

CLINICAL RESEARCH

Willingness to pay and its determinants for missing tooth replacement among older adults: A cross-sectional study in Japan



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ABSTRACT

Statement of problem. Understanding the determinants of willingness to pay (WTP) for missing tooth replacement is essential for promoting oral health.

Purpose. This study aimed to examine the factors associated with both the WTP and WTP amount for replacing missing anterior and posterior teeth among older Japanese adults.

Material and methods. This cross-sectional study used data from the Japan Gerontological Evaluation Study (JAGES) conducted in 2022, which targeted independent adults aged ≥ 65 years. Thirty-two explanatory variables were used, including demographic, socioeconomic, oral health-related, and general health indicators, and 2 primary outcome variables for both anterior and posterior teeth: whether participants were willing to pay for missing tooth replacement and the amount they were willing to pay. Dominance analysis was used to determine the relative importance of all candidate variables.

Results. A total of 4616 participants were included (men: 57.9%). The mean $\pm$ standard deviation age was 71.9 ± 4.8 years. Of the participants, 95.6% and 94.9% expressed WTP to replace missing anterior and posterior teeth. The mean WTP amounts for anterior and posterior teeth were 71 300 Japanese Yen (JPY) and 61 100 JPY (544 and 466 USD). Dominance analysis showed that the absence of depressive symptoms was the strongest positive predictor of WTP (18.3% of the total explained variance for anterior teeth and 22.4% for posterior teeth). Wealth was the most influential factor in WTP amount (21.3% for anterior teeth and 19.2% for posterior teeth). Other key predictors included educational level, preventive dental visit, income, population density, and frequency of meeting friends.

Conclusions. While the absence of depressive symptoms emerged as the strongest predictor of whether individuals expressed WTP to replace missing teeth among older adults, wealth emerged as the most influential factor in determining the amount they were willing to pay for both anterior and posterior teeth. WTP is largely explained by economic, psychological, and social factors. These findings suggest that promoting oral health may require integrated strategies addressing financial barriers, mental health support, and social engagement. (J Prosthet Dent 2026;135:570.e1-e11)

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Clinical Implications

The absence of depressive symptoms was the strongest positive predictor of WTP for missing tooth replacement, while wealth was the most influential factor in determining the WTP amount. These findings suggest that promoting oral health among older adults may require integrated approaches that address financial barriers, mental health, and social engagement.

Oral diseases are highly prevalent, affecting an estimated 3.69 billion people worldwide.¹ They are not only a major source of pain and discomfort but also impair individuals' quality of life.² Recent studies have shown that poor oral health leads to a higher risk of serious medical conditions such as cardiovascular disease,³ stroke,³ dementia,⁴ diabetes,⁵ and ultimately mortality.^{6,7} Furthermore, the associations between poor oral health and elevated medical⁸ and long-term care costs⁹ have also been reported; maintaining oral health is a critical issue.

Regular dental visits play an important role in maintaining oral health through early detection, treatment, and health education.¹⁰ Currently, the global movement toward Universal Health Coverage (UHC) has emphasized the importance of incorporating dental services into essential healthcare benefits.¹¹ However, many countries do not include dental care within their UHC frameworks.¹² Japan introduced a universal health insurance system in 1961,¹³ covering most dental treatments, including prosthetic treatments such as fixed partial dentures (FPDs) and removable dentures.¹⁴ However, higher-cost items such as gold crowns and FPDs, metal-framework dentures, and implant-supported prostheses were not covered, often posing a financial burden for patients.¹⁴ Even in countries that provide dental care under UHC, such as Japan, there are inequalities in access to dental care.^{15,16} A previous systematic review suggested that factors such as poor oral health, general health, and lack of social support could influence dental visits in addition to financial reasons.¹⁷ Therefore, financial, physical, and psychological barriers may prevent older adults from visiting the dentist.

