Thesis International Business Administration

The Impact Loneliness and Isolation has on Individuals with Mobility Limitations

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1. Introduction

1.1 Background

Artificial Intelligence (AI) has rapidly progressed in the healthcare industry, with applications varying from early disease detection to mental health support (Graham et al., 2019). As AI continues to evolve through the years, there is rising concern that it will increase feelings of loneliness and isolation among individuals with mobility limitations. These individuals commonly experience difficulties performing daily tasks, such as navigating and participating in activities (Sundar, 2016). As these challenges are encountered, AI has developed immensely and created tools for individuals with mobility limitations for accessible support. One of these tools is GenerativeAI which uses patterns to generate content for the user (Law, 2024). While the extent of effectiveness for these tools are undetermined, evidence has suggested that it can reduce feelings of loneliness and isolation.

Loneliness can be defined as the subjective desire of social needs which remains unachieved (Macia et al., 2021). Loneliness also identifies the state of being dissatisfied with the quality and also the amount of social interactions an individual might receive (Taylor et al., 2023). While loneliness may be a universal feeling, individuals with mobility limitations are most vulnerable due to a reduced sense of social engagement with society. According to Snell (2017), loneliness has increased drastically over recent decades, which is mostly driven by technological advancements, changes in family situations, and changes in social lifestyles (Snell, 2017). Social isolation on the contrary, is an objective condition, characterised by a lack of contact with the social world and a sense of social disengagement (Taylor et al., 2023). Both concepts have been associated with negative health effects, which lead to depression for individuals of all ages (Gilmartin et al., 2013, p. 56).

Compared to the general public, individuals with mobility limitations are more vulnerable towards situational barriers. These barriers are associated with poor physical health (Rasinaho et al., 2007). There is also an overextension level of support for these individuals who have mobility limitations which will lead to poorer health functionality (Latham et al., 2015). These individuals with mobility limitations lack significant interactions with other individuals. The support Generative AI presents is assistive technology for those, such as individuals with mobility limitations, who can approach these tools and systems as if these systems were humans (Malviya and Rajput, 2025).

The influence of GenerativeAI can reduce perceptions of loneliness and isolation. AI chatbots have been proposed as tools which can reduce perceptions of loneliness (Pani et al., 2024). One of these chatbots is the Conversational Agent. These agents are AI developed which can promote feelings of companionship and emotional support (Laranjo et al., 2018). Although, chatbots might intrerupt privacy, as well as the trust that is connected with these chatbots (Coghlan et al., 2023).

1.2 Research Objective and Research Gap

This study aims to investigate the extent to which AI technologies impact feelings of loneliness and social connectedness among individuals with mobility limitations. Furthermore, it seeks to compare AI-based support to human caregiving systems, assessing whether AI can be a substitute or if it lacks essential human elements. The research will address the following key questions:

To what extent does the use of AI impact feelings of loneliness and isolation among individuals with limited mobility?

Recent studies have confirmed that individuals who have been interrupted by mobility limitations have reported to experience a sense of loneliness and isolation due to the limited amount of connectedness with the outside world (Fakoya et al., 2020). Furthermore, there is a presence of generative AI with support towards individuals with mobility limitations, especially by means of conversational tools (Laranjo et al., 2018). However, there still remains a significant gap in studies done for individuals with mobility limitations, in addition, a conceptual idea of the consequences and the barriers these generative AI tools provide for these individuals also lacks (Milne-Ives et al., 2020). This study seeks to investigate the underexplored areas by focusing on how AI conveys emotional well-being.

2. Literature Review and Hypothesis

2.1 Loneliness and Isolation

As suggested in the introduction, individuals with mobility limitations often experience loneliness and social isolation. These circumstances are recognized as critical risk factors for unfavorable health outcomes and increased mortality within the healthcare industry(Fakoya et al., 2020).

Loneliness, in this context, refers to the perceived disconnect between desired and actual relationships, often the result of limited social connections (Yanguas et al., 2018). In contrast, social isolation is defined as the absence of social contact with individuals or certain social

environments (Shankar, 2023). Both experiences are closely connected to feelings of negative mental health outcomes, including depression and reduced quality of life (Shankar, 2023).

Furthermore, both loneliness and social isolation are linked to declining levels of cognitive functions, defined as the decline of mental functionality (Kiely, 2014), often evident among individuals with disabilities (National Academies of Sciences, 2020). For individuals with mobility limitations, these risks are especially enhanced by reduced access to social surroundings and engagement in society.

2.2 Challenges Associated with Mobility Limitation

Mobility limitation refers to physical impairment or movement disorder that significantly restricts an individual's ability to engage in social environments (Livingstone et al., 2014). Individuals with mobility limitations often come across barriers with navigating environments, which contributes to diminishing quality of life (Freiberger et al., 2020).

Past physical consequences, mobility limitations are also associated with cognitive difficulties, including reduced problem solving and reduced information processing(Harada et al., 2013). These cognitive challenges, that are discussed, are closely related to the outcome of loneliness. Research has shown that individuals with intellectual or cognitive impairments, often related to mobility limitations and old age, are linked to higher rates of loneliness (Emerson et al., 2020). Lower cognitive functionality can also drastically intensify emotions in social environments.

2.3 Generative AI and its Applications

Generative AI refers to a category of artificial intelligence capable of producing autonomous content, including text, audio, and images (Lv, 2023). In healthcare, Generative AI is increasingly being applied to support early disease detection and provide assistance to individuals with disabilities through digital tools (El Morr et al,. 2024).

One of the early developments in this space is the conversational agent: an AI-driven tool designed to replicate human interactions (Laranjo, 2018). These agents have shown to support user autonomy, as well as provide emotional support (Almufareh et al., 2024), particularly for individuals with mobility limitations.

Despite these advancements, concerns remain about the over-reliance these tools provide, disengagement from human interactions, and the potential loss of an individual's skills (Krakowski, 2025). For individuals already experiencing loneliness and isolation, these risks intense consideration for these threats.

