Would Robot Caregivers Be Welcomed by Older Individuals?*

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September 10, 2026

Abstract

Population aging and shortages of long-term care workers have increased interest in caregiving robots and information and communication technology (ICT). This paper provides novel large-scale evidence on older individuals' perceptions of such technologies, drawing on a custom-designed internet survey of 4,314 Japanese individuals aged 55 to 75. Respondents choose between two otherwise identical nursing homes: one in which all care is provided by human caregivers, and one in which robots and ICT are used to provide a substantial share of care in one randomly assigned domain (communication, monitoring, or mobility assistance), while other care remains human-provided. A majority of respondents (65 percent) prefer nursing homes where robots and ICT are used. Acceptance differs substantially across care domains: It is highest for mobility assistance, intermediate for monitoring, and lowest for communication. The average willingness to pay (WTP) for a nursing home where robots and ICT provide a substantial share of care is sizable, at 8 percent above the typical nursing home fee. Prior awareness of caregiving robots is positively associated with both acceptance and WTP, pointing to the potential role of information in shaping older individuals' preferences. Acceptance and WTP are also strongly associated with sentiments toward robots and ICT expressed in attitude questions, providing support for the internal consistency of survey responses. A back-of-the-envelope calculation offers suggestive evidence that the benefits of introducing robots and ICT can be much larger than the costs, in particular for mobility-aid robots.

Keywords: Long-term care, caregiving robots and ICT, nursing homes, survey.
JEL Codes: I10, J14

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*This work was supported by the Egashira Fund; the Kurata Grant; the Policy Research Center Grant from the National Graduate Institute for Policy Studies (GRIPS); the Alumni Association Academic and Educational Grant and Research Design Grant from Seikei University; and JSPS KAKENHI Grant Number 24K00259. The authors are grateful to Yuichi Kobaru from the Oita Prefecture Social Welfare Council for his helpful comments on our survey questionnaire. We appreciate the seminar and conference participants at Puli Christian Hospital, National Chi Nan University, the 2026 Annual Meeting of the Society of Economics of Households, the National Graduate Institute for Policy Studies (GRIPS), and the Korea Development Institute Workshop on Technology Adoption in Elderly Care: Economic Perspective and Evidence. The authors also appreciate Le Thu Trang and Jinseong Park for discussing our paper. Declarations of interest: none.

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1 Introduction

Individuals who struggle with basic activities of daily living, such as eating, bathing, and walking across a room, require long-term care (LTC). In countries with rapidly aging populations, demand for LTC is growing sharply, yet supply is not keeping pace (OECD, 2020). The result is a widening gap between need and provision, manifesting in long waiting times for nursing home placement.[1] A key structural constraint on the supply side is the shortage of caregivers, a problem projected to intensify across all aging economies (e.g., Scales, 2021).

Concurrently, rapid advances in artificial intelligence have made caregiving robots and information and communication technology (ICT) an increasingly credible response to this challenge (see World Health Organization, 2022 for recent developments in assistive technology). Japan offers the most instructive case: Decades ahead of most countries in confronting care shortages, owing to its early demographic aging and restrictive immigration policies, it has already integrated caregiving robots and ICT widely into nursing home settings (Lee et al., 2025). These technologies span a range of functions, including systems that monitor residents' movements and vital signs, mobility aids that assist residents in walking or transferring between a bed and a wheelchair, and communication robots designed to hold conversations with residents. Government subsidies for nursing home purchases of robots and ICT (Eggleston et al., 2021) have further accelerated their adoption and integration into daily care routines. Japan remains, to date, the only country where caregiving robots and ICT have achieved widespread deployment in nursing home settings.

While caregiving robots and ICT hold considerable promise for expanding LTC provision, their viability as a solution to the caregiving shortage ultimately hinges on whether older adults find such care acceptable. Given the relative novelty of caregiving robots and ICT, the academic literature on them remains sparse and predominantly qualitative. Arronson (2020) documents positive reactions among nursing home residents in case study settings, and Otaka et al. (2024) similarly reports qualitative, longitudinal changes in nursing homes following robot adoption; Wright (2023) raises countervailing concerns that over-reliance on robots may deprive individuals of meaningful human connection and simultaneously deskill and devalue care work; and Obayashi et al. (2021) narrows its focus to the impact of a single communicative robot. What is notable, however, is the paucity of large-scale empirical evidence on how older adults perceive the prospect of receiving care from robots and ICT rather than human caregivers, particularly in the specific context of nursing homes, and

[1] For example, the median waiting time for a nursing home bed for someone currently living in a private home in the province of Ontario, Canada, topped 200 days, and some people wait two years or more, as of 2023 (Health Quality Ontario, 2023). In Japan, more than half wait for at least one year, while about 30 percent wait for at least three years (Nihon Sogo Kenkyujo, 2019).

using a quantitative measure of preference.[2]

This paper provides novel evidence on older adults' preferences regarding caregiving robots and ICT. To do so, we field a custom-designed internet survey of approximately 4,300 Japanese individuals aged 55 to 75. Individuals already receiving LTC are excluded from the sample, which therefore consists of those not yet in need of LTC but likely to have considered their future care arrangements. Following a standard battery of socio-demographic questions, the survey contains two main modules. In the first module, respondents are asked to imagine that they are 85 years old and need to enter a nursing home. They are then presented with a choice between two otherwise identical nursing homes: one staffed exclusively by human caregivers, and one in which robots and ICT are used for a substantial share of tasks in a randomly assigned care domain—monitoring, communication, or mobility assistance. To quantify the strength of respondents' preferences, follow-up questions repeat the same choice question but increase the cost of the previously preferred option, allowing us to estimate willingness to pay (WTP) for a nursing home where robots and ICT are used for a substantial share of tasks, relative to one staffed exclusively by human caregivers, and how it varies across care domains. We will call this module the "nursing home choice questions." In the second module, respondents indicate their level of agreement with a set of statements capturing expectations and concerns about caregiving robots and ICT, drawn from the existing literature. These statements address both caregiving robots and ICT in general, as well as each specific type. Responses to this module illuminate the perceptions underlying acceptance or rejection of robotic care and help explain why preferences may vary across care domains. We will call this module the "robot/ICT attitude questions."

Somewhat to our surprise, older individuals in Japan show a strong preference for nursing homes in which a substantial share of care is provided using robots and ICT. About two-thirds of respondents (65 percent) choose such a facility over a nursing home where care is provided without using robots and ICT. Acceptance varies markedly by function. Technologies that assist with mobility are most preferred (70 percent), followed by monitoring (66 percent), with communication-oriented technologies least favored (59 percent). Responses to the robot/ICT attitude battery and open-ended questions at the end of the survey give some hints about the reasons for these differences. In a handful of open-ended responses, some respondents note, anecdotally, that mobility-aid robots would relieve human caregivers of physical burden, freeing them to focus on communication with residents—consistent with the attitude battery, where communication emerges as the aspect of care respondents are comparatively most reluctant to delegate to robots. In terms of predictors of robot accep-

[2] A small number of surveys examine attitudes toward care robots in related but distinct contexts; we discuss this literature, and how our survey differs from it, below.

tance, having heard of caregiving robots stands out, raising the probability of choosing the robot facility by 8 to 9 percentage points.

In terms of WTP, respondents are willing to pay, on average, 8 percent above the typical nursing home fee for access to a facility with robots and ICT. As with acceptance, WTP varies by function: Respondents are willing to pay 11 percent more on average for mobility-aid robots, compared with 5 percent for communication robots. There is also substantial heterogeneity within the sample: About one-third of respondents (32 percent) are willing to pay at least 13 percent above the baseline fee, and about one-quarter (24 percent) are willing to pay at least 33 percent more. Having heard of caregiving robots and ICT prior to the survey is associated with an increase in WTP of at least 4 percent of the baseline fee. This association need not be causal, since respondents who are more receptive to robots may also be more likely to have encountered information about them. Even so, it is suggestive of an important role for information in shaping preferences for robotic care. Our back-of-the-envelope cost-benefit comparison, where WTP is used as a measure of consumer benefits, provides suggestive evidence that the benefits from robots and ICT can be much larger than the costs, in particular for mobility-aid robots.

The credibility of these results hinges on respondents' understanding of the hypothetical situations they were asked to consider. Comprehension is high. About 70 percent of respondents answer all four comprehension-check questions correctly after a second attempt. Both acceptance and WTP are higher among these full scorers than in the sample as a whole: 71 percent choose the nursing home with robots and ICT, compared with 65 percent overall, and average WTP rises from 8 percent of the baseline fee to 11 percent. While it is possible that greater interest in or familiarity with robots facilitated understanding of the scenarios, this pattern at minimum indicates that the high overall acceptance of robots and ICT is not driven by misunderstanding of the hypothetical situation. Acceptance of robots and ICT in the nursing home choice questions is also consistent with attitudes expressed in the robot/ICT attitude questions, providing further evidence of the internal consistency of survey responses. Respondents agree more strongly with positive statements than with negative ones for every type of robot and ICT, and the resulting sentiment indexes are highest for mobility-aid robots and lowest for communication robots, mirroring the pattern in acceptance and WTP. Respondents who express more positive sentiment toward robots and ICT are, in turn, more likely to choose a nursing home with robots and ICT and to report a higher WTP for it.

Taken together, these results suggest that consumer-side resistance is unlikely to be a major obstacle to deploying caregiving robots and ICT as a response to Japan's LTC shortage, though a substantial minority—about one-third of respondents—do not welcome this change. Moreover, because acceptance is strongly associated with having heard of these technologies, our results suggest that acceptance may rise further as awareness of caregiving robots and ICT continues to spread.

This paper contributes to an emerging literature on caregiving robots and ICT in Japanese nursing homes. Eggleston et al. (2021) and Lee et al. (2025) study the supply-side impacts of robots in nursing homes: on employment, retention, and wages of human caregivers.[3] The present paper shifts focus to the demand side: How potential care consumers perceive and value robot caregivers. Earlier work offers sharply divergent views. Arronson (2020) takes an optimistic view of robots as the future of long-term care, while Wright (2023) is more pessimistic. Both studies rely primarily on small case studies and qualitative observation. We contribute large-scale survey evidence on how older adults perceive and value robotic and ICT-assisted care.

The closest existing precedent is Pino et al. (2015), who use interviews and a survey to elicit around 30 older adults' attitudes and opinions toward socially assistive robots. A handful of larger-scale surveys have since examined public attitudes toward care robots, though in contexts distinct from ours. Aymerich-Franch and Gómez (2024), drawing on a survey of 1,092 European respondents, find that support for socially assistive robots in healthcare depends heavily on the specific function performed—with functions such as triage and monitoring raising particular concern—and that acceptance is lower when the perceived vulnerability of the care recipient is higher. Smith and Anderson (2017) survey 4,135 American adults and find that a majority (59 percent) would not want a robot caregiver for themselves or a family member, although a substantial share (44 percent) also express some enthusiasm. Ide et al. (2024) and Shi et al. (2026) focus specifically on home-care robots, surveying 1,004 older adults across Japan, Ireland, and Finland and 589 older adults in China, respectively, and find that familiarity with robots, openness to their ethical use, and desired product characteristics such as convenience and cost are important correlates of willingness to use them.

Our study contributes to and differs from this literature by moving beyond measures of general attitudes toward care robots to quantify their economic value to potential users of long-term care. We do so in several ways. First, we embed robot use in a concrete nursing-home choice rather than asking respondents about robots in isolation. The technologies and functions described in the survey correspond to robots already used in Japanese LTC facilities, allowing respondents to evaluate specific applications of robotic care in a realistic institutional setting. Second, we randomly assign the domain in which robots are used—

[3] Abaluck et al. (2026) investigates the effectiveness of large language model assistance in patient care in outpatient clinics in Nigeria.

monitoring, communication, or mobility assistance—under an otherwise common choice environment. This allows us to identify how the value of robotic care varies across tasks rather than relying only on correlations between acceptance and respondent characteristics. Third, and most importantly, we elicit WTP for robotic care rather than an ordinal measure of willingness to use or agreement. The resulting monetary valuation makes it possible to compare the benefits perceived by potential users with the costs of adopting these technologies, as we do in Section 5. Finally, following the strategic survey question approach discussed below, we hold fixed other dimensions of the nursing-home choice, including room type, waiting time, and other care conditions, so that the estimated WTP can be interpreted as the value respondents place specifically on the introduction of robotic care.

This paper also relates to the literature on LTC policy responses to rising care demand. Several papers study reforms to Medicaid provisions: Achou (2023), De Nardi et al. (2016), and Mommaerts (2018) examine making Medicaid more generous, while Ettner (1994) and Stabile et al. (2006) focus on expanding in-home care benefits. Hackmann (2019) studies incentivized entry of new nursing homes to increase market competitiveness, as well as higher Medicaid reimbursement rates to encourage nursing homes to accept Medicaid residents. Arapakis et al. (2022), Barczyk and Kredler (2018), and Koreshkova and Lee (2020) consider subsidies for in-home care. We contribute to this literature by examining a novel approach to expand LTC supply: the adoption of caregiving robots and ICT.

We elicit respondents' preferences using hypothetical choice questions set in a carefully constructed health scenario designed to identify relevant preferences—an approach known in the literature as strategic survey questions (SSQs). This method was pioneered by Barsky et al. (1997) and has since been applied to study preferences related to long-term care by Ameriks et al. (2011), Finkelstein et al. (2013), Ameriks et al. (2020), and Achou et al. (2026). We extend this approach to a specific and unexplored dimension of long-term care: preferences over care provided by robots and ICT.

A growing literature documents the shortage of care workers in aging societies. Speyer et al. (2026) characterizes the current state of the home-and-community-based workforce in the U.S. as a crisis. Grabowski et al. (2026) shows that immigration reduces mortality among older Americans by expanding the supply of care workers, and Kreider and Werner (2025) shows that recent immigration restrictions in the U.S. have worsened the health care worker shortage. Fu et al. (2023) documents the analogous shortage in Japan. We examine whether caregiving robots and ICT could offer a solution to this problem that is acceptable from the perspective of potential care consumers.

The rest of the paper is organized as follows. Section 2 introduces types of robots used in Japanese nursing homes. Section 3 describes the survey questions and the sample. Section

4 shows the survey results, and Section 5, based on the WTP estimated from the survey, compares the benefits and costs of introducing robots and ICT. Section 6 concludes.

2 Caregiving Robots and ICT at Nursing Homes

The Japanese government has subsidized nursing homes to purchase caregiving robots and ICT since 2015. As of 2022, more than 70% of nursing homes in Japan employ at least one caregiving robot (Lee et al., 2025).

This paper focuses on the three most common types of robots and ICT currently used in Japanese nursing homes. For each type, we describe its core functions, discuss reasons residents might welcome it, and note potential concerns. The descriptions of the core functions are based on Ministry of Health, Labour and Welfare (2023).

The first category is communication robots and ICT. These typically take the form of robotic pets, small robotic characters, or humanoids (see Figure 1, Panel (a)). Their primary function is to converse with residents to improve mood and reduce feelings of isolation. Their capabilities often extend further: reminding residents to take medication or perform stretching exercises, sharing information gathered from conversations with caregivers and family members, and suggesting appropriate care services based on that information. Because robots do not tire from repetitive interactions, they can provide a reliable source of social engagement for residents while freeing human caregivers from mentally taxing conversational tasks. At the same time, communication robots raise a legitimate concern that residents may be deprived of opportunities for genuine human connection. For residents with cognitive decline who cannot distinguish a robot from a human interlocutor, this may amount to deception (Wright, 2023).