Willingness to pay (WTP) for dental care serves as a proxy for how individuals value dental health, as measured by how much they are willing to pay for dental services.¹⁸ Previous reviews have reported that demographic and socioeconomic factors are associated with WTP.^{18–22} Pol et al²³ reported that those with higher income and educational levels responded to the higher WTP for dental examinations among the UK general population. In the context of prosthetic restoration for a

single missing tooth, implant-supported crowns have been shown to elicit higher WTP than FPDs, and greater oral care awareness has been linked to higher WTP.²⁴ Among partially dentate older adults, prior dental treatment experience and higher income were also associated with higher WTP.²⁵ However, many previous studies focused on socioeconomic factors¹⁸; few studies comprehensively examined WTP across a broad range of factors among older adults.

Understanding the relative importance of these determinants of WTP specifically for missing tooth replacement is necessary to identify priority areas of intervention and allocate appropriate health resources to develop dental care policies.^{18,19} Furthermore, the functional and psychological roles of anterior and posterior teeth differ.²⁶ Thus, determinants of WTP may also vary by tooth type. For example, esthetic and social considerations are more salient for anterior teeth, whereas functional aspects are often prioritized for posterior teeth.²⁷ Therefore, this study aimed to examine the determinants of WTP for replacing missing anterior and posterior teeth among older Japanese adults by considering a wide range of potential determinants, including demographic variables, socioeconomic status (SES), oral health-related factors, and indicators of general health, lifestyle and psychosocial status. The research hypotheses were that higher SES, better oral and general health status, and favorable lifestyle and psychosocial factors would be positively associated with both WTP and a higher WTP amount for missing tooth replacement and that these associations might differ between anterior and posterior teeth.

MATERIAL AND METHODS

This was a cross-sectional study using the Japan Gerontological Evaluation Study (JAGES) conducted in 2022. JAGES is an ongoing cohort study targeting adults aged ≥65 years living in Japan.²⁸ The survey was conducted from November to December 2022 in 69 municipalities. This study had been approved by the Ethics Committee on the Research of Human Subjects of Chiba University (approval number: 2493) and the National Center for Geriatrics and Gerontology, Japan (approval number: 992–3). All participants provided informed consent before participating in the study. This study followed the guidelines of the Declaration of Helsinki.

The questionnaire was distributed to a total of 308 333 individuals with a total of 205 191 respondents (response rate: 66.5%). After excluding the invalid responses or those without informed consent ($n=13\ 083$), the valid responses were 192 108. The variables of interest were included in the subversion questionnaire (version D) related to oral health, distributed to one-eighth of the total

