing process. This aligns with the broader aims of the RELOC-

AGE programme, which seeks to enable older adults to make informed, proactive choices that support active ageing in the right place.

Methodological considerations, strengths and limitations

Trustworthiness and generalisation of the results

All instruments used in the various studies presented in this thesis have undergone rigorous psychometric evaluations, enhancing the trustworthiness of the results generated. The perceived aspects of home – including housing satisfaction, usability, meaning of home, and housing-related control beliefs – and the SUS scale are well-established in their respective fields, adding to the research's credibility (Polit & Beck, 2020; Streiner et al., 2015). UJACAS is a recently developed self-assessment tool, and there is thus limited published research available for comparison. However, during its development, several steps were taken to ensure its psychometric robustness, providing a strong psychometric foundation (Rantanen et al., 2019). Classical test theory, which underpins this assessment, operates under the assumption that each observed score is a composite of a true score and an error term, and that errors are random and uncorrelated with true scores. It also assumes that test items have equal difficulty and discrimination levels (Streiner et al., 2015). These assumptions might lead to limitations, such as not accounting for varying levels of item difficulty, potentially resulting in less precise assessments. Since psychometric evaluation is an ongoing process (Hobart & Cano, 2009), UJACAS may require revisions to remain relevant and accurate.

Sample selection and representation

The generalisability of the findings is shaped by several factors, including the recruitment strategy, the inclusion criteria, and the demographic composition of the sample. All studies focused on individuals aged 55 and older who had expressed an active interest in relocating, which was crucial for studying housing and relocation decisions using quantitative methods. In the general population, the frequency of relocation among this age group is relatively low, which would limit the variance in the data for the relocation variable. By selecting participants actively considering moving, the study achieved a relocation rate of 12% within the first year. This higher-than-average rate provided the necessary variance for analysis but also limits the findings' generalisability to the broader population of older adults in Sweden, as the intention was to collect information-rich data rather than to represent the entire demographic (Paper 1).

The recruitment process itself underwent changes due to the GDPR incident (Zingmark & Iwarsson, submitted), which affected the initial plan to recruit from

two housing companies. The strategy was expanded to include a third housing company, and general invitations were sent out through various information channels, targeting individuals who were listed as having an interest in relocation. While this broadened the pool and likely increased diversity, it also introduced variability in participants' level of interest and commitment, potentially impacting data quality and consistency. Moreover, reliance on digital recruitment channels, amplified by the COVID-19 pandemic, may have skewed the sample towards individuals who are more tech-savvy, excluding those who are less familiar with digital tools, further limiting the generalisability of the findings.

In addition to these recruitment issues, the educational background of participants presents another limitation to generalisability. Research participants often have higher levels of education (Korkeila et al., 2001; Reinikainen et al., 2018), which was also the case in these studies, with around 70% of participants holding a university degree. This contrasts with national statistics, where upper secondary education is more common among individuals aged 55 and older (Statistikdatabasen, 2024). In the active ageing study (Paper 3), education was included as a confounder to mitigate this effect, but the findings should still be interpreted with caution, as the overrepresentation of more educated individuals could influence the results. Similarly, women were overrepresented, especially in the usability study (Paper 4), where this imbalance may have skewed the results, underrepresenting men's perspectives – a well-documented issue in healthcare research (Korkeila et al., 2001; O'Sullivan et al., 2021).

Age criteria also varied across the studies, affecting the ability to generalise findings to different age groups. The prospective RELOC-AGE project, for example, included participants starting at age 55. This approach differs from most of the existing research, which primarily addresses adults aged 67 (Abramsson & Andersson, 2015; Haak et al., 2015; Kylén et al., 2019) or older (Iwarsson et al., 2016). While studying younger older adults allows for an early-stage understanding of housing and relocation decisions, it limits insights into the specific needs and challenges of older populations. Additionally, the usability study (Paper 4) had a stricter age requirement, focusing on individuals aged 65 and older, which reflects its specific aim of evaluating a web-based housing counselling service designed for those considering relocation somewhat later in life.

Recruitment and the pandemic as a context

The onset of the COVID-19 pandemic in 2020 coincided with the start of this thesis project, inevitably impacting the studies conducted. The pandemic influenced both data collection methods and participant availability.

While the RELOC-AGE programme proceeded as planned, strict national recommendations to limit social contact (Folkhälsomyndigheten, 2020; WHO, 2020) affected the initial phase, particularly the psychometric study (Paper 2).