2.4 Theoretical Approach

This study is rooted in the Socioemotional Selectivity Theory (Carstensen et al., 2003), which suggests that an individual's perception of time is limited, often due to circumstances of mobility limitations or aging, individuals prioritize emotional relationships (Löckenhoff & Carstensen, 2004).

For individuals with mobility limitations, shifting the need for meaningful emotional connections and recognition, this is what Carstensen refers to as ‘being known’ (Carstensen, 1992). Social disconnection, common among individuals with mobility limitations, can lead to a sense of emotional disruption (Gyasi et al., 2023). This theory provides insight for understanding how and why these individuals may seek need for emotional interactions, facilitated through AI.

Individuals with mobility limitations will often turn towards AI tools, not because they need to, but because it simply offers another emotional humanized experience. AI tools are already being used as virtual therapists, as well as offering new levels of support for these individuals (Swatheeshwaran & Swathi, 2025).

2.5 Ethical Approaches for AI

Although the main concerns still remain with privacy. Generative AI tends to gather personal information which could be exploited which knowledge of the individual. Furthermore, existing medical information can be overlooked and used without consent (Murdoch, 2021). This concern needs to be taken account of and used with precaution.

Generative AI tools are used to efficiently identify various patterns which humans can not identify themselves (Saeidnia et al., 2024). Although with these benefits, the consequences are various, with a large concern of the risk of private data being leaked, or the potential harm for individuals. These concerns can have a drastic effect on the development of these Generative AI tools.

2.6 Hypothesis

To answer the research question, “to what extent does the use of AI impact feelings of loneliness and isolation among individuals with limited mobility?”, two separate batches of hypotheses have been formulated based on the literature. These hypotheses how loneliness and social isolation are impacted by GenAI and mobility limitations: These hypotheses are as follows:

Loneliness:

Loneliness is an indicator for emotional wellness, and is a predictor for various health outcomes (Fakoya & Mccorry, 2020). An individual's emotional state declines as their social well-being is hindered, causing feelings of loneliness. Mobility limitations have significant effects on the well-being of individuals. Therefore, splitting the hypothesis into three different sections,

Hypothesis 1a: Higher levels of mobility limitations are positively associated with increased feelings of loneliness.

Hypothesis 1b: Usage of GenerativeAI (GenAI) is associated positively with levels of loneliness.

Hypothesis 1c: Usage of Generative AI moderates the association between mobility limitations and loneliness.

Isolation:

Generative AI has shown to promote social welfare and social connectedness (Shafik, 2024). Generative AI also includes tools for influencing social support, endorsing the concept of social companionship (Pani et al., 2020). For individuals who have been vulnerable to social isolation due to mobility limitations, technology as such can provide a valuable asset to support emotionally. Therefore, the following hypotheses associated with social isolation are as follows:

Hypothesis 2a: Higher levels of mobility limitations are positively associated with increased social isolation.

Hypothesis 2b: Usage of Generative AI is associated positively with levels of social isolation.

Hypothesis 2c: Usage of Generative AI moderates the relationship between mobility limitations and social isolation.

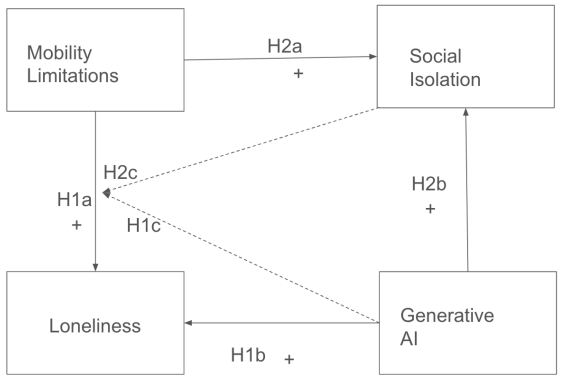

Figure 1(Hypothesis Model)

3. **Methodology**

3.1 Research Design

This study utilizes a cross sectional research approach, which is ideal to analyze data from a singular point in time (Wang & Cheng, 2020.) This approach will enable the exploration of the relationship between loneliness, isolation and GenerativeAI among individuals with mobility limitations. A survey-based methodology will be utilized, ensuring scalability for larger populations, and standardization for consistency (Lim, 2024).

3.2 Instruments for Methodology

3.2.1 UCLA Loneliness Scale

The UCLA loneliness was used to determine an individual's subjective perception. The scale includes a collection of statements that respondents will rate on the basis of their individual experiences. The scale includes: O(“I often feel this way”), S(“I sometimes feel this way”), R(“I rarely feel this way”), and N(“I never feel this way”) (Russell et al., 1980). Each response will be rated on a scale from 0(“I often feel this way”) to 3(“I sometimes feel this way”) in corresponding order, this ensures straightforward data collection and analysis. Lower scores indicate less loneliness and high scores indicate higher levels of loneliness.

The scores identified for the UCLA loneliness score was calculated by summing up all individual scores for each individual who participated. The scores were treated as continuous numerical variables. Furthermore, this tool was applied due to the ease of use for participants to answer various questions. The reliability factor also applies as these questions suggest the level of loneliness for an individual.

3.2.2 Lubben Social Network Scale

The Lubben Social Network Scale will be used to assess individuals objective aspects, this includes individuals social relationships (Lubben et al, 2006, 504). Respondents will rate the frequency of social contacts with relatives and friends on a scale ranging from 0(no engagement) to 5(frequent engagement). Although the scores originally ranged from 0 to 5 (Lubben et al, 2006, 504), adapting this to 0(no engagement) to 3(frequent engagement), matching the UCLA Loneliness Scale, which enhances consistency with data collection. Lower scores indicating less frequent social interactions and high scores indicating higher social interactions.