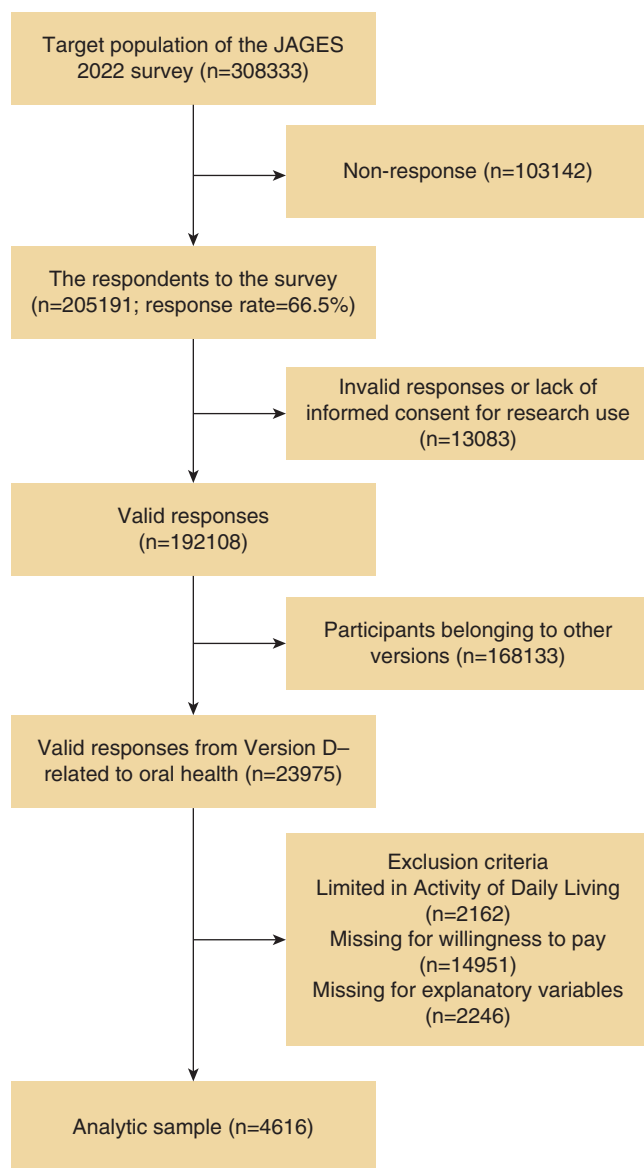


Figure 1. Flowchart for analysis (n=4616).

sample (n=23 975). Among them, those with no functional limitation and no missing value were targeted. For functional limitation, only those who answered “No assistance required” in the study were included, while those reporting any need for care or assistance were excluded. The final sample was 4616. The flowchart of the study participants is shown in [Figure 1](#).

Two primary outcome variables were assessed for both anterior and posterior teeth: WTP (binary) for missing tooth replacement and WTP amount (continuous) for missing tooth replacement. Participants were asked 2 single open-ended questions, 1 for anterior teeth and 1 for posterior teeth: “How much would you pay to get one of your missing teeth replaced?” Responses were recorded in increments of 10 000 Japanese yen (JPY), ranging from 0 to 5 million JPY in

increments of 10 000 JPY. Values were converted to United States dollar (USD) using the 2022 calendar-year average USD/JPY (1 USD was approximately 131 JPY).

For the binary WTP outcome, responses were dichotomized as “yes” (responding to any values except for 0 JPY: coded=0) or “no” (0 JPY: coded=1), considering the distribution. Protest answers in which the participants select 0 JPY have been commonly used in studies investigating WTP.²³ Separate responses were created for anterior and posterior teeth.

Thirty-two explanatory variables focused on individual and community demographic variables, SES, oral health-related factors, and general health status were selected following clinical knowledge and a previous systematic review.¹⁸ The details of the variables are shown in [Supplemental Table 1](#), available online. All the variables were dichotomized to enhance interpretability.

For statistical analysis, the descriptive characteristics of the study sample were summarized to examine whether participants reported WTP for missing tooth replacement and to calculate the average WTP amount. A logistic regression analysis was then applied using all 32 candidate variables to determine WTP (binary outcome) and linear regression analysis for the WTP amount (continuous outcome). Odds ratios (ORs) and 95% CIs for reporting no WTP, as well as B coefficient and 95% CI for WTP amount, were calculated based on all predictors. These models were used to estimate the direction and magnitude of associations between each variable and the outcomes. A crude model (Model 1) and an adjusted model (Model 2) for each model were constructed.

A dominance analysis was subsequently conducted with all 32 candidate variables to determine the relative importance of the variables for WTP and WTP amount. The command “domin” was used in the statistical software program (Stata 18.0; StataCorp LLC).²⁹ In the standard dominance analysis approach, the relative importance of explanatory variables was assessed by decomposing the model fit statistics across all possible combinations of predictors. In this study, the epsilon approximation was applied by using the epsilon option in the statistical software program (Stata 18.0; StataCorp LLC), which uses singular value decomposition to estimate general dominance weights without computing all possible model subsets.³⁰ Logistic regression models were used for binary WTP, and linear regression models were used for WTP amount. The standardized dominance statistics, dominance statistics, and 95% confidence intervals (CIs) of dominance statistics were calculated by bootstrapping. Epsilon generates its own internal fit statistics rather than relying on pseudo-R² measures.

