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Residential Interior Design for People with Special Needs in Thailand Based on Physical Abilities: Age, Gender, and Living Environment Considerations

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Abstract: Residential interior design for people with special needs necessitates more specific research, especially with respect to physical abilities. Previous studies, as opposed to general people, have overlooked the nuanced requirements generated by age, gender, and living environment differences. This study aims to examine physical abilities across different ages, genders, and residencies and identify relationships between in-home mobility and physical abilities among people with special needs. A total of 384 participants (eight different types of disabilities) completed electronic questionnaires. Among young, adult, and older groups, physical abilities and self-support showed statistical differences. Males demonstrated higher physical ability levels but decreased hand–arm movements than females. Greater physical abilities and subjective health were found in urban residents compared to non-urban residents. Additionally, in-home mobility was positively associated with out-of-home mobility, physical abilities, independence, and subjective health (all p values < 0.05). Thus, physical abilities revealed disparities across ages, genders, and resident settings. Also, the greater the mobility inside the house, the more possibilities there are to enhance physical abilities both inside and outside the house, independence, and subjective health. Design recommendations are provided regarding layout, furniture, flooring, and lighting. The consideration of these specific requirements in residential interior design is encouraged.

Keywords: interior architecture; inclusive design; ergonomics in design; indoor mobility; people with disabilities

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1. Introduction

People with special needs tend to spend more time at home [1,2], particularly in developing nations where urban facilities and services, such as inaccessible lavatories, a lack of navigation or information signs, and an absence of sloped or uneven pavement, are impeded [3,4]. Currently, the new lifestyle, influenced by the global COVID-19 epidemic, permits substantially more activities at home than was previously conceivable, and this trend continues, such as working or studying, conferencing, purchasing, and entertainment [1,5]. Residential interior design is becoming more important among all populations, including people with special needs, as it affects everyday living and both physical and mental well-being [6,7].

Environmental hazards at home among vulnerable populations, including the elderly and individuals with special needs, have been identified as one of the major flaws in interior design, such as accident-related falls, which can lead to serious injuries and mortality [8,9]. Interior design that restricts mobility within the home (for example, complex layouts, tight corners, narrow doorways, flooring that is too slippery, and a large number of stairs) can be categorized as unsafe design since it includes barriers or obstacles that limit access for users to complete their tasks successfully and safely [6,9,10]. These factors may also hinder some essential daily activities or make self-care activities more difficult, such as toileting,

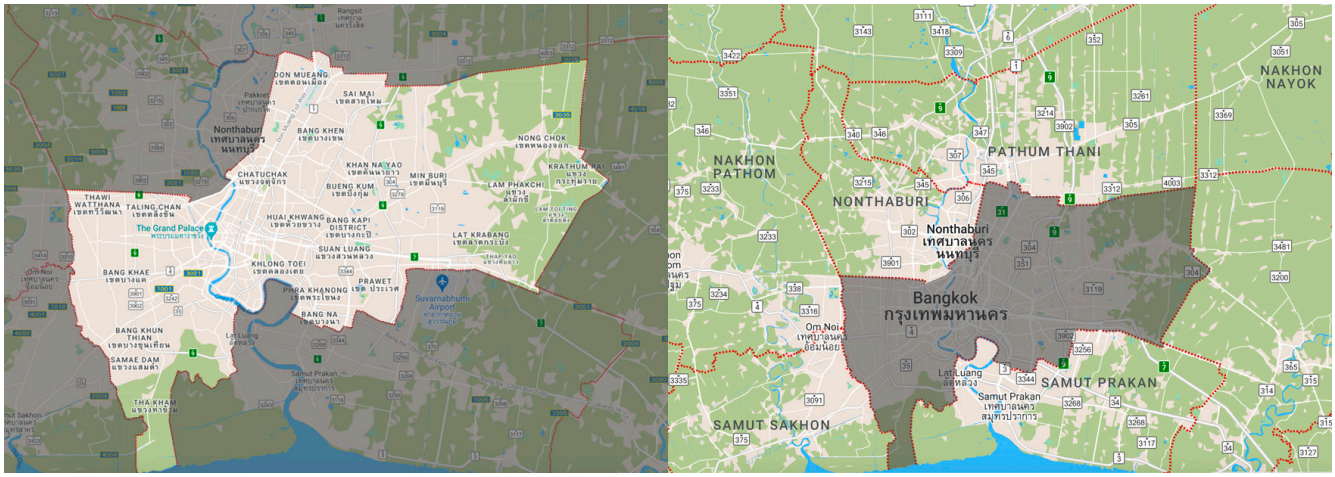
bathing, and cleaning, which reduces their independence and makes them more sedentary, all of which delay or distance healthy living [8,11]. Meanwhile, the global population is aging, and the number of people over the age of 60 is growing [4,12]. Some elderly persons may have some sort of impairment, whether temporary or partially, and it will worsen in the near future as human functions gradually decline with age, resulting in an increase in the number of people with special needs [13–15]. Since housing design is incapable of providing a safe space for people with special needs, this situation will only intensify in the future.

When designing housing spaces for people with special needs, interior design presents additional challenges since it requires a more in-depth understanding and specific requirements based on physical abilities than for the general population [16–18]. However, there is a lack of comprehensive research that examines the relationship between residential interior design and the physical abilities of this population, and even less when multiple types of disabilities are considered. Existing studies have primarily concentrated on general aspects of accessibility and universal design, but they frequently overlook the nuanced needs generated by age, gender, and living environment differences. This knowledge gap necessitates a greater awareness of how physical abilities impact residential interior design and how design interventions should cater to diverse needs. Therefore, the present study aims to examine physical abilities among people with special needs across different ages, genders, and resident settings and investigate relationships between in-home mobility and their abilities. This study will contribute to evidence-based studies and ergonomics in design that promote mobility, safety, and healthy living. By incorporating these considerations into interior design, it is possible to create living spaces that promote physical activity, independence, and overall well-being for people with special needs. Ultimately, the goal is to ensure that their homes provide a safe and healthy environment for sustainable living and an improved quality of life.

2. Materials and Methods

2.1. Participants

A total of 384 participants (with visual, hearing, physical or mobility, intellectual, learning, autism, emotional or behavioral, and multiple disabilities) were recruited for the present study. Males and females who were Thai citizens, aged at least 13 years old, and were officially registered as having one of those disabilities were included. Any individual who could not comprehend the objectives of the research or who could not be reached by the research team during the screening procedure was excluded. Fifty-four participants for each type of disability, except for multiple disabilities, which had six participants, were finalized as the total sample size of the present study. According to the information on their national identification cards, age groups were categorized as 13–14, 15–59, and 60 years old and above for young (n = 126), adult (n = 132), and older (n = 126) participants, respectively. Biological sex served as the basis for categorizing gender groups as males (n = 187) and females (n = 197). Residents of Bangkok, the capital city of Thailand, divided urbanism into those who lived inside and outside, and they were further categorized into urban (n = 235) and non-urban (n = 149) living, respectively (as shown in Figure 1). Prior to agreeing to participate and signing the consent form, all participants and/or their parents or legal guardians were provided with written information regarding the present measurement. They were also given the opportunity to contact the research team with any inquiries they may have had at any point in time. The ethical review board of Thammasat University granted approval for all procedures involving human participants in the present study.