Furthermore, the scores calculated for the Lubben Social Network Scale applied the use of continuous numerical variables. The variable was summed up from each frequency score. The Lubben Social Network Scale was applied due to the fact that the questions simply suggest the levels of social connections an individual has.

3.2.3 Generative AI Usage and Literacy

The generative usage scale will focus on a 5-item digital attachment scale, which extends to the AI (DAI) scale produced by Morales (2023). This focus on the Dependence of Artificial Intelligence, which ultimately concentrates on the emotional dependence of these AI systems. Participants also self-reported their AI frequency

through the use of a questionnaire. The score is calculated summing up the total numerical scores of each individual question. Each score identified will then be summed up for that individual, furthermore, the score will then be summed up and added up for a total score.

The Generative AI literacy scale generally focuses on chatbots as tools, as well as the communication that these AI systems engage in (l et al., 2024). The core concepts underlined in the study investigate the use of these GenAI tools, as well as evaluating the reliability of these tools. Investigating the use of these tools and distinguishing the effects that these GenAI tools have towards society (Gokcearslan et al., 2024).

Furthermore, GenAI usage and GenAI literacy was summed up using a 5-point scale. Both scales applied a continuous numerical variable to identify the summed up score. These scales were applied to understand the level of usage for Generative AI tools, as well as the levels of knowledge an individual has with Generative AI.

3.2.4 Mobility Limitations

The mobility limitations score was calculated using a binary method, where individuals were scored based on if they had mobility limitations(score of 1), and if they did not have mobility limitations(score of 0). These scores were then summed up to find a final numerical score.

The scale was applied for mobility limitations, considering that individuals can easily self-associate themselves as having mobility limitations.

3.3 Sample

To determine the right number of sample sizes, applying G-power indicates the necessary amount of sample size needed for the survey (Heinrich Heine Universität Düsseldorf, 2020). The G power was calculated identifying how many variables were needed, for this instance it was five. Identifying which test was necessary for the analysis, for this instance, it was applying a regression analysis. Furthermore, to analyze how much power was necessary, meaning the probability of accurately rejecting the null hypothesis, or in other words the chances of a type II error occuring (Kang, 2021). The final scale came to 150 participants.

3.3.1 Control Variable

Age:

Age will be considered as a control variable. Participants will be grouped into various different categories: 18-24, 25-29, 30-39, 40-49, 50-59, and 60+. Research indicated by Blacnflower and Oswald in 2004, life satisfaction declines when an individual reaches middle age. It rises again when an individual reaches older ages (Bartram, 2020). This could influence feelings of loneliness and isolation, making it a crucial factor for the analysis. (Padmanabhan Unni & Pretorius, 2021). This control variable could be a good indicator in individuals' perception of loneliness and isolation.

Furthermore, the score for age was calculated based on categorical age groups(18-24, 25-29, etc…). These categorical values were treated as dummy variables, which would base each individual in their own category. This would also help test the effect of these different age groups on loneliness.

Personality:

Personality traits, particularly neuroticism and openness will be considered as key characteristics for control variables. Studies done by Zautra et al (2005) indicated that individuals who perceive neuroticism may experience “heightened reactivity to stress”(Buecker et al, 2020). These heightened feelings lead to increased levels of loneliness. In contrast, individuals with higher levels of openness were reported to have lower levels of loneliness due to the amount of social engagement (Schutter et al., 2020). These traits will be examined to see the relation with loneliness and the usage of GenerativeAI.

The scales used to test the Big Five personality traits were used with Ten-Item Personality Inventory. This scale is used to simply measure an individual's personality, applying the use of the Big Five dimensions (Gosling et al., 2003). The scale is used to identify the Big Five dimensions, extraversion, agreeableness, neuroticism, conscientiousness, and openness. This helps identify a self-reported measure to assess one's personality.

The scales used for the Ten-Item Personality Inventory was the use of the Likert scale, which applied a scale from 1-7(disagree strongly - agree strongly). Each different trait was assessed categorically, and then summed up applying a continuous numerical variable method. This ensured that each variable was summed up in their appropriate categories to assess the effects of all different traits. Two sets of items(questions) were summed up for each individual.

3.4 Data Collection Procedure

Data will be collected evaluating ethical guidelines when using data from other individuals. Participants will be assured that data will be secure and remain private at all times.

Data will be collected via an online survey, using Qualtrics, distributed to individuals who meet the necessary criterias. The survey will begin by first confirming the participants age(18 or older) and self identify as having mobility limitations, ensuring guidelines are met.

Furthermore, there will be questions taken from the Ten-Item Personality Inventory, for individuals to self assess their personality.

Following this, the questionnaire will introduce questions regarding the UCLA loneliness Scale. Questions will consist of subjective feelings of loneliness, such as emotional disconnection with society, or a sense of social isolation. Questions stating, 'I feel disconnected from society,' or 'I feel alone,' will be rated based on the UCLA loneliness scale from 'N' (Never) to 'O' (Often).

After completing the UCLA loneliness scale, the survey proceeds with the Lubben Social Network Scale section. This section focuses on the objective feeling of isolation and loneliness, specifically on social connections with close relatives and friends. Questions will consist of, "How many times do you see your relatives in a week?", or "how many close friends do you have?" This will give insight on the levels of social connection an individual might possess.

Furthermore, the following section will provide insight to the attitudes participants have towards AI technology. Questions in this section will include individuals thoughts and feelings towards AI, as well as their attitudes towards the use of AI tools. The scales used for both GenAI usage and literacy will use a scale from 0(Never) to 4(Very Often).

Respondents will answer these questions based on numbers ranging from 0 to 3, incorporating both the Lubben Social Network Scale and the UCLA loneliness scale. The findings will identify the relationship between individuals with mobility limitations, experiencing isolation and loneliness.