The second category is monitoring robots and ICT. These systems connect sensors in residents' rooms and beds to monitors at nursing stations and alert systems carried by staff (see Figure 1, Panel (b)). They track vitals—heart rate, body temperature, and blood pressure—continuously, relieving nursing staff of the repetitive tasks of manual measurement and recording. Because the system monitors residents remotely, staff no longer need to make routine nighttime room checks, which can disrupt sleep and reduce residents' quality of life. The system also tracks sleep quality, identifying residents in deep sleep versus those about to wake, and detects motion in beds: When a resident attempts to get up, the system activates a camera on that resident so staff can intervene if there is a fall risk. Monitoring robots thus increase the likelihood that each resident's condition is closely tracked and that staff can respond in a timely manner. At the same time, they raise a concern: If nursing staff visit rooms less frequently in reliance on the system, needs that sensors fail to detect may

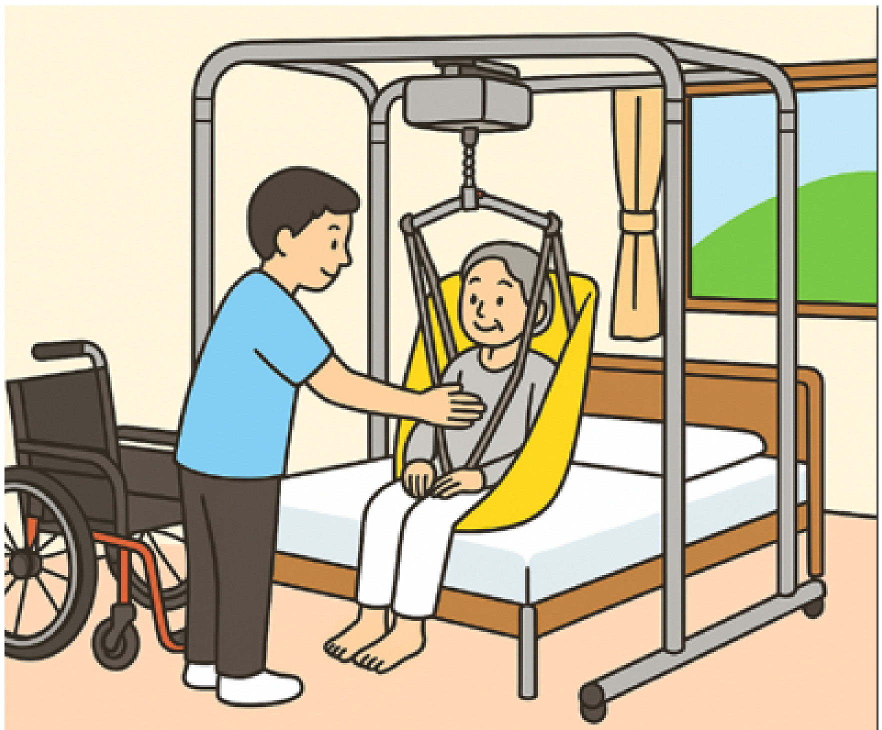
Figure 1: Illustration of Caregiving Robots and ICT

(a) Communication

(b) Monitoring

Notes: The images of Panels (a) and (b) are from the Ministry of Economy, Trade and Industry of Japan. The image in Panel (c) is generated by the authors using an AI. (continued on next page).

Figure 1: Illustration of Caregiving Robots and ICT (continued).



(c) Mobility aid

Notes: The images of Panels (a) and (b) are from the Ministry of Economy, Trade and Industry of Japan. The image in Panel (c) is generated by the authors using an AI.

go unaddressed.

The third category is mobility-aid robots and ICT. Among the various types of mobility-aid robots and equipment, we focus on those that assist with lifting residents for transfers between beds, wheelchairs, and toilets (see Figure 1, Panel (c)). Lifting is physically demanding for caregivers—typically requiring three staff members to lift a single resident of similar body weight—and injury-prone for residents as well, due to pressure concentrated at points of contact such as armpits and the backs of knees. Mobility-aid robots substantially reduce this burden: A single staff member can execute a transfer by maneuvering the robot, with no manual lifting required. This ease of transfer may also expand residents' activity levels, as they may request transfers more frequently. It also affords greater privacy during personal activities such as bathing, since fewer staff members need to be present. At the same time, mobility-aid robots carry a risk of injury if the equipment malfunctions or is used improperly.

The use of caregiving robots remains limited outside Japan. Some countries—including the U.S., Canada, Germany, and Denmark—have experimented with communication robots in selected nursing homes,[4] but widespread adoption has not occurred in any of them.

As this section makes clear, caregiving robots and ICT carry both considerable promise and legitimate concerns. Examining how potential care consumers weigh these upsides and downsides is therefore of first-order importance.

3 Survey and Sample

We fielded a custom-designed online survey on long-term care preferences in Japan, targeting individuals between 55 and 75 years old who are not yet in need of long-term care. This age range is well-suited for the study. Individuals in this group are likely to have thought about their own future care needs and to have indirect experience with nursing homes through parents and relatives. Those already receiving long-term care are excluded, as completing an online survey presents practical difficulties for this population.

Before fielding, the survey was reviewed by the Oita Prefecture Council of Social Welfare to ensure the relevance of the questions. Oita Prefecture is among the leading prefectures in Japan in robot and ICT adoption in nursing homes. We fielded the survey in two stages. In February 2026, we conducted a pilot survey with a target sample of approximately 250 respondents to verify that the survey instruments functioned as intended and that respon-

[4]See, for example, CBC (2022) for an experiment in Canada and TheMayor.EU (2021) for a similar pilot in Denmark. A related development is the large-scale distribution of AI companion robots such as Hyodol to elderly individuals living at home in South Korea, though this is a home-care rather than nursing-home setting; see CNN (2025).

dents had no difficulty understanding the questions. The main survey was fielded in July and August 2026 with a sample size of 4,314. All results reported in this paper draw on the main survey unless otherwise noted.

This survey was conducted jointly by Survey Research Center Co., Ltd., a Japanese survey research company, and NTT DOCOMO BUSINESS X, Inc. NTT DOCOMO BUSINESS X, Inc. was responsible for programming the online survey interface and provided the respondent population panel. NTT DOCOMO BUSINESS X, Inc. has access to one of the largest online survey panels in Japan, consisting of 30 million respondents, including affiliated panels. Respondents were paid an incentive based on the number of questions completed upon survey completion. This survey used quota sampling to ensure an equal number of respondents in each five-year age group, equal representation by gender, and proportional representation across Japanese prefectures.

3.1 Survey Design

The survey questionnaire is composed of three sections. The English translation of the survey questionnaire is in Appendix A.

The first section collects standard demographic and socioeconomic characteristics, including age, gender, marital status, income, wealth, whether the respondent has children, and if so, how far away they live. The section also asks about respondents' use of smartphones, email, social media, and web applications, as familiarity with these technologies may shape attitudes toward caregiving robots and ICT. Respondents report their subjective probability of needing long-term care for at least one, two, and four years. They also assess the adequacy of current caregiving staff levels in Japanese nursing homes, provide expectations for staffing adequacy ten years from now, and report how long they expect to wait for admission to a publicly subsidized nursing home. Finally, respondents indicate whether they are aware of robots or ICT currently used in Japanese nursing homes, and whether they have a family member or relative living in a facility that uses such technology.

The second section contains the main battery of questions eliciting preferences for caregiving robots and ICT. The section opens by introducing the three types of robots currently used in Japanese nursing homes—communication robots, monitoring robots, and mobility-aid robots—accompanied by the illustrations in Figure 1 and a description of each type's core functions. Both the illustrations (except for the one for the mobility-aid robots, where we focused on the lifting function) and the function descriptions are adopted from the Ministry of Economy, Trade and Industry.

We then introduce a hypothetical scenario describing respondents' future situation. Respondents are asked to imagine that they are 85 years old with two years of life remaining, require significant assistance with activities of daily living, and are experiencing some cognitive decline. The description of the health status corresponds to care-need level 4 in the Japanese long-term care system. At this care level, individuals are eligible for and commonly enter nursing homes. Respondents are also asked to imagine the financial and family situation they would most likely face at age 85.

Respondents are then presented with two nursing home options, A and B, identical in monthly fee (150,000 yen) and room type (a semi-private room shared with one other resident, the most common arrangement in Japanese nursing homes). We assume that there is no waiting time for either nursing home. The only difference between the two nursing homes is the use of caregiving robots and ICT. Nursing home A provides all care through human caregivers. Nursing home B provides a substantial share of care using robots and ICT in one randomly assigned domain: monitoring, communication, or mobility aid.

After respondents select their preferred option, the survey presents a follow-up question in which the chosen option carries a higher price. The follow-up fee is 200,000 yen per month. If the respondent continues to prefer the same option, a further question raises the fee to 300,000 yen per month. If the respondent switches at 200,000 yen, the follow-up instead lowers the fee to 170,000 yen per month. Responses to these questions identify willingness to pay (WTP) for access to caregiving robots and ICT, relative to the 150,000 yen baseline fee, within one of eight intervals (in yen per month): $(-\infty, -150\text{K})$, $(-150\text{K}, -50\text{K})$, $(-50\text{K}, -20\text{K})$, $(-20\text{K}, 0)$, $(0, 20\text{K})$, $(20\text{K}, 50\text{K})$, $(50\text{K}, 150\text{K})$, and $(150\text{K}, \infty)$.

The validity of responses to these hypothetical questions depends on respondents' correct understanding of both the hypothetical health scenario and the nursing home options presented to them. To assess comprehension, we ask four test questions: two on the hypothetical scenario and two on the nursing home options.

The final section presents statements reflecting expectations and concerns about each type of caregiving robot and ICT, drawn from the prior literature as well as from a site visit to a nursing home in Oita Prefecture that has deployed such robots and ICT. For example, a positive statement regarding communication robots and ICT reads: "Being able to chat or play with communication robots will help me feel less lonely and stay connected." A negative statement for the same type of robots and ICT reads: "I am concerned that having communication robots will deprive me of opportunities to make connections with humans." For each statement, respondents indicate their level of agreement on a 9-point scale (1 to 9). We first present four statements—two positive and two negative—about caregiving robots and ICT overall, presented in randomized order, followed by the same structure for each specific type of robot and ICT. We then include five statements concerning human caregivers and the effects of robots and ICT on them, with particular attention to foreign caregivers. Responses to this battery shed light on the expectations and concerns underlying the preferences elicited in the previous section.

A particular concern about communication robots and ICT is that they may just substitute for human interaction rather than expanding residents' total communication time. To measure this concern directly, we elicit respondents' expectations about the effect of communication robots and ICT on communication time, both in total and with human caregivers specifically. The question begins by informing respondents that, in a typical Japanese nursing home without communication robots, residents spend on average two hours per day communicating with human caregivers (Japan Public Health Association, 2011). Respondents are then asked whether introducing communication robots would increase or decrease total communication time (the sum of time spent with robots and with humans) and time with human caregivers specifically, relative to this two-hour baseline, and if so, by how much.

3.2 Sample Characteristics and LTC-related Expectations

Table 1 reports summary statistics for the survey sample. By construction, the average age is approximately 65 and roughly half of the respondents are female (51 percent). Forty three percent have a university education and about two-thirds are married. The average respondent has 20.7 million yen in net worth and 5.2 million yen in annual household income, corresponding to approximately 130,000 and 33,000 in U.S. dollars.

The vast majority of respondents have children, with an average of 1.3 children. About 31 percent have a child living within walking distance. Technology use is widespread in the sample: 91 percent use email frequently, 77 percent use social media platforms such as Facebook and Zoom, and 71 percent use web applications such as food delivery and ride-hailing services. Half of the respondents have heard of robots and ICT used in nursing homes (49 percent), though only 2 percent have a family member or relative in a nursing home that uses them.

The survey also elicits respondents' subjective probability of needing long-term care for at least one, two, and four years over their remaining lifetime. Respondents generally view long-term care as a real possibility: The average probability of needing it for at least one year is 38 percent. Most also expect that, once they need care, they will need it for an extended period—the average probability of needing care for at least four years is 31 percent, only seven percentage points below the probability of needing it for at least one year.

The first section of the survey also asks respondents to assess the adequacy of the caregiver workforce in Japanese nursing homes, both currently and ten years from now, on an 11-point

Table 1: Sample Summary Statistics and LTC-related Expectations

	Percentiles			
Variable	25th	50th	75th	Mean
Age	60	65	70	64.8
Female				0.51
University education				0.43
Married				0.65
Financial wealth (million ¥)[1]	1.8	7.5	25.0	20.7
Household income (million ¥)[2]	2.3	4.0	6.5	5.2
Homeowner				0.70
Number of children	0	2	2	1.3
Child in walking dist.				0.31
Use email				0.91
Use social media				0.77
Use web applications				0.71
Heard of caregiving robots				0.49
Relative in NH with robots				0.02
Chance of needing LTC (%)				
For 1 year	5	35	55	38.0
For 2 years	5	25	55	34.7
For 4 years	5	25	55	30.7
Perceived adequacy of caregiver workforce[3]				
Current	2	3	5	3.3
10 years later	2	3	5	3.0

Note: N = 4,314
[1] N = 3,242; [2] N = 3,548. The smaller numbers of observations for these variables are due to respondents who chose "Don't know/Refuse to answer."
[3] Out of the 11-point scale, where the lowest score is 0 (not adequate at all) and the highest score is 10 (fully adequate).

scale ranging from 0 ("not adequate at all") to 10 ("fully adequate"). Respondents hold a markedly negative view of current workforce adequacy, with an average score of only 3.3. They expect little improvement over time. If anything, conditions are expected to worsen slightly, with the average score falling to 3.0 over the next ten years.

All of the characteristics above are elicited in the first part of the survey, before robot/ICT type is randomly assigned (Section 4). Appendix Table B1 confirms that the three randomly assigned groups are statistically indistinguishable from one another on these predetermined characteristics.

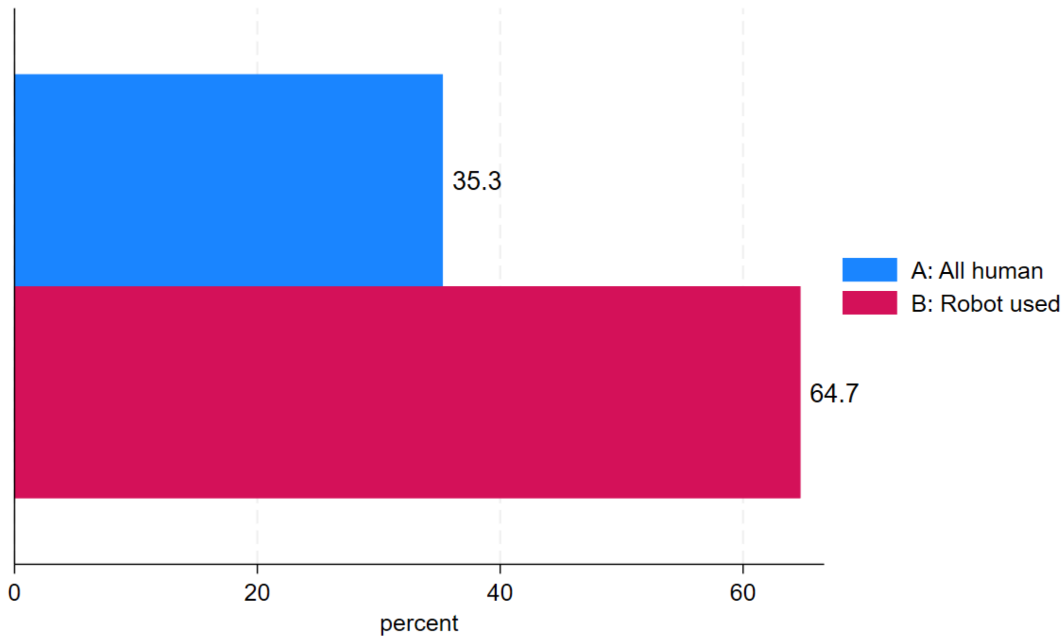
4 Survey Evidence on Preferences for Caregiving Robots and ICT

4.1 Choices between Robot and Human Caregivers

This subsection reports results from the hypothetical nursing home choice questions. Somewhat to our surprise, a substantial majority of older Japanese individuals prefer a nursing home where a significant share of care is provided using robots and ICT. Figure 2 shows that roughly two-thirds of respondents choose the nursing home with robots and ICT over one where all care is provided by human caregivers, when all other conditions, including cost, are held constant between the two nursing homes. This suggests that expanding the deployment of caregiving robots and ICT as a response to the LTC shortage can be welcomed by older Japanese individuals. We also examine the acceptance among those who answered all four comprehension-check questions correctly after the second attempt (Appendix Figure B1). About 70 percent of respondents received the full score after the second attempt (see Section 4.4; we refer to this group as "full scorers" hereafter; see Appendix B.1.2 for the comparison of observable characteristics between the full scorers and non-full scorers). The figure shows that 71 percent of them choose the nursing home where a substantial share of care is provided using robots and ICT, compared with 65 percent in the full sample. This pattern suggests that the high overall acceptance we document is unlikely to be driven by misunderstanding of the hypothetical choice.

At the same time, acceptance rates vary markedly by type of robot and ICT. Figure 3 reports hypothetical nursing home choice results by care domain. Mobility-aid robots and ICT are the most welcomed: 70 percent of respondents in that treatment arm choose the nursing home with robots and ICT. Communication robots and ICT are the least welcomed, with fewer than 60 percent doing so. These differences are statistically significant: The gap between communication robots and ICT and each of the other two types is significant at the 1 percent level, while the gap between mobility-aid and monitoring robots and ICT is significant at the 5 percent level. This pattern is also robust among full scorers (Appendix Figure B2). If anything, the gap in acceptance between mobility-aid and communication robots and ICT is larger among this group than in the full sample. This pattern has direct policy implications: If the government seeks to accelerate robot and ICT deployment through subsidies, as the Japanese government has done over the past decade, mobility-aid robots represent the most promising priority from the perspective of demand-side preferences. As we discuss below, responses to other sections of the survey hint on the reasons behind these differences.