Maps Data: Google ©2023, Snazzy Maps

(**a**) (**b**)

Figure 1. Geographical areas of the sample in Thailand. (**a**) Urban residents were referred to as people who lived in Bangkok. The study gathered information from several districts, including Huai Khwang, Sai Mai, Min Buri, Nong Chok, Bang Na, and Thawi Watthana. (**b**) Non-urban residents were referred to as people who lived in suburban and rural areas. Various provinces were observed in the study, including Nonthaburi, Pathum Thani, Samut Prakan, and Nakhon Pathom.

2.2. Measurements

The questionnaire was designed to collect data on health and socio-demographic characteristics, physical performance, and subjective health in the context of everyday living activities in home environments. Health and socio-demographic characteristics were open-ended questions, including age, biological sex, place of living, type of disability (and whether using a wheelchair or not), cause of disability, chronic health conditions, occupation, monthly income in THB, and daily travel use. In addition, physical performances were a closed-ended question and comprised mobility activity levels inside the house, mobility outside the house, postural stability, stepping across different levels, sit-to-stand movement, lifting, hand–arm motion, mobility within the indoor fitness space, physical activity intensity, walking duration, independence, and self-support. Moreover, subjective health was calculated as the average of two rating scale questions: (1) How would you feel about your overall health, apart from the disability? (2) How satisfied would you feel with your health? Scores between 0 and 10 signified the lowest and highest, respectively [3]. The electronic questionnaire was directly sent to all participants via email, with assistance from Thai national organizations and institutes in relation to each type of disability.

2.3. Statistical Analysis

Descriptive statistics are presented as percentage (% of total) in Figure 2. The Kruskal–Wallis test was used to compare three groups of young, adult, and older participants (Figure 3). The present study used the Mann–Whitney U test (for ordinal data), the chi-squared test (for nominal data), or the unpaired t-test (for continuous data) to compare each pair of age (Figures 3 and 4), gender (Figure 5), and residence (Figures 6 and 7) groups. Relationships between mobility within the houses and variables related to their daily living abilities were examined using the Pearson correlation coefficient (Figure 8) for all participants. For comparison results, effect sizes were calculated using eta squared (η^2), phi (φ), and Cohen's d, whereas correlation coefficients (r) were calculated for correlation results [19,20]. All analyses were carried out using IBM SPSS Statistics version 22, and results were considered statistically significant at a p value of less than 0.05 (two-sided).

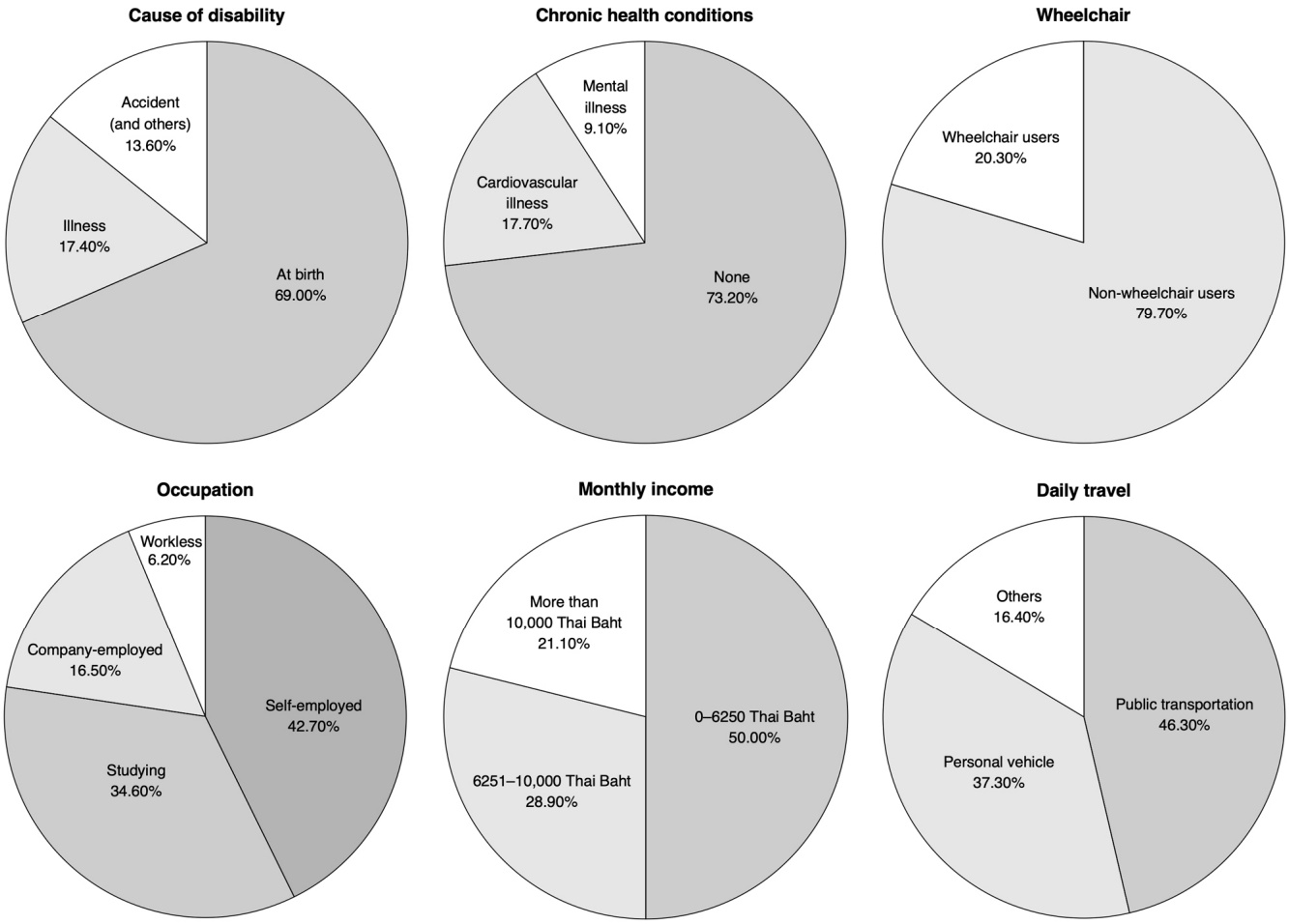


Figure 2. Health and socio-demographic characteristics of all participants.