For each analysis, the complete case analysis was conducted by excluding respondents with any missing

information. All analyses were performed using a statistical software program (Stata 18.0; StataCorp LLC) ($\alpha=.05$). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines were followed³¹ and the Observational Studies and Clinical Trials in Oral Health Research (OH-Stat) guidelines.

RESULTS

A total of 4616 participants were included in the analysis (men: 57.9%). The mean $\pm$ standard deviation age of the participants was 71.9 $\pm$ 4.8 years. The descriptive characteristics of the study sample are shown in [Table 1](#). Of the participants, 95.6% expressed WTP for anterior teeth, and 94.9% expressed WTP for posterior teeth.

[Table 2](#) shows the descriptive characteristics of the mean WTP for missing tooth replacement according to each variable. The mean $\pm$ standard deviation WTP amounts were 71 300 $\pm$ 151 600 JPY for anterior teeth and 61 100 $\pm$ 132 300 JPY for posterior teeth (544 and 466 USD). Particularly, participants with older age, higher income, higher educational level, higher wealth, current working status, and preventive dental visits reported higher WTP.

[Supplemental Tables 2 and 3](#), available online, show the results of the logistic regression analyses. After adjustment, women, younger age, higher income, higher wealth, prosthesis use, having preventive dental visits, having dental pain, frequent tooth brushing, never smoking, no depressive symptoms, and living in lower population density areas were significantly associated with WTP for missing tooth replacement for anterior teeth. For posterior teeth, higher income, higher wealth, having preventive dental visits, frequent tooth brushing, bad self-rated health, no depressive symptoms, and living in lower population density areas were significantly associated with WTP.

[Supplemental Tables 4 and 5](#), available online, show the results of the linear regression analysis. For anterior teeth, higher income, higher educational status, higher wealth, current working status, having preventive dental visits, swallowing difficulty, and no comorbidity, meeting friends frequently, and living in higher density areas were significantly associated with higher WTP amount. For posterior teeth, older age, higher educational level, higher wealth, current working status, prosthesis use, having preventive dental visits, swallowing difficulty, no dental pain, and no comorbidity, meeting friends frequently, and current/past drinking status were significantly associated with higher WTP amount.

[Table 3](#) shows the results of the dominance analysis examining the relative importance of WTP (binary).

Depressive symptoms were identified as the most influential factor for both anterior teeth (18.3%) and posterior teeth (22.4%). For anterior teeth, the next most important contributors were preventive dental visits (second), sex (third), smoking status (fourth), and tooth brushing frequency (fifth). For posterior teeth, the contributions of preventive dental visits (second), tooth brushing frequency (third), sex (fourth), and smoking status (fifth) had the greatest contributions. [Table 4](#) shows the results of the dominance analysis for the WTP amount. Wealth ranked highest, contributing 21.3% for anterior teeth and 19.2% for posterior teeth. For anterior teeth, the second to seventh ranked factors were educational levels, preventive dental visits, income, population density, frequency of meeting friends, and current working status. For posterior teeth, the rankings were preventive dental visit, educational level, income, frequency of meeting friends, drinking status, and population density (second to seventh, respectively). The full result outputs are shown in [Supplemental Tables 6 and 7](#), available online.

DISCUSSION

This study tested the hypothesis that higher SES, better oral and general health status, and favorable lifestyle and psychosocial factors would be positively associated with both WTP and a higher WTP amount for missing tooth replacement, with potential differences between anterior and posterior teeth. The findings partially supported this hypothesis. Specifically, the absence of depressive symptoms was the strongest positive predictor of WTP for missing tooth replacement, while wealth was the most influential factor in determining WTP amount among older Japanese adults. Educational level, preventive dental visits, income, and population density were also largely influential factors in the higher WTP amount. Social factors, such as the frequency of meeting friends and current working status, were also strong predictors, particularly for anterior teeth in relation to WTP amount. These findings underscore the importance of considering mental health and social connection, in addition to economic aspects, in promoting motivation for oral health maintenance and encouraging dental visits. However, differences in determinants between anterior and posterior teeth were less pronounced than anticipated.