3.5 Data Analysis

Data analysis will be conducted through the use of R studio to test the relationships described in the hypotheses. To explore the relationships between loneliness and AI usage, as well as isolation and AI usage, a t-test will be applied. T-test is a statistical test which compares two different means, in this case loneliness and AI usage, as well as isolation and AI usage (Kim, 2015).

To efficiently investigate the relationship between both loneliness and isolation to Generative AI, a regression analysis will be applied. The regression analysis is particularly useful when examining the influence of the independent variable(AI usage) compared to the dependent variable(loneliness and isolation) (Ali & Younas, 2021). Assumptions regarding linearity will be tested to ensure that there will be validity in the results.

Assumptions for the t-tests and regression analysis were checked by applying visual analysis of residuals, and the use of visual Q-Q plots. The assumptions were analyzed using R^2 and adjusted R^2, which ultimately investigates if the dependent variable is true (Chen and Qi, 2023). In advance, no major violations were detected through the analysis.

4. Results

The section identifies the statistical analysis used to examine the relationships between mobility limitations, loneliness, social isolation and Generative AI. Descriptive statistics were applied to identify the mean and standard deviation of loneliness, social isolation and Generative AI usage compared to the different mobility limitation categories. A correlation analysis was reported, as well as a regression analysis to test the given outcomes of the hypotheses.

4.1 Respondents Demographic

Table 1 presents the demographics of the study with the participants (N=151), although not all participants have mobility limitations. Various age groups and individuals who self-identified their level of mobility limitations.

Table 1: Respondents' Demographics (N=151)

	Frequency	Percentage
Age		
18-24	92	60.53
25-29	27	17.76
30-39	13	8.55
40-49	10	6.58
50-59	6	3.95
60+	3	1.97
Mobility Limitation		
No	114	75.00
Prefer not to say	2	1.32
Yes, mildly affects daily activities	17	11.18
Yes, moderately affects daily activities	11	7.24
Yes, significantly affects daily activities	7	4.61

4.2 Correlation

Table 2 showcases the Pearson correlation coefficients. The given variables showcased(table2) were seen as core variables for the study (Appendix for full). A notable identification in the correlation table was found between Generative AI usage and loneliness. The relationship demonstrated a positive correlation of 0.35, indicating that higher loneliness is associated with greater usage of Generative AI. On the contrary, Generative AI literacy was shown to have weak and negative correlation with loneliness (r=-0.053), indicating a weak relationship..

Furthermore, the Lubben Social Network Scale correlated negatively with loneliness (r=-0.51), which showcased that increased social contact does indeed reduce feelings of loneliness. Additionally, the use of Generative

AI and Lubben Social Network Scale were similarly shown to have a weak correlation (r=-0.19), increased social contact reduces Generative AI usage.

Table 2: Correlation

	1	2	3	4
Generative AI Usage	1.00			
Generative AI Literacy	0.17	1.00		
UCLA Loneliness Scale	0.35	-0.053	1.00	
Lubben Social Network Scale	-0.19	0.17	-0.51	1.00

4.3 Hypothesis 1: Loneliness

4.3.1 Hypothesis 1a: The Relationship Between Mobility Limitations and Loneliness

Reflecting on the first hypothesis(H1a) for Loneliness, "*Higher levels of mobility limitations are positively associated with increased feelings of loneliness."* This hypothesis was supported, as a significant positive association was identified ($\beta = 10.606$, $p < 0.05$). This suggests that individuals with mobility limitations are more likely to experience feelings of loneliness. This indicates that there is a substantial increase in loneliness for individuals who perceive loneliness. Although when determining the p value < 0.05, it suggests that there is statistical significance and evidence that there is an effect.

4.3.2 Hypothesis 1b: The Relationship Between Generative AI and Loneliness

Furthermore, reflecting on the second hypothesis(H1b), *"Usage of GenerativeAI (GenAI) is associated positively with levels of loneliness."* This hypothesis was supported as well, indicating that Generative AI has a positive association with loneliness ($\beta = 1.076$, $p < 0.001$). This association indicates that individuals who use Generative AI tools more frequently, report higher levels of loneliness. When determining the p value < 0.001, there is strong statistical significance, as well as there being strong evidence that Generative AI affects loneliness.

4.3.3 Hypothesis 1c: The Moderating Effect of GenAI Usage on Mobility Limitations and Loneliness

Finally, reflecting the third hypothesis(H1c), *"Usage of Generative AI moderates the association between mobility limitations and loneliness,"* The interaction between GenAI usage and mobility limitation show no significant relation ($\beta = -0.544$ $p > 0.05$) towards loneliness. This indicates that Generative AI does not moderate the relationship between individuals with mobility limitations and loneliness. The relationship between the moderation of Generative AI and the variables mobility limitations and loneliness perceive to have no change in the association and does not influence the variables. Furthermore, when determining the p value > 0.05, it suggests that there is weak evidence and no statistical evidence of this association.

4.4 Hypothesis 2: Social Isolation

4.4.1 Hypothesis 2a: The Relationship Between Mobility Limitations and Social Isolation

Reflecting on the first hypothesis(H2a) for social isolation, *"Higher levels of mobility limitations are positively associated with increased social isolation."* The association analyzed was not significant between individuals with mobility limitations and social isolation ($\beta = -1.371$, $p > 0.05$). This indicates the individuals with mobility limitations do not predict social isolation when applying the LSNS-6. Determining the p value > 0.05, suggests that there is weak statistical significance and weak evidence of an association.

4.4.2 Hypothesis 2b: The Relationship Between Mobility Limitations and Social Isolation

Furthermore, reflecting on the second hypothesis(H2b), *"Usage of Generative AI is associated with levels of social isolation."* Additionally, there was significant association found, but weak association between Generative AI usage and social isolation ($\beta = -0.110$, $p < 0.05$). This suggests that Generative AI usage does not impact social isolation. This relationship suggests that there are low levels of influence between the variables, although it does suggest that Generative AI does influence lower levels of social isolation. Furthermore, determining the p value < 0.05, suggests that the relation is statistically significant and that there is evidence of an association.