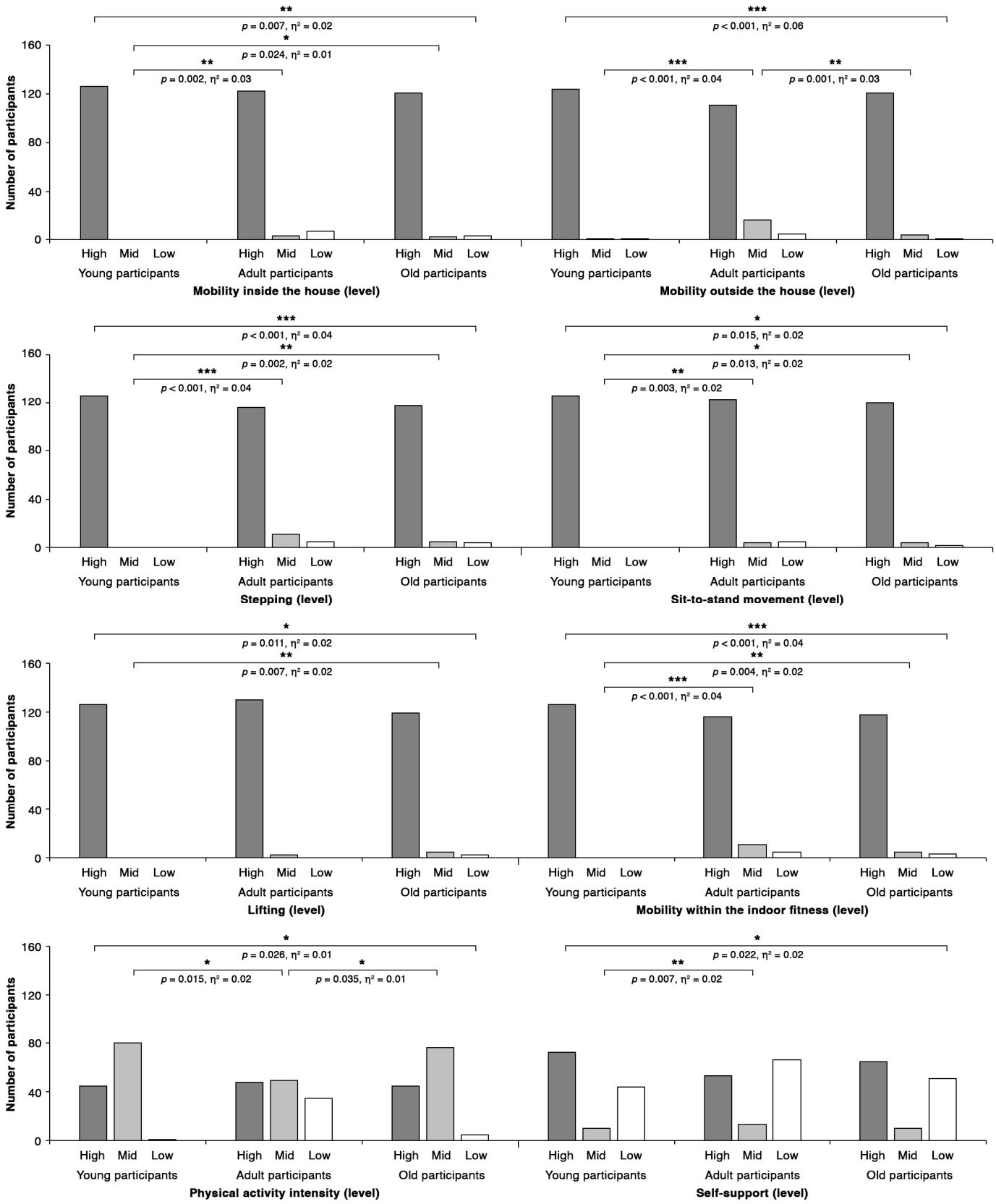


Figure 3. Age considerations: comparison results among young, adult, and older participants. Note: Symbols *, **, and *** denote significance levels at $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