Figure 2: Nursing Home Choice Result: All

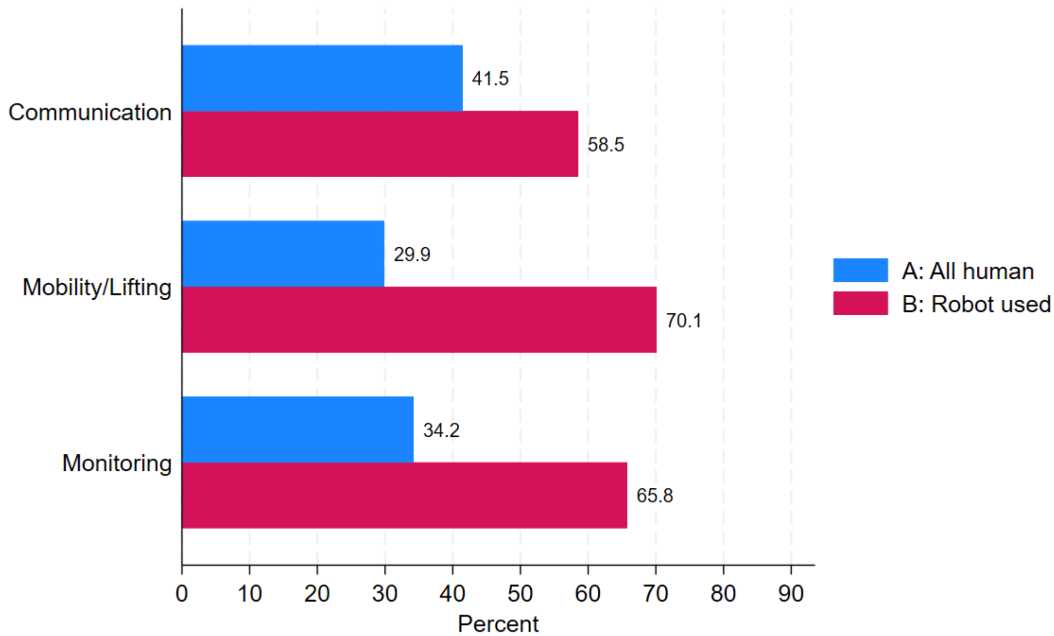


Notes: The bar charts show the fraction of respondents choosing the nursing home where all care is provided by human caregivers (Nursing Home A, blue) versus the nursing home where a substantial share of care in a randomly assigned domain—monitoring, mobility/lifting, or communication—is provided with robots and ICT (Nursing Home B, red).

Table 2 reports estimates from a linear probability model relating the choice of the nursing home with robots and ICT to respondent characteristics. Appendix Table B3 reports the same regression for full scorers. Appendix Table B4 reports a specification that includes the logs of financial wealth and household income as additional regressors, estimated on a smaller sample of 3,128 observations, down from 4,314, because a substantial share of respondents decline to report these amounts. Several associations are robust across all three specifications. Having heard of caregiving robots and ICT prior to the survey stands out. It raises the probability of choosing the robot-and-ICT facility by 9 percentage points. Having one fewer child is associated with a 2 percentage point increase in that probability, and a 10-percentage-point increase in the perceived chance of needing long-term care is associated with a 0.7 percentage point increase. On the other hand, expecting to wait longer than one year to enter a nursing home and a more pessimistic view of care worker sufficiency in 10 years are both significantly associated with greater acceptance in the main specification and once wealth and income are added, though not among full scorers.

The association between robot/ICT acceptance and observable characteristics varies by

Figure 3: Nursing Home Choice Result: By Robot/ICT Type



Notes: The bar charts show the fraction of respondents choosing the nursing home where all care is provided by human caregivers (Nursing Home A, blue) versus the nursing home where a substantial share of care is provided with robots and ICT (Nursing Home B, red), separately by the randomly chosen care domain where robots and ICT are used.

the considered type of robot/ICT. Table 3 reports the same regression as Table 2, estimated separately by robot/ICT type. Appendix Table B5 reports the corresponding specification for full scorers. Having heard of caregiving robots and ICT prior to the survey remains a strong, robust predictor of acceptance for communication and mobility-aid robots in both tables, though its association with monitoring-robot acceptance is weaker and not significant among full scorers. A higher perceived chance of needing long-term care is robustly associated with greater acceptance of mobility-aid robots in both tables, and of monitoring robots in the full sample, though not communication robots. Female respondents and those with a university degree are both significantly more likely to accept monitoring robots specifically, a pattern that holds in both tables.

4.2 Willingness to Pay

We now turn to willingness to pay (WTP). Recall that WTP is measured based on follow-up questions where the option chosen under the baseline question (where both nursing home

Table 2: Acceptance of Robots and ICT and Observable Characteristics: Full Sample

	Full Sample
Age	-0.0017
	(0.0014)
Female	0.0268*
	(0.0159)
University	0.0418***
	(0.0158)
Married	-0.0228
	(0.0172)
Good health	0.0161
	(0.0162)
Working	-0.0211
	(0.0160)
Number of children	-0.0203***
	(0.0078)
Child within walking distance	0.0094
	(0.0173)
Technology familiarity	0.0027
	(0.0086)
LTC chance, 1+ years	0.0007***
	(0.0002)
Care worker sufficiency, 10 years	-0.0080**
	(0.0037)
Expects 1+ year NH wait	0.0341**
	(0.0153)
Heard of care robots/ICT	0.0899***
	(0.0150)
Home owner	-0.0122
	(0.0171)
Robot type: Lift	0.1156***
	(0.0176)
Robot type: Monitoring	0.0688***
	(0.0175)
Constant	0.6505***
	(0.0994)
N	4,314
R^2	0.033

Note: The dependent variable is an indicator for choosing the nursing home where a substantial share of care is provided using robots and ICT. OLS estimates; standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The omitted robot/ICT type category is Communication. Technology familiarity is the count of “Yes” responses, ranging from 0 to 4, to four questions on whether the respondent uses a smartphone, email, messaging/social media apps, and online shopping or ride-hailing apps (Q12–Q15).

Table 3: Acceptance of Robots and ICT and Observable Characteristics, by Type

	Communication	Mobility/Lifting	Monitoring
Age	-0.0027	-0.0053**	0.0025
	(0.0025)	(0.0024)	(0.0024)
Female	-0.0309	0.0306	0.0796***
	(0.0285)	(0.0263)	(0.0275)
University	0.0122	0.0507*	0.0676**
	(0.0281)	(0.0263)	(0.0274)
Married	-0.0199	-0.0208	-0.0330
	(0.0305)	(0.0295)	(0.0293)
Good health	0.0018	0.0115	0.0368
	(0.0290)	(0.0271)	(0.0279)
Working	-0.0807***	-0.0071	0.0253
	(0.0289)	(0.0268)	(0.0276)
Number of children	-0.0214	-0.0242*	-0.0132
	(0.0140)	(0.0134)	(0.0133)
Child within walking distance	0.0032	-0.0013	0.0230
	(0.0308)	(0.0286)	(0.0303)
Technology familiarity	-0.0055	0.0149	-0.0018
	(0.0154)	(0.0142)	(0.0150)
LTC chance, 1+ years	-0.0003	0.0012***	0.0010**
	(0.0004)	(0.0004)	(0.0004)
Care worker sufficiency, 10 years	-0.0061	-0.0034	-0.0139**
	(0.0067)	(0.0062)	(0.0063)
Expects 1+ year NH wait	0.0130	0.0539**	0.0337
	(0.0275)	(0.0256)	(0.0264)
Heard of care robots/ICT	0.0968***	0.1355***	0.0465*
	(0.0268)	(0.0250)	(0.0259)
Home owner	-0.0309	0.0365	-0.0471
	(0.0306)	(0.0289)	(0.0293)
Constant	0.8733***	0.8597***	0.4406**
	(0.1791)	(0.1646)	(0.1709)
N	1,464	1,395	1,455
R^2	0.021	0.054	0.028

Note: Each column reports a separate OLS regression of the indicator for choosing the nursing home with robots and ICT, restricted to respondents randomly assigned to that robot/ICT type. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

options are offered at the same cost, 150K Yen per month) comes at a higher cost. With these questions, we can tell that the WTP of each respondent falls into one of the eight categories in the header of Table 4. The first row of Table 4 reports the distribution of this bracketed WTP across the full sample for all types of robots. There is substantial heterogeneity, even among respondents who accept the robot-and-ICT facility at the baseline price. Among those who accept the nursing home with robots and ICT at the baseline price, about half of these respondents switch to the all-human facility once the price rises to just 170,000 yen, implying a WTP of at most 13 percent of the baseline fee. The other half are willing to pay at least 13 percent more, with 38 percent willing to pay more than 33 percent above the baseline fee and 19 percent willing to pay more than 100 percent above it.

We also examine respondents' average WTP, in yen and as a percent of the baseline fee, reported in the Mean WTP columns of Table 4. Because a respondent's exact WTP is not observed—only the bracket it falls in—we compute this average by assigning each respondent the median value of their bracket, and a value of ±200,000 yen for the two open-ended tail brackets.[5] On average, respondents are willing to pay 8 percent more for the nursing home with robots and ICT, a sizable premium. Appendix Table B6 reports the same distribution for full scorers. Average WTP is even higher among this group, at 11 percent of the baseline fee. This again suggests that the sizable WTP we document is not driven by misunderstanding of the questions.

Table 4: Willingness to Pay for Robots and ICT

	Fraction (%) in each WTP Bracket								Mean WTP		
	$(-\infty, -150\text{K})$	$(-150\text{K}, -50\text{K})$	$(-50\text{K}, -20\text{K})$	$(-20\text{K}, 0)$	$(0, 20\text{K})$	$(20\text{K}, 50\text{K})$	$(50\text{K}, 150\text{K})$	$(150\text{K}, \infty)$	1,000 JPY	% of baseline	N
All	10.4	6.4	5.1	13.4	32.7	7.6	11.9	12.5	12.4	8.3	4,314
Communication	10.0	8.7	6.1	16.6	28.6	7.2	10.8	12.0	7.5	5.0	1,464
Mobility/Lifting	10.5	4.6	3.7	11.0	36.1	7.6	13.9	12.5	17.2	11.5	1,395
Monitoring	10.7	5.8	5.2	12.4	33.7	8.0	11.1	12.9	12.7	8.5	1,455

Note: Cell entries in the bracket columns are the percentage of respondents whose WTP falls in that interval. Mean WTP uses the bracket median (capped at ±200,000 yen for the open-ended tails); percent of baseline expresses this relative to the 150,000 yen baseline monthly fee.

As with acceptance, WTP also varies by the type of care robot and ICT, as the last three rows of Table 4 show. Mobility-aid robots command the highest premium, 11 percent of the baseline fee on average, compared with 8 percent for monitoring and 5 percent for communication robots, mirroring the ordering we document for acceptance. Appendix Table B6 shows that among full scorers, not only is the overall level of WTP higher for every type, but the gap between robot types is larger as well. Average WTP for mobility-aid robots rises to 17 percent of the baseline fee among full scorers, compared with 6 percent for communication robots, a considerably wider gap than in the full sample. This wider gap

[5]The mean WTP is not sensitive to this assumption. The two open-ended tail brackets contain a similar share of respondents, so the effect of the tail assumption on the average largely cancels out. By construction, a 10,000 yen change in the absolute value assigned to the two tail brackets changes average WTP by 200 yen, uniformly across all robot types. For example, assigning ±170,000 yen to these brackets instead of ±200,000 yen changes average WTP from 12,400 to 11,800 yen per month for all types of robots. Naturally, average WTP would be substantially larger if we instead assigned a much larger value, such as ±300,000 yen, which would raise average WTP from 12,400 to 14,400 yen per month. Relative to such large values, our choice of ±200,000 yen is a conservative one.

among the full scorers, again, suggests that the differences in WTP across robot types are not driven by misunderstanding of the hypothetical questions.

We next examine the association between WTP and observable respondent characteristics. Table 5 reports results for both the full sample and full scorers in the main text, rather than relegating the full-scorer results to the appendix as in the acceptance regressions, because the R^2 among full scorers (1.3 percent) is more than double that of the full sample (0.5 percent). This is consistent with WTP being more precisely measured among respondents who demonstrably understood the hypothetical scenario. Appendix Table B7 reports the corresponding specifications with the expanded regressor set. Having heard of caregiving robots and ICT prior to the survey is the most robust predictor of WTP, significant in both samples and more than 50 percent larger among full scorers (10.0K Yen, or 7 percent of the baseline fee, vs. 6.5K Yen, or 4 percent, in the full sample). On the other hand, while respondents were, on average, fairly pessimistic about care worker sufficiency (Table 1) and being more pessimistic was significantly associated with robot acceptance (Table 2), it is not consistently associated with a higher WTP, with flipping signs between samples. These noisy estimates may be due to the lack of variation in care worker sufficiency (Table 1).

Table 6 reports the same regression estimated separately by robot/ICT type. The impact of having heard of caregiving robots and ICT on WTP for overall robots is largely driven by its impact on the WTP for mobility/lifting robots and ICT. Its impact is significant in both the full sample and among full scorers (13.9K Yen, or 9 percent of the baseline fee, and 18.4K Yen, or 12 percent, respectively), and it is the single largest predictor of WTP among full scorers. Being single is associated with a higher WTP for mobility/lifting robots and ICT in both samples. Those who are currently working have a significantly lower WTP for communication robots.

4.3 Expectations and Concerns Regarding Robot Caregivers

To shed light on the preferences expressed in the previous two subsections, we turn to responses from the final section of the survey, in which respondents rate their agreement with statements about potential benefits and concerns regarding caregiving robots and ICT on a 9-point scale (1 = "do not agree at all"; 9 = "very much agree"). These questions are administered after the hypothetical nursing home choice questions, so the statements presented here do not influence those choices. This ordering means, however, that the nursing home choice questions, and the type of robot respondents were randomly shown, can affect their responses to the statements in this section. For this reason, we do not interpret the results in this section as evidence of causal effects; rather, they are meant to provide

Table 5: Willingness to Pay for Robots and ICT and Observable Characteristics

	Full Sample	Full Scorers
Age	-0.6891**	-0.1688
	(0.3146)	(0.2901)
Female	2.1252	2.0832
	(3.5382)	(3.2668)
University	3.5285	1.7106
	(3.5178)	(3.2206)
Married	-2.8382	-0.9519
	(3.8340)	(3.4824)
Good health	0.8373	-0.7824
	(3.6108)	(3.2941)
Working	-3.9700	-2.3556
	(3.5745)	(3.2729)
Number of children	-0.5072	-0.5264
	(1.7483)	(1.6420)
Child within walking distance	-1.3878	-3.8423
	(3.8559)	(3.5331)
Technology familiarity	-2.0247	0.0366
	(1.9203)	(1.8766)
LTC chance, 1+ years	0.0315	0.0059
	(0.0524)	(0.0469)
Care worker sufficiency, 10 years	-0.6301	1.5225*
	(0.8241)	(0.8060)
Expects 1+ year NH wait	-0.8839	-0.9374
	(3.4125)	(3.1037)
Heard of care robots/ICT	6.5697**	9.9869***
	(3.3354)	(3.0372)
Home owner	0.8481	-1.5153
	(3.8110)	(3.5369)
Robot type: Lift	9.6919**	16.3115***
	(3.9306)	(3.6085)
Robot type: Monitoring	5.0967	7.6702**
	(3.8934)	(3.5744)
Constant	58.3108***	12.6619
	(22.1792)	(20.5793)
N	4,314	3,012
R^2	0.005	0.013

Note: The dependent variable is bracketed WTP (1,000 JPY/month). OLS estimates; standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The omitted robot/ICT type category is Communication.

suggestive evidence and support for the internal consistency of survey responses. Table 7 reports each statement along with the mean and standard deviation of agreement scores. The statements in the table are abbreviated; see the survey questionnaire in Appendix A

Table 6: Willingness to Pay for Robots and ICT and Observable Characteristics, by Type