4.4.3 Hypothesis 2c: The Moderating Effect of GenAI Usage on Mobility Limitations and Social Isolation

Finally, the third hypothesis(H2c), *"Usage of Generative AI moderates the relationship between mobility limitations and social isolation."* There was no significant association identified (-0.062, $p > 0.05$). Indicating the moderation of Generative AI usage does not impact the relationship between mobility limitations and social isolation. This suggests that both mobility limitations and GenAI have an impact on social isolation within the given sample size. Determining the p value > 0.05, showcases a weak statistical significance, as well as there being weak evidence of an association.

Table 3: Regression Analysis

Variable	Loneliness (UCLA Score) (1)	Social Isolation (Lubben Score) (2)
Constant	21.355 (10.299)	8.330*** (2.514)
Mobility Limitations	10.606* (4.926)	-1.371 (1.202)
GenAI Usage	1.076*** (0.272)	-0.110* (0.066)
Extraversion	-0.649** (0.289)	-0.110 (0.066)
Agreeableness	0.699* (0.289)	-0.054 (0.090)
Conscientiousness	-0.023 (0.363)	0.018 (0.089)
Neuroticism	0.476 (0.469)	-0.029 (0.114)
Openness	-0.688 (0.443)	0.124 (0.108)
Age	-0.046 (0.090)	-0.038* (0.022)
GenAI Literacy	-0.215 (0.232)	0.009 (0.057)
Mobility × GenAI Usage	-0.544 (0.569)	-0.062 (0.139)
Low AI Literacy	-3.346 (2.547)	-0.279 (0.622)
R2/Adjusted R2	0.307/0.252	0.243/0.183

4.5 Control Variables

The effects of the control variable age were found to have no significant effect on loneliness ($\beta = -0.046$, $p > 0.05$) and social isolation ($\beta = -0.038$, $p < 0.05$). This indicates that age does not have a significant impact on loneliness and social isolation. The p value for loneliness and age($p > 0.05$) showcases that there is weak evidence of an association. However, the association for social isolation and age($p < 0.05$) demonstrates that there is evidence of an association.

Furthermore, personality traits showcase some significant effects on loneliness and social isolation. Personality trait of Extraversion was identified to be associated negatively with loneliness ($\beta = -0.649$, $p < 0.01$), supporting the idea that individuals who are more outgoing/extraverted will not be hindered by feelings of loneliness. The p value for the relationship between loneliness and extraversion($p < 0.01$), showcases that there is very significant statistical evidence of an association.

Additionally, personality trait agreeableness was significantly associated with loneliness ($\beta = 0.699$, $p < 0.05$). The idea that one can be imaginative can lead to an individual being more lonely. When observing the p value < 0.05, the relationships identified that there is statistical evidence of an association.

Furthermore, a weak association was identified with individuals with openness and loneliness ($\beta = -0.688$, $p > 0.05$). Although the relationship between social isolation and openness was found to be positively associated ($\beta = 0.124$, $p > 0.05$). This indicates that higher openness reduces loneliness, however higher openness can lead to higher social isolation. For both relationships, the p value identified was greater than 0.05, which indicates that there is no statistical significance of the relationship for both variables with personality trait openness.

4.6 Descriptive Statistics

The descriptive analysis will be shown below with table 4. The descriptive analysis identifies the significant variables, GenAI usage, UCLA loneliness scale, and Lubben Social Network Scale. These individual variables were tested compared to different mobility groups, significant, moderate, mild, and no mobility limitations. The scores identified in the analysis were the added up scores of all questions which ranged from 0-3 and 0-4. These questions were then added up to identify a final score for each participant.

Table 4 suggests that as the severity of mobility limitations increases, the levels of loneliness increases as well (15.8 to 25.0). A similar relationship was observed with the use of Lubben Social Network Scale, suggesting that as severity of mobility limitations increase, the amount of contact an individual receives decreases (8.62 to 5.29). Furthermore, the usage of Generative AI increases as mobility limitations also increase (7.12 to 9.57).

Figure(10) in the appendix, is a visualized version of table(4), suggesting that UCLA loneliness scale has the greatest effect on individuals. This relationship is also seen with the use of the Lubben Social Network Scale.

Table 4: Descriptive Analysis

Measure	No limitation	Mild	Moderate	Severe
N	114	17	11	7
UCLA Mean	15.8	23.4	24.4	25.0

UCLA SD	11.0	12.6	9.60	7.57
Lubben Social Mean	8.62	6.88	6.18	5.29
Lubben Social SD	2.56	2.71	2.04	1.60
GenAI Usage Mean	7.12	7.18	8.18	9.57
GenAI Usage SD	3.33	2.98	3.22	4.79

4.7 Scale Validation

4.7.1 Cronbach's Alpha

To test the reliability of the scales, Cronbach's Alpha was measured in (table 4 appendix). The Cronbach's Alpha measures consistency of the scale, investigating if all items in the test are the same scale (Tavakol and Dennick, 2011). The alpha for UCLA loneliness scale showed $\alpha = 0.94$ which showed excellence consistency. Generative AI Usage ($\alpha = 0.75$) showed good, and LSNS-6 ($\alpha = 0.82$) showed good on consistency scale as well.

4.7.2 Factor Analysis

Factor analysis is applied to simply understand the relationships between different factors, in this case, the question gathered for each variable (Tavakol and Wetzel, 2020). The factor analysis supported the idea that there was singularity across all scales (Table 5.1-5.4 in appendix).

4.7.3 Kaiser-Meyer-Olkin Measure

To efficiently gather information from the Kaiser-Meyer-Olkin Measure, the factor analysis has to be used. Furthermore, the Kaiser-Meyer-Olkin measures the level of adequacy for each different variable (Kaiser, 1974). The KMO measures the adequacy of 0.60, indicating a minimal acceptability(table 6 appendix).