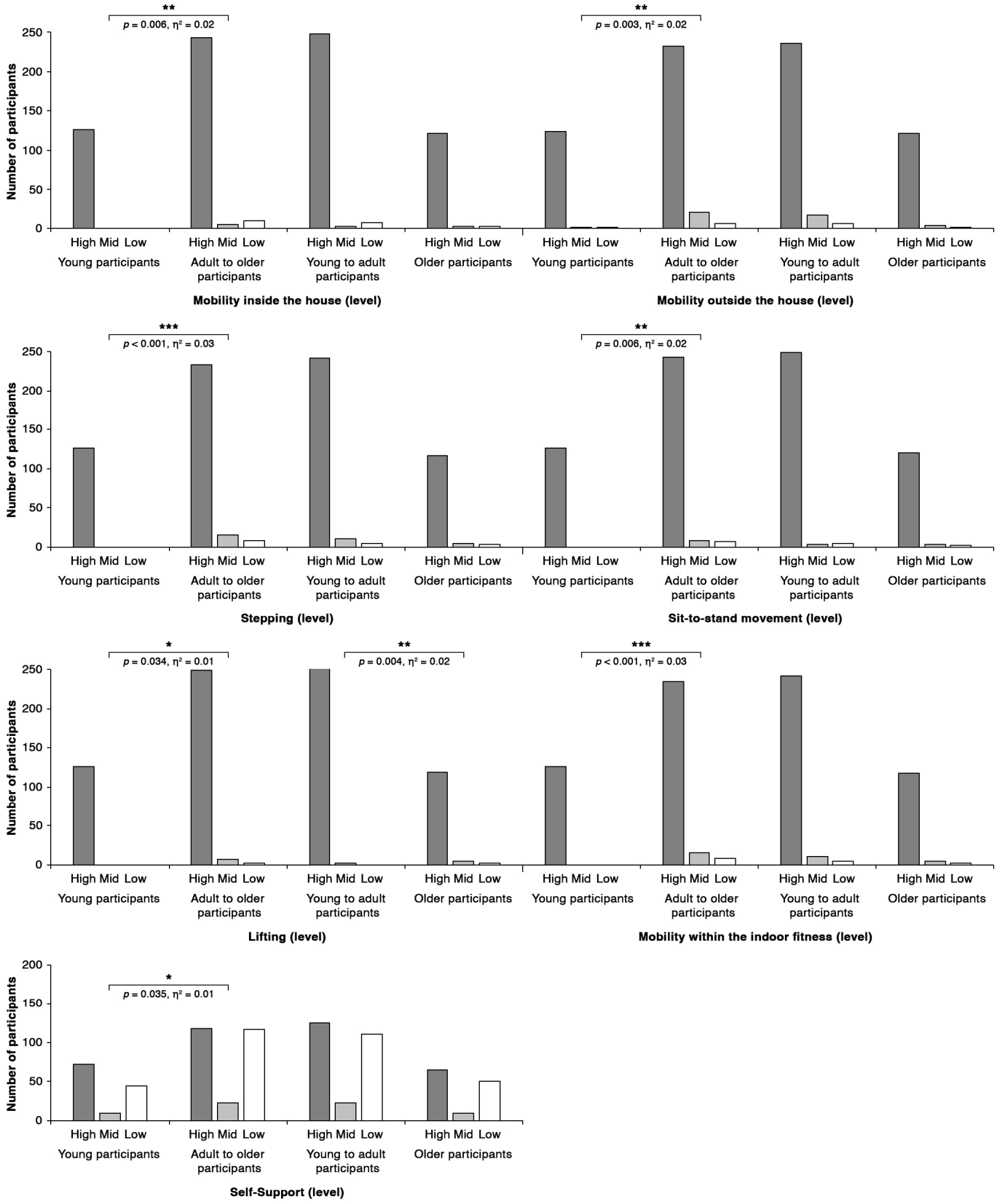


Figure 4. Sub-age groups: comparison results between young and adult to older participants and between young to adult and older participants. Note: Symbols *, **, and *** denote significance levels at $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

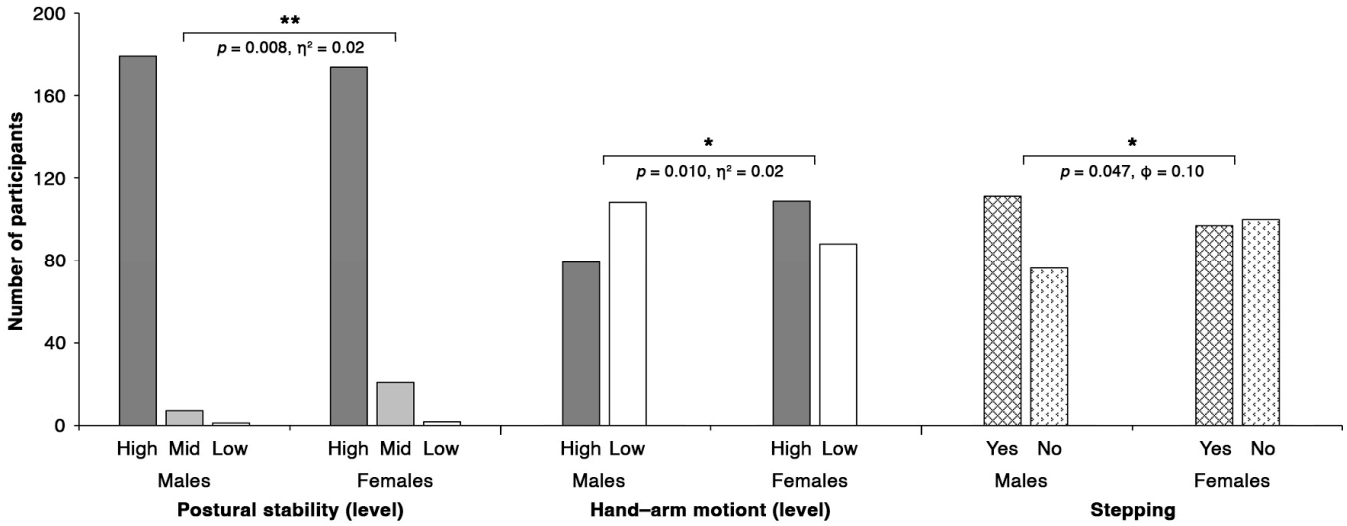


Figure 5. Gender considerations: comparison results between males and females. Note: Symbols * and ** denote significance levels at $p < 0.05$ and $p < 0.01$, respectively.

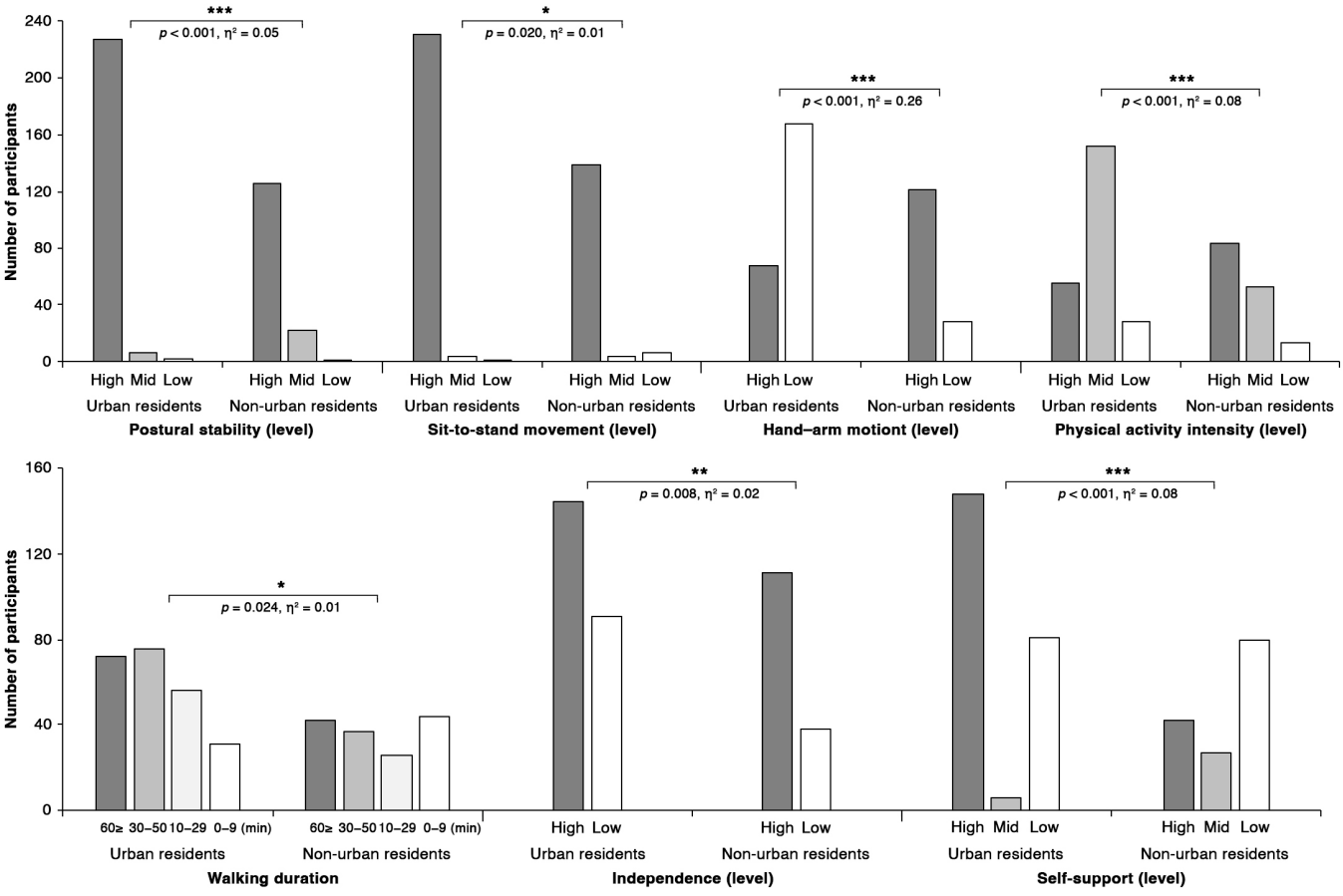


Figure 6. Living environment considerations: comparison results between urban and non-urban living. Note: Symbols *, **, and *** denote significance levels at $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