	Full Sample			Full Scorers		
	Comm.	Mobility	Monitor	Comm.	Mobility	Monitor
Age	-0.9599*	-1.2657**	0.0806	-0.1570	-0.6494	0.3515
	(0.5397)	(0.5502)	(0.5509)	(0.5318)	(0.4906)	(0.4901)
Female	-5.3231	3.6520	8.2460	-12.2898**	6.2598	11.5904**
	(6.0887)	(6.1231)	(6.2136)	(5.9008)	(5.4930)	(5.5938)
University	-1.5483	9.4086	2.9366	-11.4751**	6.8647	9.0590*
	(6.0021)	(6.1382)	(6.1917)	(5.8335)	(5.4580)	(5.4834)
Married	5.7230	-12.5055*	-3.9844	8.8891	-13.8189**	1.0968
	(6.5117)	(6.8693)	(6.6021)	(6.2335)	(6.0483)	(5.8390)
Good health	-1.1902	-5.5296	9.1994	-3.4635	0.0392	0.5566
	(6.1871)	(6.3223)	(6.2958)	(5.9296)	(5.5730)	(5.6061)
Working	-14.3176**	1.4458	1.1290	-9.6403	3.8525	-0.3355
	(6.1621)	(6.2462)	(6.2346)	(5.9090)	(5.5268)	(5.5977)
Number of children	-1.7462	0.7929	0.1208	-5.3469*	2.0939	1.6031
	(2.9819)	(3.1229)	(3.0035)	(2.9774)	(2.7877)	(2.7760)
Child within walking distance	-1.4504	-2.4913	-1.7385	-0.1923	-4.8465	-7.2515
	(6.5627)	(6.6618)	(6.8320)	(6.3697)	(5.8644)	(6.1206)
Technology familiarity	-3.1089	2.7391	-5.3905	1.8438	4.2391	-5.4427*
	(3.2889)	(3.3228)	(3.3933)	(3.4016)	(3.1651)	(3.2027)
LTC chance, 1+ years	-0.0763	0.0828	0.0887	-0.0291	0.0304	0.0362
	(0.0913)	(0.0895)	(0.0924)	(0.0865)	(0.0770)	(0.0814)
Care worker sufficiency, 10 years	-0.6981	-0.1926	-0.6537	1.2521	2.1764	1.5467
	(1.4281)	(1.4377)	(1.4269)	(1.4776)	(1.3600)	(1.3713)
Expects 1+ year NH wait	-1.3138	3.1468	-4.8969	-2.1887	1.5872	-3.5218
	(5.8569)	(5.9788)	(5.9449)	(5.5189)	(5.3525)	(5.2926)
Heard of care robots/ICT	6.0867	13.8953**	0.1597	12.3148**	18.4354***	0.4770
	(5.7079)	(5.8231)	(5.8409)	(5.4510)	(5.1648)	(5.1962)
Home owner	-4.3244	10.0029	-2.7782	-5.4804	7.5888	-5.7959
	(6.5336)	(6.7450)	(6.6022)	(6.3772)	(6.1542)	(5.9049)
Constant	95.7441**	75.4772**	21.8585	26.9564	28.1603	0.6170
	(38.1996)	(38.4004)	(38.5611)	(37.5766)	(34.7244)	(34.5052)
N	1,464	1,395	1,455	1,010	981	1,021
R^2	0.008	0.017	0.006	0.019	0.030	0.012

Note: The dependent variable is bracketed WTP (1,000 JPY/month). Each column is a separate OLS regression restricted to respondents randomly assigned to that robot/ICT type. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

for the full wording. In Panels A through D, the first two statements are positive (potential benefits) and the last two are negative (potential concerns). The final row of each of those panels reports the sentiment index for that panel, the simple average of the four statements after reverse-coding the two negative ones, so that a higher value indicates more favorable sentiment toward that use of robots/ICT.

Panel A lists statements about caregiving robots and ICT in general. Consistent with the high overall acceptance rate, respondents score positive statements above the scale midpoint of 5 and negative statements below it. Respondents tend to agree that robots and ICT will improve care quality and make nursing homes more adaptable to future needs, though

Table 7: Expectations and Concerns Regarding Robots/ICT

Statement	Mean	SD
A. Overall		
Will help address the worker shortage and improve care quality.	5.9	1.4
Will strengthen nursing homes' ability to meet future care needs.	6.1	1.4
Care provided using robots/ICT will be inferior to care by humans.	4.6	1.4
Feel anxious about robots/ICT due to unfamiliarity with technology.	4.9	1.6
Sentiment index	5.6	1.1
B. Communication		
Will reduce loneliness and help maintain social connection.	5.2	1.6
Glad to be reminded of things (e.g., medicine) without relying on others.	5.5	1.6
Conversations with robots/ICT are no substitute for human conversation.	5.1	1.7
Worried robots/ICT will take away opportunities to connect with others.	5.0	1.7
Sentiment index	5.2	1.1
C. Mobility-aid/Lifting		
Will allow residents to engage in more activities.	5.8	1.3
Glad if it reduces reliance on care workers for help.	5.7	1.5
Worried lift robots/ICT carry higher injury risk than human assistance.	4.6	1.5
Feel some resistance to relying on lift robots/ICT.	4.2	1.7
Sentiment index	5.7	1.1
D. Monitoring		
Will allow more prompt responses to residents' needs.	5.8	1.3
Will be more accurate and thorough than human caregivers in checking status.	5.5	1.4
Cannot detect residents' subtle needs.	5.0	1.5
Worried monitoring robots/ICT might miss signs of residents' needs.	5.0	1.5
Sentiment index	5.3	1.0
E. Relationship with Human Caregivers		
Will reduce physical burden on workers, allowing more attention to residents.	6.0	1.4
Enough foreign caregivers would remove the need for robots/ICT.	4.1	1.6
Feel uneasy relying on foreign caregivers due to cultural/language barriers.	5.2	1.7
Robots/ICT can eliminate foreign workers' language barrier, improving care quality.	5.5	1.4
More foreign workers would greatly benefit Japan's economy and society.	5.2	1.6

Note: N = 4,314. 1: Do not agree at all; 9: Very much agree. The sentiment index for each panel is the simple average of its four statements, with the two negatively framed statements reverse-coded (10 − response) so that higher values consistently indicate more favorable sentiment on the same 1-9 scale. Panel E has no sentiment index, as its statements concern foreign care workers rather than robots/ICT specifically. See Appendix A for the full text of each statement.

agreement is moderate, with an average score of around 6. They tend to disagree that robotic care is inferior to human care, though again, the disagreement is moderate, with an average score of 4.6. Respondents are neutral on whether unfamiliarity with technology would make them uncomfortable with robots and ICT. The resulting sentiment index for this panel, 5.6, is above the scale midpoint, establishing internal consistency with the high acceptance rate in nursing home choice responses.

Panels B through D report results for statements specific to each type of robot and ICT. Two patterns stand out. First, for all three types, agreement scores are higher for positive statements than for negative statements. This is consistent with acceptance rates exceeding 50 percent across all three types in the nursing home choice questions. Second, the sentiment index is highest for mobility-aid robots and ICT, at 5.7, which is also the type with the highest acceptance rate. Respondents agree most strongly that mobility-aid robots enable residents to engage in more physical activities. They are relatively unconcerned about the injury risk of such robots, and show even less resistance to relying on them in general. Communication robots and ICT, which had the lowest acceptance rate, have the lowest sentiment index among the three types, though only modestly below monitoring robots and ICT (5.2 vs. 5.3). While this difference is small in magnitude, it is statistically significant at the 1 percent level given the large sample size. For communication robots, respondents' reactions to negative statements are nearly neutral. Monitoring robots and ICT, whose acceptance rate was only four percentage points below that of mobility-aid robots, show a sentiment index closer to communication robots than to mobility-aid robots. We do not expect a perfect correspondence between acceptance rates from the nursing home choice questions and agreement scores in this section, as the statements presented need not carry equal weight in respondents' nursing home choices.[6]

The differences in attitudes toward these statements by robot type hint at what lies behind the gap in acceptance rates across robot types, particularly between mobility-aid/lifting and communication robots. These responses suggest that mobility-aid/lifting tasks are ones robots can more easily substitute for humans, while communication is not. Respondents think it would be better if residents could engage in more physical activities without imposing additional burden on human caregivers. The potential downsides of these robots—the possibility of injury and reluctance to rely on them physically—do not raise strong concerns among respondents. When it comes to communication tasks, however, agreement that robots and ICT help with social connection and reduce loneliness is noticeably lower than every other positive statement across the first four panels. And the statement that conversations with robots cannot substitute for human interaction is the only negative statement with an

[6]Another way to compare the sentiment indexes with the actual acceptance rate is to compute the probability that the sentiment index exceeds 5, the midpoint of the 1-9 scale, given the reported mean and standard deviation in Panels A-D of Table 7, assuming a normal distribution. This gives us 71 percent, which is reasonably close to the actual acceptance rate of 65 percent, for overall acceptance. By type, the calculated probabilities are 57, 74, and 62 percent for communication, mobility-aid, and monitoring robots, respectively, compared to the actual acceptance rates of 59, 70, and 66 percent, with a correlation of 0.92.

average score above the neutral midpoint.

Some comments from the open-ended questions at the end of the survey anecdotally support this interpretation. Several respondents suggest that because mobility-aid/lifting tasks are physically demanding but well suited to robotic substitution, offloading them could improve human caregivers' working conditions and free up time and energy for communication with residents, a task where humans are seen as less replaceable. One respondent wrote, "I want technology to be actively utilized, since that would let caregivers devote their energy to the things only a human can do." Another wrote, "I hope that introducing equipment and technology will give care workers more breathing room, increasing the time they can spend with elderly residents." A third respondent from the pilot survey drew the contrast explicitly. After noting that care robots would be especially useful for physically demanding tasks such as repositioning patients, they added, "though I'm a little uneasy about whether it's possible to build a sense of community with residents" through robots.

In the last set of statements, we focus on the relationship between robots/ICT and human caregivers. Consistent with the discussion above, respondents broadly agree that introducing robots and ICT would reduce the physical burden on care workers and allow them to devote more attention to residents, with an average score of 6.0, the highest in this panel. We next turn to how respondents view robots and ICT relative to employing more foreign care workers, an alternative approach to relieving care worker shortages that a growing literature focuses on (Grabowski et al., 2026; Kreider and Werner, 2025). On one hand, foreign care workers could be seen as a substitute for robots and ICT, if a sufficient inflow of foreign labor were to resolve the shortage directly. On the other hand, robots and ICT could instead complement foreign care workers, for instance by easing the language barrier they face and thereby enhancing their productivity. Respondents' answers favor the complementary view. They largely disagree that a sufficient supply of foreign care workers would remove the need for robots and ICT, with an average score of only 4.1. At the same time, they express some unease about relying on foreign care workers because of cultural and language differences, with an average score of 5.2, and they agree, with a somewhat higher average score of 5.5, that robots and ICT could ease this very language barrier and improve the quality of care foreign workers provide. Respondents are also mildly positive, with an average score of 5.2, that a larger foreign workforce would benefit Japan's economy and society more broadly. Taken together, these responses suggest that respondents view robots/ICT and foreign care workers less as competing solutions to the care worker shortage than as complementary ones, with robots and ICT potentially easing one of the frictions—the language barrier—that make relying on foreign care workers more difficult.

In considering the welfare implications of communication robots and ICT, one important aspect is how they affect the time residents spend communicating, whether with human caregivers or with robots. In an ideal scenario, communication robots and ICT would not reduce time spent with human caregivers, instead adding to it and increasing residents' total communication time. In a worst-case scenario, robots would simply substitute for human caregivers, leaving total communication time unchanged while reducing the human-only component. To understand respondents' expectations, we ask how introducing communication robots and ICT would affect (i) the total time residents spend communicating, with human caregivers and robots combined, and (ii) the time spent communicating with human caregivers alone, relative to a baseline of 2 hours per day, the average time care workers currently spend communicating with residents according to studies in Japan (Japan Public Health Association, 2011). Respondents who indicate a change in either measure are then asked to select the size of that change from four bracketed options (less than 30 minutes, 30 minutes to 1 hour, 1 to 2 hours, or more than 2 hours per day). We convert these responses into a continuous measure using the bracket median (15, 45, or 90 minutes), signed by the direction of change and top-coded at 180 minutes for the open-ended top bracket; respondents who report no change are assigned a value of zero. Table 8 reports the resulting distribution. On average, the results lie between the two extreme scenarios described above: total communication time is expected to increase, but at the expense of a small reduction in the human-only component. There is also substantial heterogeneity in both distributions. The majority of respondents do not expect a significant increase in the total communication time, which might be one of the reasons behind the communication robots being the least welcomed

Table 8: Distribution of Expected Changes in Communication Time

	Percentiles				
Variable	25th	50th	75th	Mean	N
Change in total communication time (minutes/day)	0	0	45	24.3	4,314
Change in human-only communication time (minutes/day)	-45	0	15	-6.7	4,314

Note: Change relative to a baseline of 2 hours per day. Constructed from the bracketed follow-up responses using the bracket median (15, 45, or 90 minutes), signed by direction of change and top-coded at ±180 minutes for the open-ended top bracket ("more than 2 hours"); respondents reporting no change are assigned a value of zero.

We also examine this consistency at the individual level using regressions. Specifically, we regress robot acceptance and WTP on each respondent's sentiment index—the general sentiment index for the pooled (Overall) specification, or the corresponding type-specific index for each type-restricted specification—along with the five statements on human and foreign caregivers (Panel E, Table 7), controlling for the same observable characteristics used throughout. For the Communication-type specification, we additionally include the two communication-time-change variables. Table 9 reports the results. Across all eight specifications, the sentiment index is a strong and highly significant predictor of both acceptance and WTP ($p < 0.01$ in every column). For example, in the pooled specification, a one-point increase in the sentiment index is associated with an increase in WTP of 16.3K yen, or about 11 percent of the baseline fee.

Table 9: Acceptance and WTP Regressions on Attitude Battery Responses

	Robot Acceptance				WTP for Robots			
	Overall	Comm.	Mobility	Monitor	Overall	Comm.	Mobility	Monitor
Sentiment index	0.1188***	0.0764***	0.1057***	0.0871***	16.2960***	8.6713***	13.6999***	15.6420***
	(0.0090)	(0.0119)	(0.0157)	(0.0136)	(2.0717)	(2.6105)	(3.8148)	(3.1417)
Reduces worker	-0.0023	0.0288**	-0.0063	0.0149	-0.0235	4.9384*	-1.5920	2.8283
burden	(0.0071)	(0.0122)	(0.0126)	(0.0118)	(1.6497)	(2.6783)	(3.0556)	(2.7357)
Foreign workers	-0.0306***	-0.0518***	-0.0322***	-0.0433***	-1.2858	-5.3788***	-1.5120	-1.5737
reduce need for tech	(0.0056)	(0.0094)	(0.0097)	(0.0090)	(1.2830)	(2.0591)	(2.3678)	(2.0722)
Foreign worker	-0.0022	-0.0096	0.0026	-0.0051	-1.8533*	-2.8756	0.1665	-3.3194*
barrier unease	(0.0046)	(0.0084)	(0.0076)	(0.0082)	(1.0680)	(1.8383)	(1.8589)	(1.9044)
Tech eases foreign	0.0003	0.0007	0.0138	-0.0064	0.0792	-1.2141	1.4084	-0.2618
worker barrier	(0.0070)	(0.0126)	(0.0122)	(0.0122)	(1.6264)	(2.7573)	(2.9777)	(2.8093)
Foreign workers	-0.0013	0.0021	-0.0039	-0.0010	-1.9539	-0.4394	0.8067	-5.1495**
benefit economy	(0.0061)	(0.0110)	(0.0106)	(0.0105)	(1.4112)	(2.4065)	(2.5761)	(2.4239)
Change in total		-0.0002				-0.0834		
communication time		(0.0002)				(0.0520)		
Change in human		0.0002				0.0067		
communication time		(0.0002)				(0.0523)		
Constant	0.2085*	0.6365***	0.4123**	0.2456	0.5305	79.3632*	10.5834	-9.3318
	(0.1123)	(0.1969)	(0.1866)	(0.1911)	(25.9528)	(43.1680)	(45.3780)	(44.1898)
N	4,314	1,464	1,395	1,455	4,314	1,464	1,395	1,455
R^2	0.126	0.098	0.148	0.111	0.034	0.034	0.038	0.045

Note: OLS estimates; standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The Overall column uses the general sentiment index (Q28) and the pooled sample; the Communication/Mobility/Monitor columns use that type's own sentiment index (Q31/Q30/Q29, respectively) and restrict the sample to respondents randomly assigned to that type. All columns control for the same regressors as the small set in Tables 2 and 5 (age, gender, university education, marital status, health, employment, number of children, having a child within walking distance, technology familiarity, perceived chance of needing long-term care, perceived care worker sufficiency in 10 years, expecting to wait 1+ years for a public nursing home, having heard of caregiving robots/ICT, and home ownership; robot/ICT type dummies in the Overall column only), not individually reported here. The change in total and human-only communication time is only controlled for in the Communication columns; both are measured in minutes relative to a 2-hour/day baseline.

Among the statements on human and foreign caregivers, the clearest pattern is that respondents who agree a larger supply of foreign care workers would reduce the need for robots and ICT are significantly less likely to accept robots in every specification and, for communication robots specifically, are also willing to pay significantly less for them. Recall that, on average, respondents mildly disagree with this statement, with the average agreement score of 4.1 (see Section 4.3). This, combined with the fact that respondents overall agree (mean 5.5) that robots/ICT can ease foreign workers' language barrier, suggests that the average respondent sees robots and foreign caregivers as complements. However, there can be heterogeneity in the perceived complementarity and substitutability between the two. The negative coefficients on this statement imply that those who view robots and foreign caregivers as substitutes are less willing to accept care robots and ICT.