Evidence shows that perceived loneliness increased during the pandemic (Luchetti et al., 2020; Su et al., 2023; Wu, 2020), as social isolation and loneliness affected many older adults (Wu, 2020). Social isolation and loneliness affected a significant portion of the older adult population (O'Sullivan et al., 2021). However, some participants reported having more free time due to reduced social activities and work commitments (Zingmark et al., 2022). For instance, some participants expressed that joining the test–retest phase of the psychometric study provided them with much-needed social interaction. Booking follow-up appointments was easy, as many had empty schedules. This environment may have increased participation and engagement, but also introduced self-selection and response bias (Elston, 2021), as those who participated may have had different motivations compared to non-participants, potentially affecting the data's quality and reliability. It is therefore important to acknowledge that the pandemic's unique conditions may have influenced participants' motivations and the data collected (Zingmark et al., 2022).

The pandemic's unique context limits the generalisability of these findings to non-crisis periods. Social, economic, and health conditions during this time were unusual, and may have influenced participants' priorities regarding housing and health differently than under normal circumstances (Carlsson et al., 2022). Therefore, it is important to contextualise the results, acknowledging that the pandemic likely shaped participants' responses and behaviours, particularly in areas like social and physical activities (Zingmark et al., 2022). For example, participants modified their exercise routines by substituting gym visits with outdoor walks and experienced disruptions in social activities due to restrictions. While some embraced digital alternatives, others felt disconnected or dissatisfied.

Interestingly, most items in UJACAS were reported as being unaffected by the pandemic, indicating that respondents generally perceived no significant changes in their goals, their ability, their opportunity to act, or the frequency of their activities during the assessment period. Challenges in differentiating between ability and opportunity to act were noted among some participants, suggesting nuanced impacts of the pandemic on these dimensions of active ageing (Zingmark et al., 2022). This highlights the complexity of assessing active ageing during such disruptive periods, and emphasises the need to consider temporal effects in forthcoming longitudinal studies.

Thus, the COVID-19 pandemic may have influenced recruitment and data collection in the first and second year of the prospective RELOC-AGE. The psychometric study (Paper 2) highlighted the impact of COVID-19 on the psychometric properties of UJACAS, particularly regarding physical and social activities. This suggests that data collected during the pandemic may have been influenced by the unique circumstances, affecting the reliability of the findings.

Digital access

Reliance on digital channels (online survey in Papers 2 and 3, and a digital web service in Paper 4) presented a potential risk of excluding individuals with limited access to or comfort with digital technologies, particularly among older adults. Research shows clear disparities in how older adults engage with digital platforms, with some individuals being less comfortable using such services (Hunsaker & Hargittai, 2018; König et al., 2018). Even though internet use is widespread in Sweden, with 94% of adults aged 66–75 using it frequently or daily (The Swedish Internet foundation, 2024), it was important to provide alternative methods to ensure inclusivity. To mitigate the risk of digital exclusion, participants in Papers 2 and 3 could request a paper version of the questionnaire or respond via telephone, thus allowing those with lower digital literacy or limited access to digital tools to participate. In Paper 4, participants self-rated their digital skills, rated their proficiency between 3-5 giving the participants a somewhat varied overall proficiency to engage with digital tools used for the study. These measures ensured that the studies remained accessible to a diverse range of participants and minimised the risk of digital exclusion.

Statistical approach and justification

Parametric methods were selected for the analysis of UJACAS data based on the approach taken in previous research (Rantanen et al., 2021; Rantanen et al., 2019). Although UJACAS data are ordinal in nature, they were treated as continuous in accordance with prior studies that applied parametric techniques to Likert-type scales under similar conditions. This decision aligns with the understanding that, in large samples, Likert-type scales can be treated as approximating interval data, allowing for parametric methods (Norman, 2010; Sullivan & Artino, 2013). The central limit theorem further supports this approach, suggesting that large sample sizes tend to normalise the distribution of sample means (Field, 2018).

In study 3, where OLS regression was used, the normality of residuals was specifically tested, and the UJACAS data were found to meet the assumptions for parametric methods, including linearity and homoscedasticity. By using parametric methods, the analysis aimed to maximise statistical power and robustness, ensuring reliable and interpretable results.

Moreover, because the cross-sectional setting is a limitation when it comes to regression modelling involving interaction effects, the findings reported are at best indicative, but are valuable for future research on dynamics involving housing, health and active ageing.

Conclusions and implications

The RELOC-AGE programme has the potential to generate policy-relevant knowledge on associations between housing, relocation, and active ageing. Such knowledge is crucial for developing proactive housing approaches for older adults at the individual, group, and societal levels.