5. Discussion

This study examined whether there was a relationship between social isolation and mobility limitations, as well as between loneliness and individuals with mobility limitations. The research was divided into two different sets of hypotheses, targeting loneliness and social isolation. The results suggested that there was a significant relationship between mobility limitations and increased feelings of loneliness. Although the relationship that social isolation had was not prominent.

Analyzing the first hypothesis collectively, revealing that loneliness has a significant effect on mobility with a beta coefficient of 21.355. Although GenAI usage and GenAI literacy(high and low) showed negative effects with beta coefficient values of -0.215 and -3.346 respectively. Individuals with high GenAI literacy rates showcased a negative effect, suggesting that these individuals are less affected by loneliness. Similarly for GenAI low literacy rates, it showed a significant low effect of -3.346. Although the opposite might be expected, this could be that GenAI does not have a significant effect on these individuals.

Analyzing the effect of social isolation, in the second hypothesis, results suggest a weak relationship between social isolation and other variables. The variables of GenAI usage (-0.110), GenAI literacy rates(low and high: 0.009 and -0.279), and mobility limitations(-1.371), show no sign of correlation or significance. The low coefficients for social isolation could be influenced by the lack of relation between the variables. The lubben social network scale(LSNS-6) focuses on social networks in society, it does not capture the general concept of emotional connectedness and the influences brought by factors such as GenAI or mobility limitations.

5.1 Comparison to Other Research

The findings align with previous literature,where individuals who overuse GenAI tools have increased feelings towards loneliness. Research done by Liao et al.(2025) demonstrated that Gen AI dependency increased loneliness. The reasoning behind this was that individuals who overused phones, may have felt distant from others, which caused feelings of loneliness (Liao et al., 2025). In comparison to the research, the suggestion that individuals who are dependent on GenAI tools suggest increased levels of loneliness. This is comparable with research done here where both suggest that loneliness increases as GenAI increases.

Furthermore, a study done by Moeyersons et al.(2022), discussed the experiences aging individuals had with mobility limitations, reported feelings of social isolation and loneliness. The core responses from the research examined that individuals had losses of functionality due to mobility limitations. The concept of a 'shrinking world,' reflects the barriers individuals with mobility limitations face (Moeyersons et al., 2022). In comparison to the research that was done, both examine that individuals feel more isolated when having mobility limitations. However, the research (Moeyersons et al., 2022) examined a closer relationship elderly individuals had with social isolation and loneliness, and the effect of having mobility limitations.

6.1 Interpretation of Results

The results suggested in the regression table have shown that individuals with mobility limitations have in fact been hindered by feelings of loneliness (β=10.606). This relation was interpreted by Moeyersons et al.(2022), which identified that there was a relation towards individuals who were aging and who were in care homes were constrained due to their mobility limitations. In relation to this research, individuals who have mobility limitations feel a necessity to have human interactions.

Applying the Socioemotional Selectivity Theory (Löckenhoff & Carstensen, 2004, 1396), suggests that individuals prioritize emotional connections due to constraints of time. In relation to this research, individuals with mobility limitations have heightened feelings of loneliness which aligns with the concept of the Socioemotional Selectivity Theory. Mobility limitations might hinder the access of interactions with other individuals. Furthermore, the relation between the effects of loneliness and Generative AI, and Social isolation and Generative AI suggest this concept of an AI companionship may not effectively substitute human interactions. As social isolation suggests a negative relation(β=-0.110) and loneliness showcasing a positive(β=1.076) this indicates that both do not realistically play a role in hindering social isolation and loneliness. When identifying the relation between loneliness and Generative AI, it suggests that human interactions are irrepressible, and that human interactions will always bring more meaning.

6.1.1 Contribution to Theory

When studying table(3), the results of the regression table suggest that individuals with mobility limitations are significantly linked to levels of loneliness (β = 10.606). Research done by Emerson et al(2013), suggests that these cognitive impairments, such as mobility limitations, are linked to levels of loneliness, which can be seen by the results of the survey.

The link made with Generative AI and loneliness can be made that these tools can harness feelings of loneliness(β=1.076). As suggested by Krakowski(2025), the overreliance of these tools can harness feelings of loneliness. Excessive use of Generative AI tools can lead to diminishing levels of social connectedness,

A comparison between GenAI literacy and feelings of loneliness and social status are associated with negative experiences. The analysis suggests that GenAI literacy and social disconnections contribute to negative feelings of loneliness and social isolation (β=-3.346 and β=-0.279). In relation to the study, the suggestions made by Gokcearslan et al(2024), showcases the use of these Generative AI tools and their effects on society. As shown above, the effect of lower rates of GenAI literacy, which showcase the understanding of these tools, have a negative impact on loneliness and social isolation. It suggests that there is a correlation between limited knowledge of Generative AI tools and diminishing levels of loneliness and social isolation.

6.2 Practical Implications

The study suggests several practical implications that individuals with mobility limitations might be less likely to be influenced by loneliness and social isolation if they were closer to human-like interactions. Individuals might seek closer relations from family members, this could hinder the process of social isolation as shown from the regression table(table 3). The greatest concern was shown to be that these individuals have less social connections than others due to their social barriers (Skiba, 2019, 151). To support these individuals, it is essential to develop care systems that would influence social interactions. Creating such opportunities would reduce loneliness and social isolation.

Furthermore, the use of Generative AI could be used to create senses of belongingness and hinder feelings of loneliness and social isolation. GenAI tools have the potential to remove circumstances related to loneliness and social isolation. Furthermore, GenAI can provide basic support systems to individuals who seek support (Van Meter et al., 2025). GenAI could also support social interactions for individuals requiring this support. Furthermore, there still needs to be humanized interactions between individuals. As stated by Krakowski(2025), he suggested that harnessing these tools could reduce an individual's ability to complete tasks, as well as the loss of meaningful interactions. The use of Gen AI needs to find the balance between support, as well as the need for constant uprising of interactions between individuals in need.