The study findings were mostly consistent with those of previous studies on WTP in dental service contexts.^{18–21,23} Individuals with depressive symptoms were less likely to express WTP for missing tooth replacement, reflecting established associations between mental health and lower dental service use.³² For the WTP amount, this study reaffirms the large influence of

Table 1. Descriptive characteristics of study sample for willingness to pay (binary) (n=4616)

		Total	Willingness To Pay	
			Anterior Teeth	Posterior Teeth
		n	Yes %	Yes %
Sex	Men	2673	94.2	93.6
	Women	1943	97.4	96.6
Age	65–74	1709	96.4	95.5
	≥75	2907	95.1	94.5
Income (million JPY)	0.00–1.99	1730	93.8	93.1
	≥2.00	2886	96.6	95.9
Educational level	Low/Middle	2576	95.3	94.4
	High	2040	95.9	95.5
Wealth (million JPY)	0–9.99	1531	93.6	93.1
	≥10.00	3085	96.5	95.8
Current working status	No	2840	95.4	94.6
	Yes	1776	95.8	95.3
Marital status	No partner	947	94.8	94.2
	Having partner	3669	95.7	95.1
Number of teeth	0–19 teeth	1282	93.9	93.3
	≥20 teeth	3334	96.2	95.5
Dental prosthesis use	No	1802	95.0	94.6
	Yes	2814	95.9	95.1
Preventive dental visit within 1 year	No	1790	93.5	93.0
	Yes	2826	96.9	96.1
Dental treatment visit within 1 year	No	1553	94.3	93.8
	Yes	3063	96.2	95.5
Dry mouth	No	3721	95.5	94.9
	Yes	895	95.8	94.7
Swallowing difficulty	No	3582	95.5	95.0
	Yes	1034	95.6	94.6
Mastication difficulty	No	3466	95.7	95.2
	Yes	1150	95.2	94.0
Occlusal status	Bad	1224	94.8	94.0
	Good	3392	95.8	95.2
Dental pain	No	3311	95.2	94.7
	Yes	1305	96.4	95.3
Tooth brushing frequency	<2 times a day	996	92.4	91.6
	≥2 times a day	3620	96.4	95.8
Periodontal disease	No	3150	95.5	94.7
	Yes	1466	95.7	95.2
Comorbidity	No	932	96.1	95.6
	Yes	3684	95.4	94.7
Health examination within 1 year	No	1497	95.1	94.4
	Yes	3119	95.8	95.1
Frequency of meeting friends	Several per year, rarely	1487	94.7	93.6
	≥Several a month	3129	96.0	95.5
Smoking status	Current/Past	2310	94.0	93.4
	Never	2306	97.1	96.4
Drinking status	Current/Past	2803	95.0	94.3
	Never	1813	96.5	95.8
Walking time	<60 mins	2855	95.7	95.0
	≥60 mins	1761	95.3	94.8
Self-rated health	Bad	499	95.4	95.2
	Good	4117	95.6	94.9
Vegetable and fruit intake	<1 time a day	883	93.8	93.0
	≥1 time a day	3733	96.0	95.3
Meat and fish intake	<1 time a day	2084	95.1	94.0
	≥1 time a day	2532	96.0	95.7
Frequency of going out	<4 times a week	888	95.6	94.8
	≥4 times a week	3728	95.5	94.9
Eating together	<1 time a month	580	94.5	93.4
	≥1 time a month	4036	95.7	95.1
Depression status	No depression	3641	96.6	96.1
	Depressive symptoms/Depression	975	91.5	90.5
BMI	<25	3450	95.7	95.1
	≥25	1166	95.3	94.3
Population density	Low	2248	95.9	95.5
	High	2368	95.2	94.3
	Total	4616	95.6	94.9

BMI, Body Mass Index; JPY, Japanese Yen.