Finally, expected changes in communication time—both in total and with human caregivers specifically—are not significantly associated with either acceptance or WTP for communication robots. This may imply that respondents' preferences for communication robots and ICT are shaped more by the perceived nature and quality of conversations with those robots, not by the changes in the communication time.

Appendix Table B8 reruns these regressions after replacing each panel's aggregated sentiment index with its four individual underlying items, entered without reverse-coding. Some patterns emerge. First, as expected, coefficients on positively framed statements are mostly positive and those on negatively framed statements are mostly negative; in fact, every statistically significant coefficient carries the expected sign, with sign reversals occurring only among statistically insignificant estimates. Second, statements do not carry equal weight. In particular, in every panel, the largest-magnitude coefficient on acceptance belongs to a negatively framed statement, and averaged across panels, the magnitude of coefficients on negatively framed statements is roughly 80 percent larger than on positively framed statements. This suggests that disagreement with a stated concern carries more weight in respondents' acceptance decisions than agreement with a stated benefit.

4.4 Credibility of Survey Responses

The credibility of this paper's findings hinges on the quality of responses to the main battery of survey questions: the hypothetical nursing home choice questions. A critical check is therefore whether respondents correctly understood the hypothetical scenario presented to them. After introducing the scenario and before eliciting choices, the survey administers four comprehension test questions: two on the hypothetical health situation (age and remaining life expectancy) and two on the nursing home options (the care domain in which robots and ICT are used in Nursing Home B and the cost comparison between the two nursing homes). Each question is asked at most twice. If a respondent answers any question incorrectly in the first round, the survey displays the correct answers and re-administers only the missed questions in the second round. Table 10 shows that respondents understood the hypothetical scenario well. In the first round, the average respondent answered approximately three of the four questions correctly. By the second round, about 70 percent answered all four questions correctly. This establishes that respondents completed the nursing home choice questions with a sound understanding of the hypothetical scenario, supporting the credibility of their responses. As documented above, acceptance, WTP, and the gap between robot types in both measures are all larger among full scorers than in the full sample, indicating that these patterns are not driven by misunderstanding of the survey questions.

Table 10: Number of Correct Answers to the Comprehension Test Questions

	Percentiles					
Variable	10th	25th	50th	75th	90th	Mean
First trial	1	1	3	4	4	2.6
Second trial	2	3	4	4	4	3.4

Note: N = 4,314. The full score is 4.

Another source of support for the credibility of our results is the internal consistency between responses to the nursing home choice questions and responses to the robot/ICT attitude battery. As discussed above, respondents' attitudes toward robots and ICT are, on net, positive, and this net positivity is most pronounced for mobility-aid robots and least pronounced for communication robots, mirroring the same ranking found in both acceptance and WTP. Even stronger support for internal consistency is the strong and robust association between sentiment indexes and robot acceptance and WTP at the individual level (Table 9). This makes it more likely that the observed acceptance and WTP patterns reflect genuine underlying preferences rather than noise in survey responses.

5 Comparing Benefits and Costs of Caregiving Robots and ICT

Given that we now have estimates of increases in consumer surplus associated with introducing robots and ICT to nursing homes—measured as WTP—we compare them with the costs associated with introducing such robots. Note that the calculations we present in this section are back-of-the-envelope, since both our measures of benefits and costs rely on a number of assumptions. Still, this exercise demonstrates how our survey measures can help provide broad, suggestive guidance on whether introducing robots can be justified on cost-benefit grounds.

We take the average WTP from the sample as our measure of benefits (per person, per month). The first two columns in Table 11 report, again, the average WTP from the full sample and the full scorers. These numbers should be interpreted with some caveats. First, if the introduction of robots and ICT can increase the supply of nursing home care services and reduce the waiting time to enter a nursing home, this can be an additional source of consumer surplus. But it is not captured in our WTP measure, as our survey abstracts from the waiting time issue. Second, Japanese public LTC insurance covers 70 to 90 percent of LTC costs. Respondents may therefore be reluctant to state a high WTP when the survey frames the entire premium for the preferred nursing home option as an out-of-pocket cost, even if their true valuation of the improvement is higher. Considering these two points, our benefit measures might be underestimates.

Table 11: Benefits and Costs of Caregiving Robots and ICT, by Type

	Benefits		Costs			
	Overall	Full Scorers	Cost (A)	Users (B)	Monthly Depreciation Rate (C)	Cost per Person per Month (D)
Communication	7.5	8.3	400	2	1.67%	3.3
Mobility	17.2	24.8	1,640	15	1.67%	1.8
Monitoring	12.7	16.4	400	2	1.67%	3.3

Note: Benefits columns report average willingness-to-pay (WTP) for the robot-equipped facility, in thousand (K) yen per month, computed directly from survey responses (see Table 5). "Overall" uses the full sample; "Full Scorers" restricts to respondents with a perfect comprehension-check score after retry (Section 4.4). Cost (A) is in thousand (K) yen; sources for supply-side cost figures are discussed in the text. $D = (A/B) \times C$.

To compute the cost per person per month, we proceed in three steps. First, we obtain a rough estimate of the price of the type of machine considered, reported in the third column (A). Second, we examine how many users typically share the same machine, reported in the fourth column (B). Third, we determine the monthly depreciation rate, reported in the fifth column (C). The cost per person per month, reported in the last column, is then calculated as $(A/B) \times C$. These numbers should also be interpreted with caveats. If robots and ICT can reduce the number of caregivers employed, this can reduce costs. On the other hand, our numbers do not take into account additional operational costs, such as training caregivers and staff on how to use these robots and ICT. Finally, future technological developments, particularly in AI, could dramatically change the costs of these machines.

For the depreciation rate, we assume that all robots and ICT are used for five years, based on a discussion of typical useful lives for nursing-care robots (2ndLabo, 2026). For the communication robot, our estimate is based on a high-end model, PARO, a therapeutic robot seal, which costs 400K yen (Pet Robot, 2026), and we assume that it is shared by two residents in a semi-private room. For the mobility robot, according to our consultation with the Oita Prefecture Council of Social Welfare and one nursing home we visited in preparation for this research (Green Garden Minami-Oita), typically one floor-traveling lift and one standing lift are shared by a group of 15 residents. A floor-traveling lift typically costs 560K yen (Iura, 2026) and a standing lift costs 1,080K yen (Fuji Corporation, 2026). Lastly, for the monitoring robot, our estimate is based on a high-end model, HitomeQ, a ceiling-camera system with skeletal-recognition AI, which costs 400K yen per room (Physical

AI Hojokin Nabi, 2026), and we again assume that it is shared by two residents in a semi-private room. Considering a high-end model in each category, along with the typical number of residents sharing each device, corresponds to a situation in which a substantial share of care in each domain is provided using robots and ICT under current technology.

The resulting Table 11 shows that, under our assumptions, the benefits are much larger than the costs. While the benefit is only about 2.3 times larger than the cost for the communication robot, it is as much as 9.6 times larger for the mobility robot, based on the overall sample (even larger among full scorers). Although these numbers are back-of-the-envelope calculations with many assumptions, as discussed above, the results provide suggestive evidence that introducing robots and ICT can be welfare-improving and pass a cost-benefit test, in particular for mobility-aid robots and ICT. A more accurate cost-benefit analysis would require additional studies on how robots and ICT affect the supply side, for example by estimating cost elements not included in our analysis, such as training of care workers and changes to work organization.

6 Conclusion

This paper presents novel large-scale evidence on older individuals' preferences for caregiving robots and ICT, drawing on a custom-designed survey of 4,314 Japanese individuals aged 55 to 75. We find a strong overall preference for caregiving robots and ICT. About two-thirds of respondents choose a nursing home where a substantial share of care is provided using robots and ICT over an all-human alternative, and on average, they are willing to pay 8 percent above the typical nursing home fee for access to such a facility. Acceptance and WTP both vary significantly by robot type, with mobility-aid robots the most preferred and communication robots the least preferred. A back-of-the-envelope cost-benefit calculation based on our WTP estimates provides suggestive evidence that the benefits of introducing robots and ICT are likely to be much larger than the costs, particularly for mobility-aid robots.

Our findings have direct policy implications. First, at least in Japan, it is unlikely that people's overall dispreference for robotic care can be a major obstacle to using robots and ICT as a solution to the LTC shortage. Second, although a non-negligible fraction of respondents prefer the all-human alternative to a nursing home where a substantial share of care is provided using robots and ICT, having heard of caregiving robots and ICT prior to the survey is strongly associated with both acceptance and WTP. This suggests that informing individuals about the functions these robots are capable of could be important if the government wants to continue pursuing this policy direction. Third, preferences for mobility-aid robots are the strongest among the three types we consider, implying that mobility-aid robots should be the top priority for policy support.

While our findings from Japan—the country that began experiencing the effects of population aging decades before most other countries—are informative, they cannot necessarily be generalized elsewhere. Cultural differences may play an important role in shaping acceptance of caregiving robots and ICT. Japan's culture of not wanting to be a burden on others ("meiwaku") may make it a country particularly well suited for robot caregivers to thrive. In their open-ended comments, several respondents cited not wanting to be a burden on others as a key reason to welcome robots and ICT. Other contextual factors, such as the availability of foreign care workers and how well they are already integrated into the economy, are also likely to be important. Examining people's opinions toward caregiving robots and ICT in other countries with aging populations is therefore an important next step for future research.

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A Survey Questionnaire (English Translation)

Survey on Life in Later Age

- As the population continues to age, there is growing interest in the use of care technology in nursing homes and other care facilities. This survey was developed as part of a research project on care technology conducted jointly by Keio University, the National Graduate Institute for Policy Studies (GRIPS), Seikei University, and Carleton University.
- This survey is anonymous. You are not required to provide your name. The information collected will be carefully managed, and no personal information about participants will be disclosed to any third party.
- Your responses will be statistically processed in a form that cannot identify any individual, and will be used solely for non-commercial academic research purposes. The anonymized data may be shared with other researchers for research purposes, or may be made publicly available in the future.
- Participation in this survey is voluntary. You may stop answering the questions at any time. However, because this survey is conducted anonymously, it will not be possible to withdraw your data after your responses have been submitted.
- So that your responses reflect your honest views, please answer as intuitively as possible. The survey is expected to take approximately 10 to 20 minutes, but there is no time limit — please take as much time as you need.
- This research is conducted in accordance with the ethical guidelines established by the researchers' respective institutions, which serve as the overarching ethical standard for the project. In addition, in accordance with the Statistics Act, we are obligated to properly manage the information collected through this questionnaire and are bound by a duty of confidentiality. Through these measures, we protect participants' rights and ensure compliance with applicable laws.

Thank you for your cooperation.

Principal Investigator: Keisuke Otsu (Professor, Faculty of Business and Commerce, Keio University)

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Survey conducted by: Survey Research Center Co., Ltd. and NTT Com Research

* A note from NTT Com Research:

Any inquiries or comments concerning the content of this survey or how to respond to it will be forwarded to the principal investigator, with any personal information removed.

(Screening Questions)

QA How old are you? (Please answer with a number.)

[Mandatory]

[Numeric entry box] years old

- *If QA = 55–74, proceed to QB.*
- *If QA < 55 or QA ≥ 75, display: "Thank you for your willingness to cooperate with this survey. Unfortunately, you are not eligible to participate." and end the survey.*

QB In which prefecture do you live?

[Mandatory]

[List of prefectures displayed]

QC Do you currently need help from someone else with any activities of daily living (e.g., eating, dressing, bathing, walking across a room, getting in or out of bed)? Please select the one option that applies.

[Mandatory]

1. Yes
2. No

- *If QC = "2. No", proceed to Q1 of the main survey.*
- *If QC = "1. Yes", display: "Thank you for your willingness to cooperate with this survey. Unfortunately, you are not eligible to participate." and end the survey.*

(Main Survey)

Q1 Which of the following best describes your gender? Please select the one option that applies.

[Mandatory]

1. Male
2. Female
3. Other / Prefer not to say

Q2 Which of the following best describes the last school you graduated from? Please select the one option that applies.

[Mandatory]

1. Junior high school
2. High school (full-time)
3. High school (part-time or correspondence)
4. Advanced vocational school
5. College of technology
6. Junior college
7. Specialized/vocational school
8. 4-year university
9. Graduate school
10. Other (please specify)

Q3 Which of the following best describes your current marital status?

[Mandatory]

1. Married
2. In a common-law or cohabiting relationship
3. Separated
4. Widowed
5. Divorced
6. Single, never married

Q4 Which of the following is closest to your current state of health? Please select one.

[Mandatory]

1. Excellent
2. Good

3. Fair
4. Not very good
5. Poor

Q5 Which of the following best describes your current work situation? Please select the one option that applies. If you have more than one job, please answer only about your main job.

[Mandatory]

1. Executive or officer of a company, corporation, or other organization
2. Regular employee (full-time/permanent staff)
3. Non-regular employee (e.g., contract employee, temporary/dispatched staff, part-time employee, casual worker; including at-home work and day labor)
4. Self-employed (including family workers)
5. Freelance
6. Retired
7. Looking for work (including job-seeking after retirement)
8. Not working, for reasons other than retirement

Q6 Please tell us the total amount of savings and investments that you [and your spouse/partner, where applicable] hold (e.g., time deposits, private life insurance, individual annuity/pension products such as NISA or iDeCo, postal life insurance, agricultural (JA) or other mutual-aid insurance, postal annuities, accumulation-type injury insurance, stocks, investment trusts, and bonds (government or corporate)).

[Mandatory]

** If you have a spouse or a common-law/cohabiting partner, please include their savings as well. If not, please answer with your own total.*

[Drop-down list with wealth brackets, with the last option "Don't know/Prefer not to say"]

- *If Q6 = Don't know/Prefer not to say, proceed to Q6a. Otherwise, jump to Q7.*

Q6a For those who answered "don't know / prefer not to say" to the previous question, we would like to ask in broader terms: approximately how much are your total savings and investments?

[Mandatory]

1. Less than ¥5,000,000
2. ¥5,000,000 to less than ¥10,000,000
3. ¥10,000,000 to less than ¥20,000,000
4. ¥20,000,000 or more
5. Don't know / prefer not to say

Q7 Do you [or your spouse/partner, where applicable] own any of the following real estate? Please select all that apply.

[Mandatory]

** If you have a spouse or a common-law/cohabiting partner, please include their real estate as well. If not, please answer with your own real estate.*

1. Your current residence
2. A vacation home (second house) or other real estate
3. Own neither of the above

- *If Q7 = "1. Current residence" or "2. Vacation home/other real estate" (one or more), proceed to Q7a.*
- *If Q7 = "3. Own neither of the above", proceed to Q8.*

Q7a Please tell us the total market value of all real estate that you [or your spouse/partner, where applicable] own, and the total outstanding balance of any mortgage(s) on that real estate.

[Mandatory]

** If you have a spouse or a common-law/cohabiting partner, please include their real estate and mortgage balance as well. If not, please answer with your own real estate and mortgage balance.*

A. Total market value of real estate

[Drop-down list with value brackets, with the last option being "Don't know/Prefer not to say"]

B. Total outstanding mortgage balance on real estate

[Drop-down list with value brackets, with the last option being "Don't know/Prefer not to say"]

Q8 Aside from any mortgage(s), what is the total amount of debt that you [or your spouse/partner, where applicable] currently have (e.g., credit card balances, auto loans, student loans, or other personal loans)?

[Mandatory]

** If you have a spouse or a common-law/cohabiting partner, please include their debt as well. If not, please answer with your own debt.*

[Drop-down list with value brackets, with the last option being "Don't know/Prefer not to say"]

- *If Q8 = Don't know/Prefer not to say, proceed to Q8a. Otherwise, please skip to Q9.*

Q8a For those who answered "don't know / prefer not to say" to the previous question, we would like to ask in broader terms: approximately how much is your total debt, aside from any mortgage(s)?

[Mandatory]

1. Less than ¥500,000
2. ¥500,000 to less than ¥1,000,000
3. ¥1,000,000 to less than ¥5,000,000
4. ¥5,000,000 or more
5. Don't know / prefer not to say

Q9 What is the total pre-tax income (see note below) of your household (yourself and any family members with whom you share living expenses) for the year 2025?

[Mandatory]

** Total income before deductions such as taxes and social insurance premiums, including wages/salary, social security benefits, gifts, and property income. Please exclude any inheritance.*

[Drop-down list with value brackets, with the last option being "Don't know/Prefer not to say"]

- *If Q9 = Don't know/Prefer not to say, proceed to Q9a. Otherwise, skip to Q10.*

Q9a For those who answered "don't know / prefer not to say" to the previous question, we would like to ask in broader terms: approximately how much was your household's total pre-tax income for 2025?