6.3 Limitations and Future Research

This research faced multiple limitations. The most significant was the limited number of individuals who self recognize themselves as having mobility limitations. This impacted the reliability of the findings. Having data collected from hospitals of care homes could have improved research outcomes.

Furthermore, the sample sizes of underrepresented ages that were older than 40 years old. Loneliness and social isolation among these individuals were not represented correctly due to the fact that many of these individuals were from pre existing connections from friends and families. Future studies would benefit from sampling individuals who were close friends and relatives to sample accurate data from each age group.

Another issue identified was the disproportionate sample sizes of age groups. Age groups 18 to 24 were over represented. The research would have benefited from balancing out different age groups which would have

provided better insights to how these different populations are affected by loneliness and social isolation.

Finally, future research would benefit from incorporating qualitative research, such as open-ended questions regarding loneliness. This would capture a bigger picture of how individuals feel about situations regarding loneliness. Numeric scales, such as the UCLA loneliness scale ('N' Never, or 'O" Often) do not fully capture the experiences individuals have. Qualitative approaches could create richer data collection on how individuals with mobility limitations perceive senses of loneliness and social isolation (Russell et al., 1980).

7. Conclusion

The study, based on the research question, *"to what extent does the use of AI impact feelings of loneliness and isolation among individuals with limited mobility?"* suggest that the results from both hypotheses analyze that the higher an individual's mobility limitation is, the greater the loneliness levels are. Furthermore, the usage of Generative AI was weakly associated with social isolation, although positively associated with loneliness. This could reflect that individuals turn to AI tools when they experience loneliness.

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Appendix:

"During the preparation of this work, Sam E.G. Janssen used Chatgpt for the structure and help with grammar. After using this tool/service, I thoroughly reviewed and edited the content as needed, taking full responsibility for the final outcome."

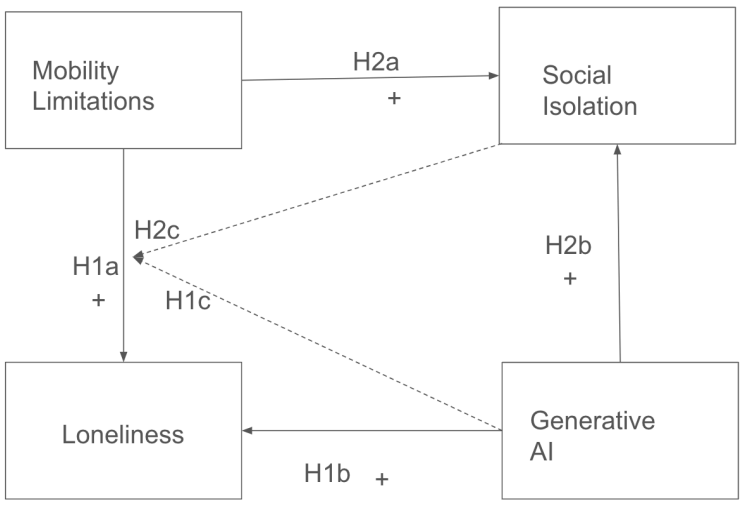

Figure 1

Table 3: Correlation

	Generative AI Usage	Generative AI Literacy	UCLA Loneliness Scale	Lubben Social Network Scale	Ten-Item Personality	Age	Mobility Limitations

					Inventory		
Generative AI Usage	1.00	0.17	0.35	-0.19	0.035	-0.050	0.089
Generative AI Literacy	0.17	1.00	-0.053	0.17	0.43	-0.29	-0.24
UCLA Loneliness Scale	0.35	-0.053	1.00	-0.51	0.012	-0.048	0.30
Lubben Social Network Scale	-0.19	0.17	-0.51	1.00	0.15	-0.17	-0.35
Ten-Item Personality Inventory	0.035	0.43	0.012	0.15	1.00	-0.072	-0.25
Age							
Mobility Limitations	-0.050	-0.29	-0.048	-0.17	-0.072	1.00	0.17
	0.089	-0.24	0.30	-0.35	-0.25	0.17	1.00

Table 4: Descriptive Analysis

Measure	No limitation	Mild	Moderate	Severe
N	114	17	11	7
UCLA Mean	15.8	23.4	24.4	25.0
UCLA SD	11.0	12.6	9.60	7.57
Alpha = 0.82				
Lubben Mean	8.62	6.88	6.18	5.29
Lubben SD	2.56	2.71	2.04	1.60
Alpha = 0.94				
GenAI Mean	7.12	7.18	8.18	9.57
GenAI SD	3.33	2.98	3.22	4.79
Alpha = 0.75				

Table 5.1: UCLA Loneliness Scale

Question	**MR1**	**h2**	**u2**
Question 52	0.61	0.38	0.62

Question 53	0.68	0.47	0.53
Question 54	0.73	0.54	0.46
Question 55	0.74	0.55	0.45
Question 56	0.74	0.54	0.46
Question 57	0.74	0.55	0.45
Question 58	0.73	0.53	0.47
Question 59	0.74	0.55	0.45
Question 84	0.74	0.55	0.45
Question 85	0.73	0.53	0.47
Question 86	0.67	0.45	0.55
Question 7	0.59	0.35	0.65
Question 8	0.67	0.45	0.55
Question 9	0.59	0.35	0.65
Question 10	0.76	0.58	0.42
Question 11	0.75	0.56	0.44
Question 12	0.68	0.46	0.54
Question 13	0.61	0.37	0.63

Table 5.2: GenAI Literacy Scale

Item	MR1	h^2	u^2
Question 69	0.45	0.1988	0.80
Question 70	0.41	0.1689	0.83
Question 71	0.73	0.5264	0.47