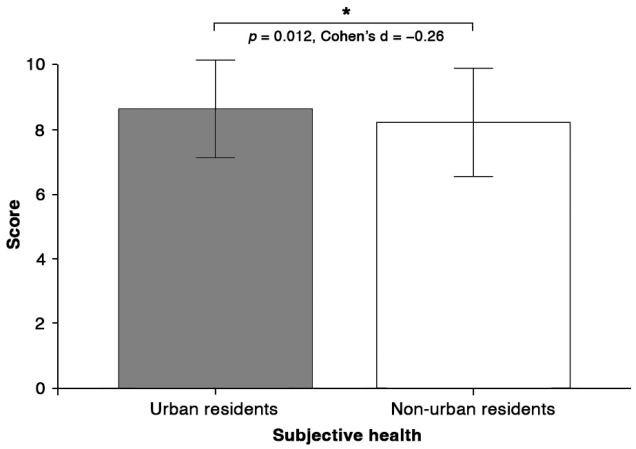


Figure 7. Living environment considerations: comparison results of subjective health between urban and non-urban living. Note: Symbol * denotes significance level at $p < 0.05$.

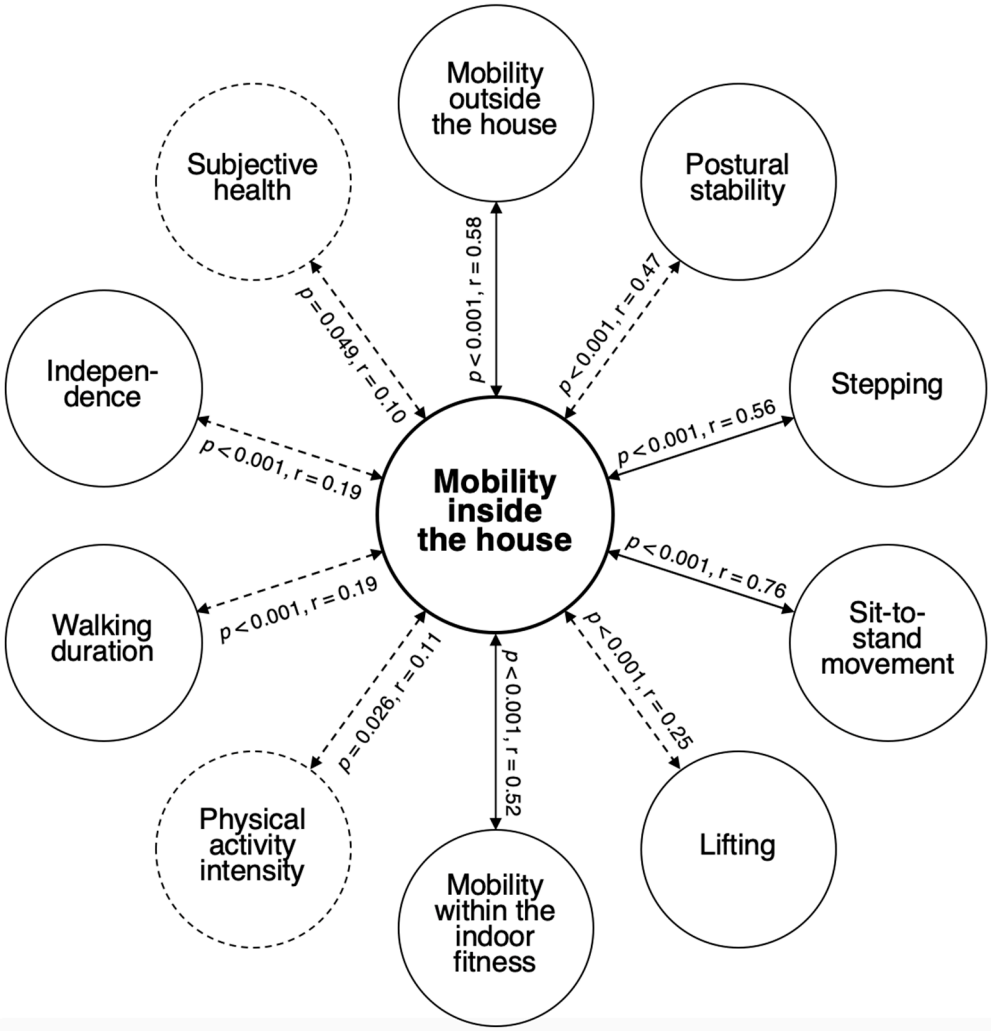


Figure 8. Bivariate correlations between mobility within the house and variables related to daily living abilities. Note: Dashed and continuous circular lines denote significance levels at $p < 0.05$ and $p < 0.001$, respectively. Dashed and continuous lines with arrowheads indicate correlation coefficients (r) of less than and greater than 0.50, respectively.

3. Results

The present study included participants who were mostly born disabled (69.00%); had no serious chronic health conditions (73.20%); did not use wheelchairs (79.70%); worked independently (42.70%); earned approximately THB 6250 (Thai currency) per month (50.00%); and used public transportation (46.30%), such as the sky train, subway, bus, and motorcycle taxi, on a regular basis (as shown in Figure 2).

Figure 3 shows comparisons by age group—young, adult, and older participants—and by pair. Among three age groups, there were statistically significant differences in levels of mobility inside the home ($p = 0.007$ with $\eta^2 = 0.02$), mobility outside the home ($p < 0.001$ with $\eta^2 = 0.06$), step ability ($p < 0.001$ with $\eta^2 = 0.04$), sit-to-stand movement ($p = 0.015$ with $\eta^2 = 0.02$), lifting ability ($p = 0.011$ with $\eta^2 = 0.02$), mobility within indoor fitness space ($p < 0.001$ with $\eta^2 = 0.04$), physical activity intensity ($p = 0.026$ with $\eta^2 = 0.01$), and self-support ($p = 0.022$ with $\eta^2 = 0.02$).