[Mandatory]

1. Less than ¥1,500,000
2. ¥1,500,000 to less than ¥3,000,000
3. ¥3,000,000 to less than ¥5,000,000
4. ¥5,000,000 to less than ¥7,000,000
5. ¥7,000,000 to less than ¥12,000,000
6. ¥12,000,000 or more

7. Don't know / prefer not to say

Q10 In total, how many living children do you have, including any who live apart from you (for example, because they are now independent)? Please include biological, step, and adopted children.

[Mandatory]

1. 0
2. 1
3. 2
4. 3
5. 4
6. 5
7. 6
8. 7
9. 8
10. 9
11. 10
12. 11 or more

- *If Q10 = "2. 1" through "12. 11 or more", proceed to Q10a.*
- *If Q10 = "1. 0", proceed to Q12.*

The following questions ask about the child who currently lives closest to your home.

Q10a Does that child currently live with you, or within walking distance?

[Mandatory]

1. Yes
2. No

- *If Q10a = "2. No", proceed to Q11.*
- *If Q10a = "1. Yes", proceed to Q12.*

Q11 Approximately how far away from your home does that child live?

[Mandatory]

1. About less than 1 hour one-way by transportation
2. About 1 to less than 3 hours one-way by transportation
3. About 3 hours or more one-way by transportation

Q12 Do you use a smartphone on a regular basis?

[Mandatory]

1. Yes
2. No

Q13 Do you use email on a regular basis?

[Mandatory]

1. Yes
2. No

Q14 Do you use messaging or video-call apps such as LINE, FaceTime, or Zoom, or social-networking services such as Facebook, Instagram, or X (Twitter), on a regular basis to stay connected with people close to you?

[Mandatory]

1. Yes
2. No

Q15 Do you use online shopping services such as Rakuten, Amazon, or Yahoo! Shopping, delivery apps such as demae-can or Uber Eats, or taxi-hailing apps such as S-Ride or GO, on a regular basis?

[Mandatory]

1. Yes
2. No

For the next several questions, we would like to know what you think about the likelihood that certain events will happen in the future. Please answer intuitively, using a scale from 0% to 100%.

Here, "0%" means "I am certain this event will not happen," and "100%" means "I am certain this event will happen." For example, no one can be completely certain about tomorrow's weather, but if you think it is unlikely to rain, you might answer "15%"; if you think it is very likely to rain, you might answer "85%."

- *[Insert a sample image of the response screen (an actual screenshot of the response interface).]*

Certainly will not happen *Certainly will happen*

0%	5%	15%	25%	35%	45%	55%	65%	75%	85%	95%	100%
○	○	○	○	○	○	○	○	○	○	○	○

- *Display Q16, Q16a, and Q16b on the same screen.*

Q16 By "activities of daily living (ADLs)", we mean activities such as eating, dressing, bathing, walking around a room, and getting in and out of bed.

What do you think is the probability that, at some point during your lifetime, you will need help with any of these activities of daily living for 1 year or more?

[Mandatory]

Certainly will not happen *Certainly will happen*

0%	5%	15%	25%	35%	45%	55%	65%	75%	85%	95%	100%
○	○	○	○	○	○	○	○	○	○	○	○

Q16a What do you think is the probability that, at some point during your lifetime, you will need help with any activities of daily living — such as eating, dressing, bathing, walking around a room, or getting in and out of bed — for 2 years or more?

[Mandatory]

Certainly will not happen *Certainly will happen*

0%	5%	15%	25%	35%	45%	55%	65%	75%	85%	95%	100%
○	○	○	○	○	○	○	○	○	○	○	○

- *If Q16a (2 years or more) > Q16 (1 year or more), display the error message: "The probability of needing help with activities of daily living for 2 years or more cannot exceed the probability of needing help for 1 year or more. Please correct your answer to either this question or the one above."*

Q16b What do you think is the probability that, at some point during your lifetime, you will need help with any activities of daily living — such as eating, dressing, bathing, walking around a room, or getting in and out of bed — for 4 years or more?

[Mandatory]

Certainly will not happen *Certainly will happen*

0%	5%	15%	25%	35%	45%	55%	65%	75%	85%	95%	100%
○	○	○	○	○	○	○	○	○	○	○	○

- *If Q16b (4 years or more) > Q16a (2 years or more), display the error message: "The probability of needing help with activities of daily living for 4 years or more cannot exceed the probability of needing help for 2 years or more. Please correct your answer to either this question or the one above."*

Perceptions of Current Nursing Homes

In this section, we will ask about your impressions of nursing homes in your area.

Q17 What is your impression of the current "number of care workers relative to the number of residents" at nursing homes? Please answer intuitively, treating a score of 0 as "very insufficient" and a score of 10 as "fully sufficient."

[Mandatory]

Very insufficient Fully sufficient

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Q18 Ten years from now, what do you think the "number of care workers relative to the number of residents" at nursing homes will be? Please answer intuitively, treating a score of 0 as "very insufficient" and a score of 10 as "fully sufficient."

[Mandatory]

Very insufficient Fully sufficient

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Q19 Suppose that in the future your health deteriorates and you become eligible to enter a publicly subsidized nursing home (such as a Tokubetsu Yougo Roujin Home). Intuitively, how long do you think you would have to wait before being admitted?

[Mandatory]

1. No waiting at all
2. 1 to 3 months
3. 3 to 6 months
4. 6 months to 1 year
5. 1 to 2 years
6. 2 years or more

Q20 Suppose that in the future your health deteriorates and you need to enter a nursing home. Which type of facility would you like to use?

[Mandatory]

1. A public nursing home (e.g., a Tokubetsu Yougo Roujin Home)
2. A private nursing home (e.g., a fee-based nursing home offering long-term care)
3. Either would be fine

- *If Q20 = "1. Public nursing home" or "2. Private nursing home", proceed to Q20a. Otherwise, skip to Q21.*

Q20a Why did you choose that type of facility? Please select all that apply.

[Mandatory]

1. Higher quality

2. Shorter waiting time
3. Lower cost
4. Other (please specify)

Q21 Have you heard of care robots, equipment, or ICT technology used to provide care to residents at nursing homes?

[Mandatory]

1. Yes
2. No

Information on Care Robots/Technology

Here, "care robots/technology" refers to devices or systems used in caregiving that make use of ICT (information and communication technology), robotics, or similar technologies. Care robots/technology have the following characteristics:

- They can collect information.
- They can make a judgment.
- They can move or operate.

Below are some examples of care robots/technology. The images shown are just examples; actual devices may look different, but you can assume they have the functions described below.

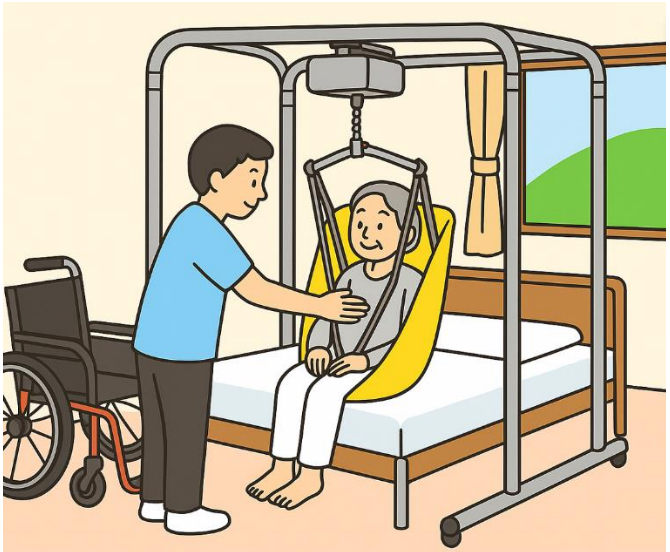
Type 1: Communication robots/technology

Expected functions:

- Improve residents' everyday life through two-way communication.
- Suggest appropriate care services based on information gathered through communication.
- Share collected information with the residents themselves, their families, and care workers.

Illustration source: "Definition of Priority Areas for the Use of Care Technology" (Ministry of Economy, Trade and Industry). Accessed January 5, 2026.

Type 2: Mobility robots/technology (lift devices)



Expected functions:

- Help residents transfer between beds, wheelchairs, and similar.
- Help maintain residents' physical balance during activities of daily living, such as using the toilet.
- Allow some tasks, such as bathing assistance, to be carried out with fewer care workers than usual.

- *"Activities of daily living" is a hover-linked term. Linked explanatory text: "Activities of daily living" refers to activities such as eating, dressing, bathing, walking around a room, and getting in and out of bed.*

Illustration source: "Definition of Priority Areas for the Use of Care Technology" (Ministry of Economy, Trade and Industry). Accessed January 5, 2026.

Type 3: Monitoring robots/technology

Expected functions:

- Allow care workers to monitor multiple residents at once, day and night, using sensors.

- Accumulate information about residents and share it with the residents themselves, their families, and care workers.
- Contact care workers when attention is needed.

Illustration source: "Definition of Priority Areas for the Use of Care Technology" (Ministry of Economy, Trade and Industry). Accessed January 5, 2026.

Q22 Do you have any family members or relatives living in a nursing home that uses even one form of care robot/technology?

[Mandatory]

1. Yes
2. No
3. Don't know

- *If Q22 = "1. Yes", proceed to Q22-1.*
- *If Q22 = "2. No" or "3. Don't know", proceed to the next section.*

Q22-1 Which type(s) of care robots/technology are used? Please select all that apply.

[Mandatory]

1. Communication robots/technology
2. Mobility robots/technology (lift devices)
3. Monitoring robots/technology
4. Other robots/technology

Choice between Nursing Homes with and without Robots/Technology

- *Display on a new screen.*

The hypothetical scenario is as follows:

- You are 85 years old.
- You are expected to live for about 2 more years (24 months).
- Your physical and mental health has already declined significantly, and you meet the eligibility conditions to enter a publicly subsidized nursing home (such as a Tokubetsu Yougo Roujin Home).
- Specifically, you have difficulty with multiple activities of daily living and require significant help with them in daily life.
- You also have noticeable difficulties with memory and reasoning.
- For your family situation, financial situation, and other aspects of your life, please imagine the most likely situation you would face at age 85.

- *"Activities of daily living" is a hover-linked term. Linked explanatory text: "Activities of daily living" refers to activities such as eating, dressing, bathing, walking around a room, and getting in and out of bed.*

- *Display on a new screen.*

For research purposes, it is very important to first confirm that you have understood the hypothetical scenario.

Q23_1 In this hypothetical scenario, how old are you?

[Mandatory]

1. [Age given in QA] years old
2. 85 years old

- *Option 1 displays the respondent's age as entered in QA.*

Q23_2 In this hypothetical scenario, how long are you expected to live?

[Mandatory]

1. I am expected to live for about 2 more years (24 months).
2. I don't know how long I will live.

- *If Q23_1 = "2. 85 years old" and Q23_2 = "1. About 2 more years (24 months)", display: "You answered all questions correctly. Thank you for confirming your understanding of the hypothetical scenario." and proceed to the introduction to the next set of questions ("In the next set of questions...").*
- *If Q23_1 = "2. 85 years old" and Q23_2 = "2. I don't know how long I will live", display: "You answered 1 question correctly. In the hypothetical scenario, you are expected to live for about 2 more years (24 months). Because this is very important for the purposes of this research, please review the hypothetical scenario again and answer the remaining question one more time." and return to the scenario-review screen.*
- *If Q23_1 = "1. [age from QA]" and Q23_2 = "1. About 2 more years (24 months)", display: "You answered 1 question correctly. In the hypothetical scenario, you are 85 years old. Because this is very important for the purposes of this research, please review the hypothetical scenario again and answer the remaining question one more time." and return to the scenario-review screen.*
- *If Q23_1 = "1. [age from QA]" and Q23_2 = "2. I don't know how long I will live", display: "You answered 0 questions correctly. In the hypothetical scenario, you are 85 years old. In the hypothetical scenario, you are expected to live for about 2 more years (24 months). Because this is very important for the purposes of this research, please review the hypothetical scenario again and answer the remaining questions one more time." and return to the scenario-review screen.*
- *Display the hypothetical-scenario review screen on a new page (the scenario is shown again, as above).*
- *Q23_1_2 will be asked only if Q23_1 = "1. [age from QA]",*
- *Q23_2_2 will be asked only if Q23_2 = "2. I don't know how long I will live",*

Q23_1_2 In this hypothetical scenario, how old are you?

[Mandatory]

1. [Age given in QA] years old
2. 85 years old

Q23_2_2 In this hypothetical scenario, how long are you expected to live?

[Mandatory]

1. I am expected to live for about 2 more years (24 months).
2. I don't know how long I will live.

- *Depending on the combination of (final) answers to Q23_1/Q23_1_2 and Q23_2/Q23_2_2, one of several feedback messages is displayed confirming how many questions were answered correctly and restating any point answered incorrectly just as after the first trial, before proceeding to the introduction to the next set of questions.*

In the next set of questions, we will ask you to compare two nursing homes. Neither facility has any waiting time.

In one facility (Facility A), all care is provided by human caregivers. In the other (Facility B), some of the care is provided using care robots/technology.

- *Display on a new screen.*

Please imagine the two facilities below, assuming that you yourself are 85 years old, expected to live for about 2 more years (24 months), and in the care-dependent state described in the hypothetical scenario above, meeting the conditions for admission to a publicly subsidized nursing home.

Facility Conditions

- Facility A: All care is provided by human hands.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands.

Aside from this, Facilities A and B are identical, as follows:

- Monthly cost: approximately ¥150,000 (out-of-pocket cost after subsidies, long-term care insurance, etc.)
- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

- *[Robot_area] is randomly assigned, with equal probability, to one of: "monitoring," "mobility (lift)," or "communication." (The same word is used for [Robot_area] throughout the rest of the survey.)*
- *Whichever term is shown for [Robot_area] ("monitoring," "mobility (lift)," or "communication") is hover-linked to the corresponding explanatory screen from the Type 1/2/3 descriptions above.*
- *Display on a new screen.*

For research purposes, it is very important to first confirm that you have understood the facility conditions.

Q24_1 At Facility B, is all of the care provided using robots?

[Mandatory]

1. All of the care is provided using robots.
2. Some of the care is provided using robots.

Q24_2 Is there a difference in cost between Facility A and Facility B?

[Mandatory]

1. There is a difference in cost.
2. There is no difference in cost.

- *If Q24_1 = "2. Some of the care..." and Q24_2 = "2. No difference in cost", display: "You answered all questions correctly. Thank you for confirming your understanding of the facility conditions." and proceed to Q25.*
- *If Q24_1 = "2. Some of the care..." and Q24_2 = "1. There is a difference in cost", display: "You answered 1 question correctly. The monthly cost is ¥150,000 for both Facility A and Facility B. Please review the facility conditions again and answer the remaining question one more time." and return to the facility-conditions review screen.*
- *If Q24_1 = "1. All of the care..." and Q24_2 = "2. No difference in cost", display: "You answered 1 question correctly. At Facility B, care related to [Robot_area] in particular has a substantial portion provided using care robots/technology, while all other care is provided by human hands. Please review the facility conditions again and answer the remaining question one more time." and return to the facility-conditions review screen.*
- *If Q24_1 = "1. All of the care..." and Q24_2 = "1. There is a difference in cost", display: "You answered 0 questions correctly. At Facility B, care related to [Robot_area] in particular has a substantial portion provided using care robots/technology, while all other care is provided by human hands. The monthly cost is ¥150,000 for both Facility A and Facility B. Please review the facility conditions again and answer the remaining questions one more time." and return to the facility-conditions review screen.*
- *Display the facility-conditions review screen on a new page (the facility conditions are shown again, as above).*

- *Q24_1_2 is asked only if Q24_1 = "1. All of the care...".*
- *Q24_2_2 is asked only if Q24_2 = "1. There is a difference in cost".*

Q24_1_2 At Facility B, is all of the care provided using robots?

[Mandatory]

1. All of the care is provided using robots.
2. Some of the care is provided using robots.

Q24_2_2 Is there a difference in cost between Facility A and Facility B?

[Mandatory]

1. There is a difference in cost.
2. There is no difference in cost.

- *Depending on the combination of (final) answers to Q24_1/Q24_1_2 and Q24_2/Q24_2_2, one of several feedback messages is displayed confirming how many questions were answered correctly and restating any point answered incorrectly just as after the first round of questions, before proceeding to Q25.*

Q25 Please imagine these two facilities once more.

[Mandatory]

Facility Conditions

- Facility A: All care is provided by human hands.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands.