Question 72	0.68	0.4641	0.54
Question 73	0.74	0.5510	0.45
Question 74	0.84	0.7066	0.29
Question 75	0.76	0.5810	0.42
Question 76	0.37	0.1401	0.86
Question 77	—	0.0089	0.99
Question 78	0.31	0.0981	0.90

Table 5.3: 10-Item Personality Inventory

Item	MR1	h^2	u^2
Question 35	0.54	0.2886	0.71
Question 36	—	0.0437	0.96
Question 37	0.66	0.4354	0.56
Question 38	—	0.0020	1.00
Question 39	0.59	0.3493	0.65
Question 40	—	0.0003	1.00
Question 41	0.57	0.3207	0.68
Question 42	—	0.0133	0.99
Question 43	0.42	0.1770	0.82
Question 44	—	0.0027	1.00

Table 5.4: Lubben Social Network Score

Question	MR1	h2	u2
Question 14	0.68	0.46	0.54
Question 15	0.71	0.51	0.49
Question 16	0.64	0.41	0.59
Question 17	0.65	0.42	0.58

Table 3: Regression Analysis

Variable	Loneliness (UCLA Score) (1)	Social Isolation (Lubben Score) (2)
Constant	21.355 (10.299)	8.330*** (2.514)
Mobility Limitations	10.606* (4.926)	-1.371 (1.202)
GenAI Usage	1.076*** (0.272)	-0.110* (0.066)
Extraversion	-0.649** (0.289)	-0.110 (0.066)
Agreeableness	0.699* (0.289)	-0.054 (0.090)
Conscientiousness	-0.023 (0.363)	0.018 (0.089)
Neuroticism	0.476 (0.469)	-0.029 (0.114)
Openness	-0.688 (0.443)	0.124 (0.108)
Age	-0.046 (0.090)	-0.038* (0.022)
GenAI Literacy	-0.215 (0.232)	0.009 (0.057)
Mobility × GenAI Usage	-0.544 (0.569)	-0.062 (0.139)
Low AI Literacy	-3.346 (2.547)	-0.279 (0.622)
R2/Adjusted R2	0.307/0.252	0.243/0.183

Table 6: Kaiser-Myer-Olkin

Variable	KMO Value
GenAI Usage	0.59
Gen AI Literacy	0.58
Personality	0.55
UCLA Loneliness	0.65
Lubben Social Network	0.54
Age	0.49
Mobility Limitations	0.76

Overall MSA	0.60

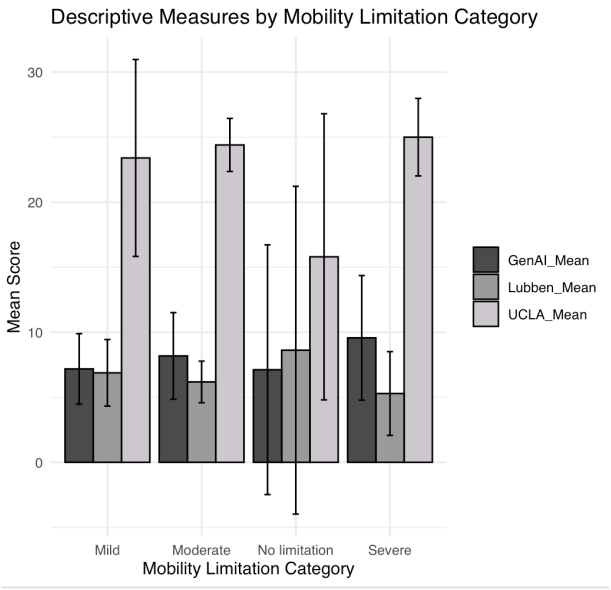

Figure 2:

Table 7: Appendix Table

Variable	**Description**	**Operationalization**
mobility_limitation_score	The score of Question5(Do you consider yourself to have a mobility limitation that affects your daily activities?)	Binerary(0 = no mobility limitations, 1 = yes mobility limitations)
mobility_genai_usage	The interaction between mobility limitations and Generative AI usage	This was done applying a continuous numeric method
Extraversion	Ten-Item Personality Inventory personality trait	Categorically to assess each trait individually, then numerically summing up
Agreeableness	Ten-Item Personality Inventory personality trait	Categorically to assess each trait individually, then numerically summing up
Neuroticism	Ten-Item Personality Inventory personality trait	Categorically to assess each trait individually, then numerically summing up
Conscientiousness	Ten-Item Personality Inventory personality trait	Categorically to assess each trait individually, then numerically summing up
Openness	Ten-Item Personality Inventory personality trait	Categorically to assess each trait individually, then numerically summing up
age_numeric	Age which had to do with categories(18-24, 25-29,30-39, 40-49,50-59, & 60+). This was placed into different categories(21.5, 27.5…)	Categorically where each different age was put into a category
age_total	Used to measure the amount of numbers in the sample	Done numerically to add all the samples together
literacy_age	Variable of Generative AI literacy compared to age	This was done categorically to determine each score for each age
usage_age	Variable of Generative AI usage compared to age	This was done categorically to determine each score for each age
ucla_age	Variable of UCLA loneliness compared to age	This was done categorically to determine each score for each age

lubben_age	Variable of Lubben Social Network compared to age	This was done categorically to determine each score for each age
ucla_score	This was the total score gained from the variable UCLA loneliness score.	This was done numerically where the finally score was the sum of each individual
model_loneliness	Model used to create the regression analysis for the regression table(3)	This was done applying all variables above, categorically and numerically
lubben_score	This was the total score acquired from the variable Lubben Social Network score.	This was done numerically where the finally score was the sum of each individual
model_lubben	Model used to create the regression analysis for the regression table(3)	This was done applying all variables above, categorically and numerically
genai_usage_score	This was the final score acquired from the variable Generative AI usage	This was done numerically where the finally score was the sum of each individual
genai_literacy_score	This was the final score acquired from the variable Generative AI literacy	This was done numerically where the finally score was the sum of each individual