Younger participants were shown to have greater levels of ability than adult participants in terms of mobility within and outside of residences, stepping, sit-to-stand movement, mobility inside of fitness space, physical activity intensity, and self-support (where p values ranged between less than 0.001 and 0.015, and η^2 ranged between 0.02 and 0.04). Younger participants also showed better levels of mobility inside the home, step ability, sit-to-stand movement, lifting ability, and mobility within indoor workout areas (where p values ranged between 0.002 and 0.024, and η^2 ranged between 0.01 and 0.02) than older participants. Additionally, adult participants exhibited differences compared to older participants in mobility outside of residences and physical activity intensity (where p values ranged between 0.001 and 0.035, and η^2 ranged between 0.01 and 0.03), as shown in Figure 3.

Figure 4 demonstrates that the adult to older age group reported greater mobility inside the home, mobility outside the home, step ability, sit-to-stand movement, lifting ability, mobility within indoor fitness space, and self-support (where p values ranged between less than 0.001 and 0.035, and η^2 ranged between 0.01 and 0.03) than the young age group. On the other hand, the younger to adult age group reported greater lifting ability ($p = 0.004$ with $\eta^2 = 0.02$) than the older age group.

Figure 5 compares gender differences in observations. Male participants reported higher levels of postural stability ($p = 0.008$ with $\eta^2 = 0.02$) and were more likely than female participants to have better step ability ($p = 0.047$ with $\varphi = 0.10$). In addition, female participants reported greater hand–arm movement than their male counterparts ($p = 0.010$ with $\eta^2 = 0.02$).

Figures 6 and 7 exhibit comparative results between urban and non-urban living. In comparison to participants who lived in non-urban areas, those who lived in urban areas demonstrated higher levels of postural stability ($p < 0.001$ with $\eta^2 = 0.05$) and sit-to-stand movement ($p = 0.022$ with $\eta^2 = 0.01$), were able to engage in more intense physical activity ($p < 0.001$ with $\eta^2 = 0.08$), could spend more time walking ($p = 0.024$ with $\eta^2 = 0.01$), had more independence in living ($p = 0.008$ with $\eta^2 = 0.02$), were better able to support themselves in daily activity ($p < 0.001$ with $\eta^2 = 0.08$), and gained higher subjective health scores ($p = 0.012$ with Cohen's $d = -0.26$). On the other hand, non-urban residents moved more fluidly in hand–arm motion than urban residents ($p < 0.001$ with $\eta^2 = 0.26$).

Figure 8 presents mobility within the home, which is correlated to factors pertaining to daily living abilities. All participants reported that their mobilizations within their homes were positively correlated with mobilizations outside of them, with their ability levels for postural control, stepping, sit-to-stand movement, lifting, mobility within indoor fitness spaces, walking duration, and independence (all p values < 0.001 with r varied between 0.19 and 0.76), and they positively correlated with levels of physical activity intensity ($p = 0.026$ with $r = 0.11$) and subjective health ($p = 0.049$ with $r = 0.10$).

4. Discussion

Overall, the young participant group exhibited better health in terms of mobility level, physical activity level, and self-help level than those in the adult and older groups. In sub-age considerations, it is more obvious that the young group ranged at a high level in most performances as opposed to the group of adult and older participants, who fell into all levels and varied from low to high levels. Regarding gender, male participants demonstrated greater ability in balancing while being restricted more in the upper extremities, such as the arms or hands, than female participants. Urban residents exhibited higher physical ability, physical fitness, self-reliance, and subjective health (with the exception of hand–arm movement) than non-urban residents. Furthermore, the mobilization inside the home was positively associated with physical performances (including stability, stepping, postural change, and lifting abilities), mobilizations outside and in fitness areas, physical activity, independence, and a positive sense of well-being.

Interestingly, in addition to the older group, the adult group was also found to be inferior to the young group with respect to several categories of physical abilities. Adults with special needs have a significant prevalence of low levels of physical activity [21]. This inactivity corresponds to a downward trend in physical activity and an increase in sedentary behavior with age, both of which contribute to poor physical performance and negative health outcomes [22,23]. Moreover, the adult group had similar characteristics to the older group, wherein it was observed that the older population with intellectual disabilities displayed markedly low levels of physical activity [24]. Unlike the general population, where older individuals were found to be the most vulnerable age due to their restricted movements [6,25,26], the present findings exhibit that adults can be considered the most vulnerable age group, particularly when accompanied by older individuals, among people with special needs. This focuses the attention on interior design for adults when considering people with special needs, who are sometimes overlooked when creating home spaces because adults are more often involved in occupational or workplace design.

According to our findings, there are gender differences among people with special needs that are similar to those found in the general population, particularly among the elderly. The present study discovered that female participants had lower postural stability and stepping ability than male participants, which was consistent with several studies that found that women were more likely to fall due to difficulties in balancing, tripping, or slipping, even within their own homes [8,27,28]. Moreover, the greater movements observed in the arms and hands of the female participants can be attributed to their role as housewives and the everyday housekeeping they perform [29]. The majority of household chores include cleaning, and these tasks usually require the use of the arms and hands [30]. Cleaning occupations, which primarily employ women and/or the elderly [31, 32], emphasize moving the arms and hands more freely and efficiently. These illustrate that home fall prevention strategies and home adjustable fixtures and tools, where range and motion of the arms and hands can be safely attained when people with special needs undertake daily tasks within their houses, should receive more serious consideration in interior design.

Among people with special needs, the present findings found that those who lived in the city had better overall physical abilities than those who lived outside the city. This could be explained by the fact that the urban resident group leads a more active lifestyle, can afford to have more fitness equipment at home, and finds it more convenient to travel to public spaces near their homes where physical activity is more frequently available [33], whereas the rural resident group spends more time on sedentary activities, such as screen time among teenagers [34], and has fewer facilities supported around their neighborhoods. These findings were supported by our health and socio-demographic characteristic results, which revealed that individuals with no chronic health conditions were more likely to be in the urban group than the non-urban group (74.50% and 71.10%, respectively), suggesting the importance of leading an active lifestyle. Urban residents earn a higher income than non-urban residents (median values of THB 9500 and 1000, respectively) and have fewer