Aside from this, Facilities A and B are identical, as follows:

- Monthly cost: approximately ¥150,000 (out-of-pocket cost after subsidies, long-term care insurance, etc.)
- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

Assuming that you yourself are 85 years old, expected to live for about 2 more years (24 months), and in the care-dependent state described in the hypothetical scenario above (meeting the conditions for admission to a publicly subsidized nursing home), which of the two facilities would you choose to enter?

1. Facility A
2. Facility B

- *If Q25 = "1. Facility A", proceed to Q26_1.*
- *If Q25 = "2. Facility B", proceed to Q26_2.*

Q26_1 Now, please suppose that Facility A and Facility B come with different costs. Aside from cost, everything else is the same as the "Facility Conditions" shown previously.

[Mandatory]

New Facility Conditions

- Facility A: All care is provided by human hands. Cost: **¥200,000**/month.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands. Cost: ¥150,000/month.

Aside from cost, Facilities A and B are identical, as follows:

- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

In this case, which facility would you choose?

1. Facility A
2. Facility B

- *If Q26_1 = "1. Facility A", proceed to Q26_3.*
- *If Q26_1 = "2. Facility B", proceed to Q26_4.*

Q26_2 Now, please suppose that Facility A and Facility B come with different costs. Aside from cost, everything else is the same as the “Facility Conditions” shown previously.

[Mandatory]

New Facility Conditions

- Facility A: All care is provided by human hands. Cost: ¥150,000/month.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands. Cost: **¥200,000**/month.

Aside from cost, Facilities A and B are identical, as follows:

- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

In this case, which facility would you choose?

1. Facility A
2. Facility B

- *If Q26_2 = "1. Facility A", proceed to Q26_5.*
- *If Q26_2 = "2. Facility B", proceed to Q26_6.*

Q26_3 Now, please suppose that Facility A and Facility B come with different costs. Aside from cost, everything else is the same as the “Facility Conditions” shown previously.

[Mandatory]

New Facility Conditions

- Facility A: All care is provided by human hands. Cost: ¥300,000/month.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands. Cost: ¥150,000/month.

Aside from cost, Facilities A and B are identical, as follows:

- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

In this case, which facility would you choose?

1. Facility A
2. Facility B

- *Skip to the next section.*

Q26_4 Now, please suppose that Facility A and Facility B come with different costs. Aside from cost, everything else is the same as the “Facility Conditions” shown previously.

[Mandatory]

New Facility Conditions

- Facility A: All care is provided by human hands. Cost: ¥170,000/month.

- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands. Cost: ¥150,000/month.

Aside from cost, Facilities A and B are identical, as follows:

- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

In this case, which facility would you choose?

1. Facility A
2. Facility B

- *Skip to the next section.*

Q26_5 Now, please suppose that Facility A and Facility B come with different costs. Aside from cost, everything else is the same as the "Facility Conditions" shown previously.

[Mandatory]

New Facility Conditions

- Facility A: All care is provided by human hands. Cost: ¥150,000/month.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands. Cost: ¥170,000/month.

Aside from cost, Facilities A and B are identical, as follows:

- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

In this case, which facility would you choose?

1. Facility A
2. Facility B

- *Skip to the next section.*

Q26_6 Now, please suppose that Facility A and Facility B come with different costs. Aside from cost, everything else is the same as the "Facility Conditions" shown previously.

[Mandatory]

New Facility Conditions

- Facility A: All care is provided by human hands. Cost: ¥150,000/month.
- Facility B: For care related to [Robot_area], a substantial portion is provided using care robots/technology; all other care is provided by human hands. Cost: ¥300,000/month.

Aside from cost, Facilities A and B are identical, as follows:

- A semi-private room shared with one other person
- No waiting time — you can enter the facility immediately

In this case, which facility would you choose?

1. Facility A
2. Facility B

- *Throughout Q26_1–Q26_6, [Robot_area] displays the same term ("monitoring," "mobility (lift)," or "communication") assigned earlier, hover-linked to the corresponding explanatory screen.*

Expectations regarding Care Robots/Technology

In this section, we will ask about your expectations of how introducing care robots/technology into nursing homes would affect residents' everyday lives, focusing on how it would affect the total amount of care time received.

According to studies in Japan, care workers currently spend an average of 2 hours per day communicating with residents. Please imagine that a nursing home introduces communication robots/technology for this purpose.

- *Display Q27-1 and Q27-2 on the same screen.*

Q27-1 If the nursing home uses communication robots (technology), how do you think the total time spent communicating (conversing, interacting, etc.) with residents — by both human care workers and communication robots combined — will compare to the current average of 2 hours per day? Please answer intuitively.

[Mandatory]

1. It will increase from the current level.
2. It will stay the same as the current level.
3. It will decrease from the current level.

Q27-2 If the nursing home uses communication robots (technology), how do you think the time spent communicating (conversing, interacting, etc.) with residents by human care workers alone will compare to the current average of 2 hours per day? Please answer intuitively.

[Mandatory]

1. It will increase from the current level.
2. It will stay the same as the current level.
3. It will decrease from the current level.

- *"Communication" is hover-linked to its explanatory screen (Type 1 description).*
- *If Q27-1 = "2. Stay the same" and Q27-2 = "1. Increase", display the error message: "If the total time spent communicating with residents by both human care workers and robots combined stays the same, then the time spent by human care workers alone must either stay the same or decrease. Please correct one of your answers."*
- *If Q27-1 = "3. Decrease" and Q27-2 = "1. Increase" or "2. Stay the same", display the error message: "If the total time spent communicating with residents by both human care workers and robots combined decreases, then the time spent by human care workers alone must also decrease. Please correct one of your answers."*
- *Q27-3 is asked only if Q27-1 = "1. Increase" or "3. Decrease".*
- *Q27-4 is asked only if Q27-2 = "1. Increase" or "3. Decrease".*
- *Display Q27-3 and Q27-4 on the same screen.*

《Q27-1 = 1, 3》

Q27-3 You indicated that the total time spent communicating with residents by both human care workers and robots combined will [“increase” if Q27-1 = 1; “decrease” if Q27-1 = 3] compared to the current average of 2 hours per day. By about how much, in total, do you think it will [increase/decrease] per day?

[Mandatory]

1. Less than 30 minutes per day
2. 30 minutes to 1 hour per day
3. 1 to 2 hours per day
4. More than 2 hours per day

《Q27-2 = 1, 3》

Q27-4 You indicated that the time spent communicating with residents by human care workers alone will [“increase” if Q27-2 = 1; “decrease” if Q27-2 = 3] compared to the current average of 2 hours per day. By about how much do you think it will [increase/decrease] per day, on average?

[Mandatory]

1. Less than 30 minutes per day
2. 30 minutes to 1 hour per day
3. 1 to 2 hours per day
4. More than 2 hours per day

- *"Communication" is hover-linked to its explanatory screen (Type 1 description).*

From this point on, we will ask about your views regarding care robots/technology. Please tell us how much you agree or disagree with each statement, on a 9-point scale from “1 = strongly disagree” to “9 = strongly agree.”

- *Randomize the order of the four statements in Q28.*

Q28 How much do you agree or disagree with the following statements about care robots/technology in general? Please answer intuitively.

[Mandatory]

	Strongly disagree				Neither agree nor disagree				Strongly agree
Introducing care robots/technology into nursing homes will help address the shortage of care workers and improve the quality of care.	○	○	○	○	○	○	○	○	○
Care robots/technology will strengthen nursing homes' ability to respond to future care needs.	○	○	○	○	○	○	○	○	○
Care provided using care robots/technology is generally of lower quality than care provided by humans, so the overall quality of care will decline.	○	○	○	○	○	○	○	○	○
I feel anxious about care robots/technology because I am not used to devices and technology in general.	○	○	○	○	○	○	○	○	○

- *Randomize the order of the four statements in Q29.*

Q29 How much do you agree or disagree with the following statements about monitoring robots/technology? Please answer intuitively.

[Mandatory]

	Strongly disagree				Neither agree nor disagree				Strongly agree
Introducing monitoring robots/technology will make it possible to respond more quickly to residents' needs.	○	○	○	○	○	○	○	○	○
Monitoring robots/technology can check residents' condition more carefully and accurately than human care workers.	○	○	○	○	○	○	○	○	○
Monitoring robots/technology cannot detect residents' subtle needs.	○	○	○	○	○	○	○	○	○
I am worried that monitoring robots/technology might miss signs related to residents' needs.	○	○	○	○	○	○	○	○	○

- *"Monitoring" is hover-linked to its explanatory screen (Type 3 description).*

- *Randomize the order of the four statements in Q30.*

Q30 How much do you agree or disagree with the following statements about mobility (lift) robots/technology? Please answer intuitively.

[Mandatory]

	Strongly disagree		Neither agree nor disagree		Strongly agree

Using mobility (lift) robots/technology will allow residents to engage in more activities.	○	○	○	○	○	○	○	○	○
I would be glad if mobility (lift) robots/technology reduced the number of care workers I had to rely on for help.	○	○	○	○	○	○	○	○	○
I am worried that using mobility (lift) robots/technology carries a higher risk of injury than assistance provided by a human.	○	○	○	○	○	○	○	○	○
I feel some resistance to relying on mobility (lift) robots/technology.	○	○	○	○	○	○	○	○	○

- *"Mobility (lift)" is hover-linked to its explanatory screen (Type 2 description).*

- *Randomize the order of the four statements in Q31.*

Q31 How much do you agree or disagree with the following statements about communication robots/technology? Please answer intuitively.

[Mandatory]

	Strongly disagree				Neither agree nor disagree				Strongly agree
Talking or interacting with communication robots/technology will not only reduce loneliness but also help maintain a sense of connection with society.	○	○	○	○	○	○	○	○	○
I would be glad to be reminded of things such as taking medicine by communication robots/technology, without having to rely on another person.	○	○	○	○	○	○	○	○	○
Conversations with communication robots/technology are not a substitute at all for conversations with other people.	○	○	○	○	○	○	○	○	○
I am worried that introducing communication robots/technology will take away opportunities to connect with other people.	○	○	○	○	○	○	○	○	○

- *"Communication" is hover-linked to its explanatory screen (Type 1 description).*

- *Randomize the order of the five statements in Q32.*

Q32 How much do you agree or disagree with the following statements about human care workers, including foreign workers employed in Japan? Please answer intuitively.

[Mandatory]

	Strongly disagree				Neither agree nor disagree				Strongly agree
Introducing care robots/technology will reduce the physical burden on care workers, allowing them to give more attention to residents.	○	○	○	○	○	○	○	○	○
If enough foreign care workers could be hired, there would be no need to introduce care robots/technology.	○	○	○	○	○	○	○	○	○
I feel uneasy about relying on foreign care workers because of cultural and language barriers.	○	○	○	○	○	○	○	○	○
Care robots/technology can eliminate the language barrier for foreign care workers and improve the quality of care they provide.	○	○	○	○	○	○	○	○	○
An increase in foreign workers would greatly benefit Japan's economy and society.	○	○	○	○	○	○	○	○	○

Feedback

Q33 Was it easy or difficult to imagine the types of care robots/technology discussed in this survey?

[Mandatory]

1. It was easy.
2. It was difficult.

Q34 Was it easy or difficult to understand the "hypothetical scenario" and "facility conditions" presented in this survey?

[Mandatory]

1. It was easy.
2. It was difficult.

Q35 Please share your expectations and concerns about caregiving robots and ICT that are not covered by this survey.

[Free response]

Q36 Please share your thoughts about this survey. Your opinions will be used to improve this survey.

[Free response]

B Additional Results

B.1 Additional Sample Characteristics

B.1.1 Balance across Randomized Robot/ICT Type

Appendix Table B1 reports the means of the sample characteristics and LTC-related expectations from Table 1, separately by the randomly assigned robot/ICT type—communication, mobility/lifting, or monitoring—together with the p-value from a joint F-test that the three group means are equal. The three groups are statistically indistinguishable from one another on every characteristic, with the exception of the use of social media, which is marginally significant with a p-value of 8 percent, and the difference between groups is not so large, at 3 percentage points. This confirms that the random assignment of robot/ICT type is balanced on respondents' predetermined characteristics.

Table B1: Balance across Randomized Robot/ICT Type

Variable	Communication	Mobility	Monitoring	p-value
Age	64.6	64.8	65.0	0.28
Female	0.50	0.51	0.52	0.61
University education	0.43	0.43	0.42	0.77
Married	0.66	0.66	0.65	0.91
Financial wealth (million ¥)	20.2	21.8	20.1	0.37
Household income (million ¥)	5.2	5.3	5.1	0.72
Homeowner	0.71	0.70	0.69	0.55
Number of children	1.3	1.3	1.3	0.48
Child in walking dist.	0.30	0.31	0.30	0.56
Use email	0.91	0.91	0.91	0.91
Use social media	0.79	0.76	0.76	0.08*
Use web applications	0.70	0.71	0.72	0.24
Heard of caregiving robots	0.48	0.48	0.50	0.52
Relative in NH with robots	0.02	0.02	0.02	0.30
Chance of needing LTC (%)				
For 1 year	37.6	37.4	39.1	0.27
For 2 years	34.1	34.2	35.7	0.28
For 4 years	30.2	30.1	31.6	0.31
Perceived adequacy of caregiver workforce				
Current	3.3	3.3	3.3	0.54
10 years later	3.0	3.0	3.0	0.92

Note: N = 1,464 (Communication), 1,395 (Mobility), 1,455 (Monitoring). The p-value is from a joint F-test (regression of the row variable on indicators for randomized robot/ICT type) of equality of the three group means. * p<0.10, ** p<0.05, *** p<0.01. As in Table 1, financial wealth and household income have fewer observations due to respondents who chose "Don't know/Refuse to answer."

B.1.2 Characteristics of the Full Scorers

Appendix Table B2 reports the means of the same sample characteristics and LTC-related expectations shown in Table 1, separately for respondents who achieved a perfect comprehension-check score after retry ("full scorers") and those who did not ("non-full scorers"). Full scorers tend to have more financial wealth, expect higher chances of needing LTC, and have more pessimistic views regarding the adequacy of the caregiver workforce. They are also much more likely to have heard of caregiving robots.

Table B2: Sample Characteristics, by Comprehension-Check Full Scorers

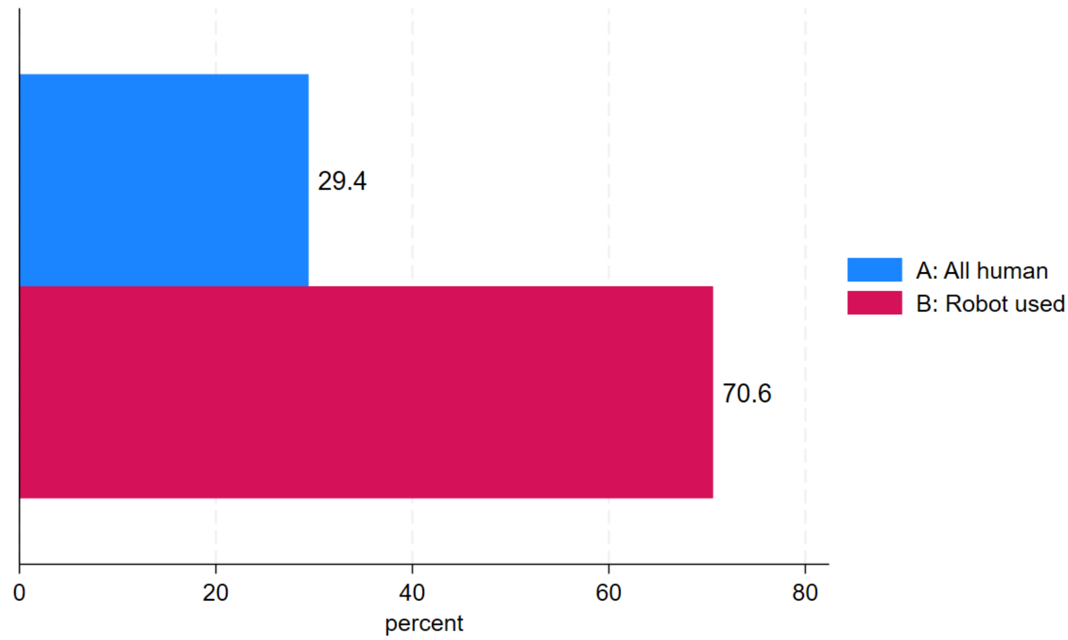
Variable	Full Scorers	Non-Full Scorers
Age	64.8	64.7
Female	0.54	0.45
University education	0.45	0.36
Married	0.65	0.66
Financial wealth (million ¥)	23.3	14.1
Household income (million ¥)	5.4	4.8
Homeowner	0.72	0.67
Number of children	1.3	1.3
Child in walking dist.	0.31	0.30
Use email	0.93	0.88
Use social media	0.79	0.73
Use web applications	0.74	0.63
Heard of caregiving robots	0.56	0.32
Relative in NH with robots	0.02	0.03
Chance of needing LTC (%)		
For 1 year	40.7	31.9
For 2 years	37.1	29.0
For 4 years	32.4	26.6
Perceived adequacy of caregiver workforce		
Current	3.1	3.7
10 years later	2.8	3.5

Note: Table reports means only, for comparison with Table 1. "Full Scorers" are respondents with a perfect comprehension-check score after retry (Section 4.4), N = 3,012; "Non-Full Scorers" are all other respondents, N = 1,302.