This thesis includes the study protocol for the Prospective RELOC-AGE project, which constitutes the basis for a longitudinal cohort study focusing on housing choices and relocation, and explores effects on active ageing among people aged 55 years and older who are considering relocation.

The empirical research included in this thesis suggests the following:

- The Swedish version of UJACAS is a reliable and valid assessment for capturing active ageing among individuals aged 55 and older listed with an interest in relocation in Sweden. Due to the SEM reported, real changes can be detected, making UJACAS suitable for longitudinal studies and intervention research focused on active ageing.
- To enhance the affordance of active ageing, the home needs to be satisfactory, meaningful, and controllable, and thus promote emotional and psychological bonds. Understanding the link between active ageing and self-rated health offers valuable insights for policymakers, housing authorities, and professionals in healthcare and social services.
- Initiatives aimed at improving education, health outcomes, and housing conditions for older adults could foster more positive views on active ageing, enhancing individual well-being and autonomy, while promoting active participation in society and contributing to the overall vitality of communities.
- The web-based housing counselling service ARP has acceptable usability to support informed housing-related decisions. By enabling residential reasoning, older adults are supported to make proactive choices based on informed decisions. Thus, ARP can serve as a proactive service that complements traditional reactive interventions in healthcare and social services targeting older adults.

Future perspectives

The findings from this thesis can serve as a foundation for future projects to support active ageing and well-being among older adults.

Longitudinal studies of active ageing

The Swedish version of UJACAS has been found to be reliable and valid for assessing active ageing among individuals aged 55 and older in Sweden. It can detect real changes due to the reported SEM, making it suitable for use in longitudinal studies and intervention research focusing on active ageing as an outcome. Given that activity levels (Zingmark et al., 2022) may have influenced the assessment of discriminant validity, further research on the relationship between active ageing and depression is warranted.

Understanding perceived aspects of home

Further research into the dynamic interplay between active ageing and perceived aspects of home could deepen our understanding of the meaning of home and housing-related control beliefs. This could, in turn, help promote active ageing and enhance well-being by optimising the home environment. Moreover, future studies should investigate potential moderating factors such as socio-economic status, cultural factors, or individual personality traits.

Utilisation of the housing counselling web service

Future research should also explore other ways to use ARP, such as through study circles or with the support of a housing counsellor, like an occupational therapist or someone with similar training. Further studies are needed to understand how these alternative methods can enhance the web service's effectiveness and reach. Future steps in the development of ARP include identifying feasible and sensitive primary and secondary outcome measures and exploring its effects in municipal contexts. Intervention development should aim at creating measurable outcomes to ensure the effectiveness and sustainability of the interventions.

Other target groups

Additional research should investigate how both UJACAS and the housing counselling service can be adapted for the wider target group. This includes identifying and exploring the potential of various socioeconomic groups, cultural backgrounds, and individual personality traits to understand how these factors might influence active ageing, and the effectiveness of the web-based housing counselling.

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Author's contribution to the papers

Paper I

Project administration and manuscript editing, including the development of descriptions for various instruments and variables.

Paper II

Conceptualisation, data collection and analysis, project administration, validation, visualisation, and writing (original draft, review, and editing).

Paper III

Conceptualisation, analysis, and writing (original draft, review, and editing).

Paper IV

Conceptualisation, data collection and analysis, project administration, validation, and writing (original draft, review, and editing).

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About the author

Frida Nordeström has been a licensed occupational therapist since 2006, earned a master's degree in occupational therapy in 2017, and obtained specialist certification in 2019. During her PhD studies, Frida has been affiliated with the Centre for Ageing and Supportive Environments (CASE) and the Proactive Ageing profile at Lund University. Her PhD project was conducted within the Active and Healthy Ageing Research Group in the Department of Health Sciences at the Medical Faculty.

Based on the hypothesis that housing choices and relocation influence opportunities for active and healthy ageing, the RELOC-AGE programme was designed to explore the relationship between housing choices, relocation, and active ageing among individuals aged 55 and older in Sweden. This thesis employs a variety of study designs connected to two of the programme's empirical projects: the Prospective and Intervention RELOC-AGE projects. The papers included in this thesis are: a study protocol providing a framework for investigating housing options and relocation decisions using a longitudinal mixed-methods approach; a translation and validation of a self-assessment for active ageing; an exploration of how active ageing relates to perceived aspects of home; and an evaluation of a web-based housing counselling service. The findings reveal key insights into how the home environment influences active ageing, with implications for promoting well-being among older adults through proactive housing decisions.

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