unemployed people in their group (5.10% and 8.10%, respectively), showing that they have more potential money to spend on health promotion. Both groups were presented as non-wheelchair users, with urban residents reporting 80.00% and non-urban residents reporting 79.20%. However, due to the readiness of the cities, they displayed divergent travel behaviors, with the first group using public transportation (63.50%) and the latter group relying on their own private vehicles (52.20%). Additionally, people with special needs preferred free access to physical activities and fitness equipment, such as at public parks [35], which were more convenient to reach for the urban group because many of them could travel by public transit (e.g., sky train and subway), and these parks provided a greater variety of activities and equipment, whereas the non-urban group was more likely to use neighborhood parks (where public parks were absent), which lacked activities and quality equipment. A closer look at the types of residential living revealed that there were two main types observed in this study: group and private residences. The term group residence refers to residential care homes and centers where residents share living spaces and facilities. Sub-types were also found in age and gender categories, such as only for children, women, and men. In Thailand, the Department of Empowerment of Persons with Disabilities, Ministry of Social Development and Human Security regulates the Home for Protection and Development for Persons with Disabilities, which has locations in Nonthaburi, Pathum Thani, and Samut Prakan, among others. In addition, the term private residence refers to an individual living in a single (or family) home, which can either be owned or rented. As observed within the study, the urban group was more likely to live in a private residence (e.g., a compact unit, apartment, or home), which may be due to their workplaces, whereas the non-urban group was more likely to live in a group residence, which may be due to restricted opportunity and financial constraints. This explanation can help support the subjective health result, which observed that the urban group was more satisfied with their overall health and lives than the non-urban group. Regarding the general population, nevertheless, rural residents were more likely to have higher physical fitness than urban residents [36,37]. Although both general and disabled populations were found to be distinct between home places, there is an inverse relationship and a different rationale when it comes to people with special needs. Thus, interior home design should be approached with prudence, as people with special needs have additional challenges where more confounding factors could impact their capacity to make a good living.

Furthermore, the present findings imply that the greater the degree to which a house provides its users with more opportunities to engage in movements within the home, the more a person's level of physical performance, independence, and subjective health with regard to activities of daily life for people with special needs can be significantly increased. When accessibility and safety are properly occupied, interior housing design can create spaces that encourage people with special needs to move more actively, as physical activity leads to several positive health outcomes. This is supported by previous research, which found that people with disabilities who engaged in high-mobility environments had higher levels of physical activity, more social interactions with their communities (outside of their homes' activities), and better health in both body and mind [38–40]. Conversely, older people who had low mobility (due to environmental restrictions, such as home hazards or inaccessible facilities) were associated with inactive behavior, a fear of falling, low social engagement, and a higher risk of chronic diseases [8,39,41]. Thus, this correlation result emphasizes the importance of interior design, which has a major effect on the well-being of people with special needs. Additionally, it is also expected that successful interior housing design contributes to improving the quality of life of people with special needs and can ensure that their home is a safe, healthy place to live over the long term, which can eventually lead to sustainable living for people with special needs.

4.1. Design Recommendations

4.1.1. Planning and Layout Design

A well-organized planning design should prioritize an uncomplicated space with a non-complex layout. This is advantageous in reducing cognitive loads for older people with special needs, who naturally have a deterioration in cognitive function and make poor decisions [6,42] and for adults with special needs who want to reduce physical effort in mobility and develop self-support. An open-concept layout can provide users with an overview of the entire arrangement, allowing them to recognize their positions within the spaces as proprioception and organize their energy to travel to destination areas and complete tasks [8,43]. This helps people with low levels of mobility (motor function), movement (coordination), and activity intensity in preparing their bodies for performances and supports a sense of autonomy via movement confidence [44].

A clear route and appropriate maneuvering space should be considered, such as planning with minimal junctions or uncrossed circulations, to make daily hygiene routines, housekeeping duties, and work-at-home activities safer and more effective [6,8]. This is carried out to support those who live independently and are responsible for taking care of themselves, as well as those of working age and adults with special needs, in better arranging their repetitive tasks and workloads. Also, it must be ensured that doorways, hallways, and corridors are large enough to accommodate both single (using a wheelchair or walking aid equipment) and multiple (with personal assistance or in the event of paramedic rescue assistance) users and that sharp curves and small corner areas are avoided [45]. Choices for arched openings should be offered between common rooms instead of doors in order to improve accessibility and eliminate the problems caused by difficult openings, damaged hinges, and drooping or heavy doors [6]. This is to ensure that the circulations are accessible and to avoid lifting concerns, as most disabled people, particularly elderly people, have a low lifting ability.

A zonal arrangement should be provided to create proximity and layout continuity by grouping related areas, such as the kitchen, dining, and living spaces, together in order to reduce unnecessary travel and make it easy to understand the functions of the space via the relationships between areas and elements. This helps people with cognitive impairments in staying focused (with selective attention within limited resources) and achieving their tasks [6]. For long distances, a direct approach using furniture configurations for guided circulation channels is recommended. Also, the design should consider including certain resting points in between the traveling path or between rooms so that people with special needs can pause, catch their breath, and relieve weariness while travelling between spaces [6]. This is carried out to support non-urban and non-young groups with low physical intensity so that they can engage in lengthy physical movements, such as mobility. Essential areas, such as bedrooms, bathrooms, and kitchens, should be placed on the same main level (the ground floor is preferred) to avoid the need to navigate stairs [8]. This is carried out to prevent imbalance accidents and fall-related injuries with respect to those that have trouble using stairs, including non-young people and females.

Unusual movements (e.g., bending, reaching, and turning) within spaces, such as in kitchens and bathrooms, must be considered so that these spaces are designed with safety in mind since these motions induce postural inability [46], and these areas also involve slippery surfaces where a high frequency of fall injuries has been reported [8]. Behavioral design to eliminate needless activities or unnecessary tasks can be applied to reduce time spent in those risky areas so that there is less chance for potential harm [6]. Separate tasks that can be completed in other dry spaces can also be an option. These are intended to prevent people with special needs, who lack body balance and have restricted hand–arm motion (females and urban citizens, respectively), from losing their stability and falling.

The design should emphasize the creation of a central location where people with special needs can fully access and conveniently reach these areas for regulating the functions of the house, such as switches for lights, curtains, gate opening, and other frequently used features or wireless control systems [47]. Emergency response devices that are promptly

accessible should be installed at multiple locations throughout the home [48]. This assists non-urban residents who have a low level of independence, self-support, subjective health, and walking capacity in having full control of their homes in order to support their daily activities, and this also provides the ability to quickly request assistance if needed.

4.1.2. Built-in and Loose Furniture Design

Built-in countertops, such as those for cooking, working, and gardening, should come with adjustable heights. Built-in storage solutions, such as cabinets and drawers that are easily accessible and at various heights (or vertically) [46], ensure that items are within reach without the requirement for excessive physical exertion, such as kneeling or extending. This adjustable feature helps reduce the overreach of hand–arm movement tasks and supports body balance for males and non-urban residents with special needs, respectively. Lightweight fixtures and non-handle mechanics for opening panels or doors are beneficial for those who suffer from fine motor dysfunction and have low lifting, energy, and hand grip [6]. Open shelves with clear labeling can be considered to make items more apparent, allow individuals to efficiently locate goods, and provide an orderly in-home environment for those with limited vision [43].