B.2 Acceptance

Appendix Figure B1 reports the fraction of respondents choosing the nursing home where a substantial share of care is provided using robots and ICT over one where all care is provided by human caregivers, as in Figure 2, restricted to respondents who answer all four comprehension-check questions correctly after the second attempt (full scorers).

Figure B1: Nursing Home Choice Result: Full Scorers Only

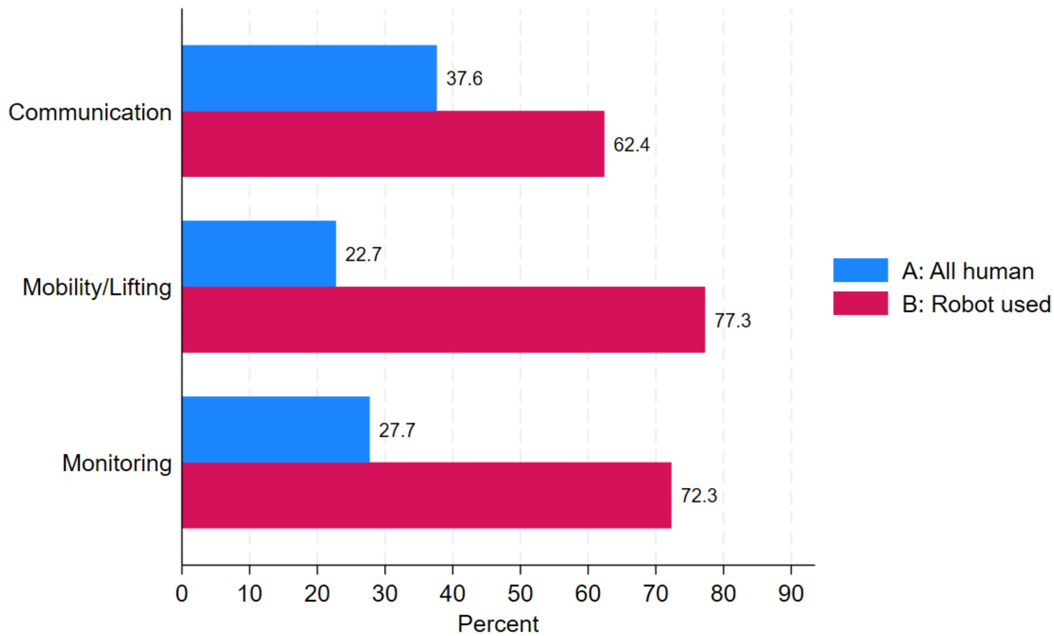


Notes: The bar charts show the fraction of respondents choosing the nursing home where all care is provided by human caregivers (Nursing Home A, blue) versus the nursing home where a substantial share of care in a randomly assigned domain—monitoring, mobility/lifting, or communication—is provided with robots and ICT (Nursing Home B, red), restricted to respondents who answer all four comprehension-check questions correctly after the second attempt.

Appendix Figure B2 reports the same choice results separately by the randomly assigned care domain in which robots and ICT are used—communication, mobility/lifting, or monitoring—as in Figure 3, again restricted to full scorers.

Table B3 reports the same specification as Table 2, restricted to full scorers. Table B4 reports the same specification as Table 2 for the full sample, but adds two additional regressors: the logs of financial wealth and household income. Financial wealth is constructed from a bracket-based question (Q6/Q6a) as the bracket median, top-coded at 1.3 times the lower bound of the top bracket for respondents who fall in the open-ended top category. Household income is constructed analogously from a separate bracket-based question (Q9/Q9a). Both questions allow a "Don't know/Prefer not to answer" response, which a substantial share of respondents choose (3,242 of 4,314 respondents answer the wealth question and 3,548 answer the income question). As a result, the sample for Table B4, which requires non-missing values for both variables in addition to the other regressors, falls to 3,128 observations. Neither

Figure B2: Nursing Home Choice Result: By Robot/ICT Type, Full Scorers Only



Notes: The bar charts show the fraction of respondents choosing the nursing home where all care is provided by human caregivers (Nursing Home A, blue) versus the nursing home where a substantial share of care is provided with robots and ICT (Nursing Home B, red), separately by the randomly chosen care domain where robots and ICT are used, restricted to respondents who answer all four comprehension-check questions correctly after the second attempt.

wealth nor income is a statistically significant predictor of acceptance in this specification.

Appendix Table B5 reports the same by-type regression as Table 3, restricted to full scorers.

B.3 Willingness to Pay

Appendix Table B6 reports the same WTP distribution as Table 4, restricted to full scorers.

Appendix Table B7 reports the same WTP regressions as Table 5, for both the full sample and full scorers, with the same expanded regressor set as Table B4 in Section B.2, which adds the logs of financial wealth and household income; see that section for their construction and the resulting sample size.

Table B3: Acceptance of Robots and ICT and Observable Characteristics: Full Scorers

	Full Scorers
Age	-0.0010
	(0.0016)
Female	0.0114
	(0.0182)
University	0.0198
	(0.0180)
Married	-0.0158
	(0.0194)
Good health	0.0130
	(0.0184)
Working	-0.0211
	(0.0183)
Number of children	-0.0276***
	(0.0092)
Child within walking distance	0.0035
	(0.0197)
Technology familiarity	0.0063
	(0.0105)
LTC chance, 1+ years	0.0005*
	(0.0003)
Care worker sufficiency, 10 years	0.0038
	(0.0045)
Expects 1+ year NH wait	0.0265
	(0.0173)
Heard of care robots/ICT	0.0808***
	(0.0169)
Home owner	-0.0241
	(0.0197)
Robot type: Lift	0.1491***
	(0.0201)
Robot type: Monitoring	0.0963***
	(0.0199)
Constant	0.6345***
	(0.1148)
N	3,012
R^2	0.037

Note: Sample restricted to respondents who answer all four comprehension-check questions correctly after the second attempt. OLS estimates; standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The omitted robot/ICT type category is Communication.

Table B4: Acceptance of Robots and ICT and Observable Characteristics: Full Sample, Expanded Regressor Set

	Full Sample
Age	0.0001
	(0.0017)
Female	0.0238
	(0.0187)
University	0.0276
	(0.0189)
Married	-0.0162
	(0.0203)
Good health	0.0153
	(0.0189)
Working	-0.0100
	(0.0191)
Number of children	-0.0263***
	(0.0091)
Child within walking distance	-0.0015
	(0.0204)
Technology familiarity	0.0055
	(0.0105)
LTC chance, 1+ years	0.0005*
	(0.0003)
Care worker sufficiency, 10 years	-0.0111**
	(0.0044)
Expects 1+ year NH wait	0.0362**
	(0.0179)
Heard of care robots/ICT	0.0828***
	(0.0175)
Home owner	-0.0081
	(0.0207)
Robot type: Lift	0.0961***
	(0.0206)
Robot type: Monitoring	0.0588***
	(0.0203)
Log financial wealth	0.0047
	(0.0040)
Log household income	-0.0034
	(0.0068)
Constant	0.5595***
	(0.1193)
N	3,128
R^2	0.031

Note: OLS estimates; standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The omitted robot/ICT type category is Communication. Financial wealth and household income enter in natural logs; log(0) is set to 0 for the small number of respondents reporting exactly zero wealth or income.

Table B5: Acceptance of Robots and ICT and Observable Characteristics, by Type: Full Scorers

	Communication	Mobility/Lifting	Monitoring
Age	-0.0011	-0.0045*	0.0024
	(0.0031)	(0.0026)	(0.0027)
Female	-0.0792**	0.0264	0.0848***
	(0.0340)	(0.0291)	(0.0314)
University	-0.0533	0.0374	0.0793**
	(0.0336)	(0.0289)	(0.0308)
Married	-0.0045	-0.0324	-0.0128
	(0.0359)	(0.0320)	(0.0328)
Good health	-0.0046	0.0286	0.0145
	(0.0342)	(0.0295)	(0.0315)
Working	-0.0840**	0.0077	0.0140
	(0.0341)	(0.0293)	(0.0314)
Number of children	-0.0463***	-0.0193	-0.0166
	(0.0172)	(0.0148)	(0.0156)
Child within walking distance	0.0154	-0.0190	0.0135
	(0.0367)	(0.0311)	(0.0343)
Technology familiarity	0.0188	0.0158	-0.0166
	(0.0196)	(0.0168)	(0.0180)
LTC chance, 1+ years	-0.0001	0.0009**	0.0007
	(0.0005)	(0.0004)	(0.0005)
Care worker sufficiency, 10 years	0.0050	0.0058	0.0009
	(0.0085)	(0.0072)	(0.0077)
Expects 1+ year NH wait	-0.0058	0.0367	0.0375
	(0.0318)	(0.0284)	(0.0297)
Heard of care robots/ICT	0.0938***	0.1291***	0.0344
	(0.0314)	(0.0274)	(0.0292)
Home owner	-0.0432	0.0493	-0.0771**
	(0.0368)	(0.0326)	(0.0331)
Constant	0.7751***	0.8462***	0.5500***
	(0.2167)	(0.1840)	(0.1936)
N	1,010	981	1,021
R^2	0.032	0.047	0.025

Note: Sample restricted to respondents who answer all four comprehension-check questions correctly after the second attempt. Each column reports a separate OLS regression of the indicator for choosing the nursing home with robots and ICT, restricted to respondents randomly assigned to that robot/ICT type. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table B6: Willingness to Pay for Robots and ICT: Full Scorers

	Fraction (%) in each WTP Bracket								Mean WTP		
	($-\infty$, -150K)	(-150K, -50K)	(-50K, -20K)	(-20K, 0)	(0, 20K)	(20K, 50K)	(50K, 150K)	(150K, ∞)	1,000 JPY	% of baseline	N
All	4.4	6.3	5.2	13.5	41.2	9.3	12.9	7.2	16.4	10.9	3,012
Communication	5.2	8.8	6.6	16.9	35.2	8.6	12.0	6.5	8.3	5.5	1,010
Mobility/Lifting	3.7	4.0	3.6	11.5	45.2	9.5	14.6	8.1	24.8	16.5	981
Monitoring	4.2	6.1	5.5	11.9	43.2	9.8	12.3	7.0	16.4	10.9	1,021

Note: Sample restricted to respondents who answer all four comprehension-check questions correctly after the second attempt. Cell entries in the bracket columns are the percentage of respondents whose WTP falls in that interval. Mean WTP uses the bracket median (capped at $\pm$200,000 yen for the open-ended tails); percent of baseline expresses this relative to the 150,000 yen baseline monthly fee.

Table B7: Willingness to Pay for Robots and ICT and Observable Characteristics: Expanded Regressor Set

	Full Sample	Full Scorers
Age	-0.2714	0.2168
	(0.3655)	(0.3328)
Female	1.2410	1.0478
	(4.0913)	(3.7154)
University	2.8072	0.7853
	(4.1313)	(3.7562)
Married	-4.0978	0.7761
	(4.4477)	(4.0452)
Good health	0.4750	0.2747
	(4.1420)	(3.7436)
Working	-1.4542	-0.0215
	(4.1886)	(3.8167)
Number of children	-0.5549	-0.3267
	(1.9884)	(1.8408)
Child within walking distance	-1.0812	-2.6525
	(4.4686)	(4.0355)
Technology familiarity	-2.3882	0.6921
	(2.3110)	(2.2049)
LTC chance, 1+ years	-0.0209	-0.0307
	(0.0600)	(0.0531)
Care worker sufficiency, 10 years	-1.9978**	1.0166
	(0.9614)	(0.9271)
Expects 1+ year NH wait	2.0764	3.4684
	(3.9243)	(3.5195)
Heard of care robots/ICT	6.4360*	11.5800***
	(3.8453)	(3.4634)
Home owner	-0.1298	1.7568
	(4.5417)	(4.1514)
Robot type: Lift	7.0685	13.6293***
	(4.5203)	(4.0873)
Robot type: Monitoring	2.8191	5.4281
	(4.4537)	(4.0217)
Log financial wealth	0.4659	-0.3411
	(0.8824)	(0.8312)
Log household income	-1.8739	-3.6790**
	(1.4823)	(1.6306)
Constant	49.0179*	6.9672
	(26.1415)	(24.5115)
N	3,128	2,258
R^2	0.006	0.016

Note: The dependent variable is bracketed WTP (1,000 JPY/month). OLS estimates; standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The omitted robot/ICT type category is Communication.

B.4 Acceptance/WTP and Attitude Battery Responses

Appendix Table B8 reports the same regressions as Table 9, with each panel's sentiment index replaced by its four underlying items, entered individually and without reverse-coding.

Three patterns emerge from this item-level exercise. First, as expected, coefficients on positively framed statements are mostly positive and those on negatively framed statements are mostly negative. In fact, every statistically significant coefficient in Table B8 carries the expected sign, with the handful of sign reversals occurring only among statistically insignificant estimates. Second, statements do not carry equal weight within a panel. The single most influential statement for Overall acceptance is not feeling anxious about robots/ICT due to unfamiliarity with technology; for Communication, it is not being worried that robots/ICT will take away opportunities to connect with others; for Mobility-aid/Lifting, it is not feeling resistance to relying on lift robots/ICT; and for Monitoring, it is not being worried that monitoring robots/ICT might miss signs of residents' needs. Third, in every panel, the largest-magnitude coefficient on acceptance belongs to a negatively framed statement. This reflects a broader asymmetry: Averaged across all four panels, the magnitude of coefficients on negatively framed statements is roughly 80 percent larger than on positively framed statements, suggesting that disagreement with a stated concern carries more weight in respondents' acceptance decisions than agreement with a stated benefit.

Table B8: Acceptance and WTP Regressions on Individual Attitude Battery Items

Statement	Robot Acceptance	WTP for Robots
A. Overall		
Helps worker shortage, quality	0.0093	3.7758**
	(0.0078)	(1.7996)
Strengthens future capacity	0.0308***	1.5142
	(0.0082)	(1.8876)
Robot care inferior to human	-0.0300***	-4.2915***
	(0.0064)	(1.4905)
Anxious, unfamiliar with tech	-0.0456***	-5.9378***
	(0.0058)	(1.3460)
N	4,314	4,314
R^2	0.130	0.036
B. Communication		
Reduces loneliness	0.0291***	3.5901
	(0.0100)	(2.1987)
Glad for reminders	-0.0089	-0.1650
	(0.0100)	(2.1940)
No substitute for human conversation	-0.0173**	0.4105
	(0.0086)	(1.8983)
Takes away human connection	-0.0400***	-6.3241***
	(0.0087)	(1.9057)
N	1,464	1,464
R^2	0.108	0.038

Note: (continued on next page.)

Table B8: Acceptance and WTP Regressions on Individual Attitude Battery Items (continued)

Statement	Robot Acceptance	WTP for Robots
C. Mobility-aid/Lifting		
Enables more activities	0.0068	6.0120*
	(0.0127)	(3.0831)
Glad, fewer workers needed	0.0216**	3.4622
	(0.0100)	(2.4437)
Higher injury risk worry	-0.0193*	-0.7912
	(0.0109)	(2.6666)
Resistance to relying on it	-0.0496***	-4.5065*
	(0.0111)	(2.7114)
N	1,395	1,395
R^2	0.153	0.039
D. Monitoring		
More prompt response	0.0218	0.9600
	(0.0147)	(3.3949)
More accurate, thorough	0.0170	2.3373
	(0.0132)	(3.0645)
Cannot detect subtle needs	0.0072	-3.7805
	(0.0117)	(2.7192)
Worried misses signs of need	-0.0553***	-7.5519***
	(0.0117)	(2.7138)
N	1,455	1,455
R^2	0.117	0.047

Note: OLS estimates; standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. Item-level counterpart to Table 9: each panel's aggregated sentiment index is replaced by its four individual items (raw responses, not reverse-coded). Panel A uses the pooled sample (no type restriction, and additionally controls for robot/ICT type dummies); Panels B-D restrict to respondents randomly assigned to that robot type. All specifications control for the same covariates as Table 9 (age, gender, university education, marital status, health, employment, number of children, having a child within walking distance, technology familiarity, perceived chance of needing long-term care, perceived care worker sufficiency in 10 years, expecting to wait 1+ years for a public nursing home, having heard of caregiving robots/ICT, home ownership, and the five statements on human/foreign caregivers), not individually reported here. See Table 7 for the full wording of each abbreviated statement.