Multifunctional furniture that serves several purposes and is flexible enough to accommodate the diverse needs and comfort preferences of users is suggested [49]. This can benefit users with limited budgets and space by saving both money and room for other necessities. When designing or selecting versatile furniture, the biomechanics and aging ergonomics of transfer positions should be considered, such as movements from lying down to sitting or standing up. These transitions can cause centers of mass imbalance in those who have poor sit-to-stand movements, like non-young and non-urban people with special needs. These transitions can potentially induce orthostatic hypotension, which is prevalent among the elderly as well [50].

Ergonomic furniture and management for working at home, such as adjustable desks and chairs, proper lighting, and cable management (to avoid tripping), can make workstations more comfortable and productive [51]. This can help maintain good posture and reduce the incidence of musculoskeletal and office syndrome symptoms. Furniture with rounded edges should be used to reduce unintended bumps and bruising [46], which can assist in safe movements and foster confident mobility throughout the space for those who are unaware of home hazards and may have certain anxieties and fears.

4.1.3. Flooring and Stepping Design

Smooth transitions between different flooring materials and levels should be created, and dangerous surfaces, such as those that are highly frictional and too slippery, should be avoided [43]. This eliminates tripping hazards for people who have abnormal gait patterns (e.g., cerebral palsy, multiple sclerosis, Parkinson's disease, and visual impairments [52]) and makes maneuvering less difficult for those who use wheelchairs and mobility supports. Tactile indications or textures, as well as contrasting hues, should be installed to designate potentially hazardous areas, such as those near staircases, level changes, and floor edges, in order to provide information about the surrounding settings and spaces. This helps guide existing areas and navigate pathways by providing more sensory features for people with visual problems [43,53]. Non-slip flooring materials should be placed in areas where moisture and wet conditions are likely to occur, such as bathrooms, kitchens, and areas close to windows, near exterior doors, and around washing and gardening equipment [43]. This can help reduce the risk of falls associated with a loss of postural balance among disabled people with mobility challenges, women, and those living in remote areas. Flooring that receives all-day sunlight must be specified and built with safe materials because it might generate heat buildup and burn the skin when unintentionally stepped on with bare feet. This should be carried out to protect those with special needs who may be unaware of or are unable to detect the temperature of the floor, such as those who have difficulties directing their stability, have lost foot sensation, or are blind [54].

4.1.4. Lighting Design

Lighting uniformity should be considered to provide clear visibility within the entire space, which, in turn, minimizes accents and shadows. This allows people with limited vision and mobility constraints to comfortably access the space, and those with cognitive disabilities can increase concentration via consistent designs, resulting in more correct responses [6]. Task lighting should be included in areas where precise actions occur, such as kitchen countertops and workstations [55], and dimmable or adjustable lighting elements should be utilized to accommodate functions, sensitivities, and personal preferences. This is carried out to ensure that people with visual problems can accomplish their tasks independently. Motion-activated lighting should be installed in corridors and other high-traffic areas [43]. This eliminates the need for manual switches, making nighttime navigation for people with limited mobility easier and more secure. Indoor lighting design that mimics natural daylight variations should be considered, which can influence circadian rhythm and behavioral activity. This helps improve physiological and mental health by guiding sleep–wake cycles and providing outside alternatives to those who may spend most of their time indoors [56], such as people with physical or mobility impairments or those who are paralyzed.

4.2. Strengths, Limitations, and Further Research

The present study has some strengths. This study represents the first investigation, to the best of our knowledge, in the field of interior design pertaining to people with special needs (eight distinct abilities) in Thailand. There were no reports from any of the participants indicating that the act of completing the questionnaires had any adverse consequences for their mental health, such as feeling stressed or exhausted. Nonetheless, the present study has some limitations. Due to the time restriction, the study had to collect data within the period of 2021–2022, which was the time when COVID-19 occurred, and it was limited in its methods for gathering data among sensitive groups. The figure references of the participants and their homes (e.g., images or drawings) were not disclosed in this study due to privacy concerns regarding the participants' rights and dignity [57,58]. The informed consent statement did not include this request to record and publish any type of image, which could have contributed more to the study's outcomes. The age range window among each group is not equal, with adults having the widest range compared to their younger and older peers. Compared to the other groups, the number of participants with multiple disabilities was relatively small, and those who have multiple disabilities appeared to be more vulnerable than others, which may have an impact on some of the results. The questionnaire completed by individuals other than the intended respondents (such as a relative, guardian, or representative) may yield inaccurate data. Although the impact of these consequences is anticipated to be minimal, it is important that further investigations be carried out with this consideration in mind. For a greater understanding of how design affects people's lives, future studies should consider undertaking visual documentation, in which participants voluntarily contribute photos, images, or video recordings of their activities (e.g., household chores, working, and community socializing) and living spaces (e.g., types of residence, quantity of areas, quality of existing, and its surroundings). Further research should also be balanced in order to be more equal in terms of age range windows and the sample size of each type of disability, and future studies should plan for long-term research to obtain a more comprehensive understanding of the impacts on interior design. Alternatively, each design recommendation provided in this study could potentially be investigated further as distinct topics to specify more precise features and interpretations.

5. Conclusions

Among people with special needs, there were disparities in physical abilities across ages, genders, and places of residence. In the context of the activities of everyday living within the homes, adult participants were found to be the most vulnerable group in addition to older participants compared to young participants. Male and urban participants had

better overall physical abilities but were limited in hand–arm movements compared to their female and non-urban counterparts. Moreover, in-home spaces where people with special needs can freely mobilize were associated with greater overall physical abilities, independence, and subjective health. This distinction should be taken into consideration when designing residential interiors since it is interconnected with the degree of mobility within home spaces as well as other physical abilities and an individual's subjective state of health. Based on the findings, design recommendations for both space and element features are proposed. The main suggestions are that the design should emphasize open planning with a non-complex layout, short and uncrossed circulations, resting spots for medium to long travel, built-in furniture with adjustable height, versatile furniture for multipurpose use, even and non-slip flooring, and lighting uniformity and harmony with natural light variations. These recommendations provide additional knowledge for creating residential spaces that require careful consideration. This knowledge can also be broadly applied to pre-aging and healthcare-built environments by using accompanying related criteria (e.g., inclusive design and aging ergonomics). A home's interior design that prioritizes mobility as an aspect of accessibility creates a functional and friendly environment that enhances the physical and mental well-being of its occupants. This promotes independence, boosts self-esteem, and instills confidence, thereby reducing dependence on caregivers or family assistance and mitigating the frustration, stress, and anxiety associated with navigating immobile conditions. For people with special needs, in-home mobility design enables them to age more comfortably and safely without the need for constant support or relocation to assisted living facilities while also maintaining their social connections and the feeling of belonging in their communities, thereby improving their overall quality of life.

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Informed Consent Statement: All participants and/or their parents or legal guardians received all the substantial information along with the questionnaire and gave their written, informed consent to participate in the present study prior to the measurement.

Data Availability Statement: The data reported in the present study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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