SES, as previous evidence has shown that higher education and income levels were associated with higher WTP amounts.^{18,19,22,23,25} Notably, despite the fact that

wealth has not been a focus of previous studies, this study adds evidence that wealth is most strongly associated with WTP amount.

Table 2. Descriptive characteristics of study sample for willingness to pay amount (continuous) (n=4616)

		Willingness to Pay Amount (JPY)			
		Anterior Teeth		Posterior Teeth	
		Mean	SD	Mean	SD
Sex	Men	69 900	158 000	62 000	136 100
	Women	73 200	142 200	59 800	127 100
Age	65–74	68 200	134 600	54 800	103 800
	≥75	73 100	160 700	64 700	146 400
Income (million JPY)	0–1.99	53 900	131 400	47 800	122 200
	≥2.00	81 700	161 600	69 000	137 500
Educational level	Low/Middle	58 300	116 900	50 800	115 000
	High	87 700	185 100	74 000	150 500
Wealth (million JPY)	0–9.99	45 000	119 500	40 000	100 200
	≥10.00	84 300	163 600	71 500	144 600
Current working status	No	66 800	136 700	57 700	124 900
	Yes	78 500	172 500	66 400	143 300
Marital status	No partner	71 900	162 000	57 700	126 600
	Having partner	71 100	148 800	61 900	133 800
Number of teeth	0–19 teeth	64 400	165 900	58 500	149 200
	≥20 teeth	73 900	145 600	62 100	125 200
Dental prosthesis use	No	68 700	162 600	55 500	127 400
	Yes	72 900	144 000	64 600	135 300
Preventive dental visit within 1 year	No	53 800	115 900	46 200	115 400
	Yes	82 300	169 400	70 500	141 200
Dental treatment visit within 1 year	No	63 000	129 500	54 700	128 200
	Yes	75 500	161 500	64 300	134 300
Dry mouth	No	73 200	159 300	62 400	136 400
	Yes	63 200	113 700	55 700	113 800
Swallowing difficulty	No	69 800	144 300	59 900	127 600
	Yes	76 300	174 300	65 200	147 600
Mastication difficulty	No	75 300	162 900	63 800	135 600
	Yes	59 100	109 600	53 000	121 800
Occlusal status	Bad	62 800	126 000	57 100	135 500
	Good	74 300	159 700	62 500	131 200
Dental pain	No	74 200	150 900	64 000	139 500
	Yes	63 800	153 100	53 600	111 800
Tooth brushing frequency	<2 times a day	58 600	149 600	53 200	127 200
	≥2 times a day	74 800	151 900	63 200	133 600
Periodontal disease	No	73 000	158 400	61 400	132 000
	Yes	67 600	135 700	60 300	133 000
Comorbidity	No	84 100	183 500	69 100	147 200
	Yes	68 000	142 200	59 000	128 200
Health examination within 1 year	No	64 500	131 300	54 600	120 600
	Yes	74 500	160 300	64 200	137 500
Frequency of meeting friends	Several per year, rarely	58 300	131 400	49 400	115 800
	≥Several a month	77 400	159 900	66 600	139 200
Smoking status	Current/Past	68 500	151 300	60 000	131 400
	Never	74 000	151 800	62 100	133 300
Drinking status	Current/Past	73 600	152 600	65 400	143 500
	Never	67 700	149 900	54 400	112 600
Walking time	<60 mins per day	70 300	142 400	59 000	124 400
	≥60 mins per day	72 800	165 400	64 400	144 200
Self-rated health	Bad	48 400	98 100	46 400	108 700
	Good	74 100	156 600	62 900	134 800
Vegetable and fruit intake	<1 time a day	57 000	116 900	45 800	95 300
	≥1 time a day	74 700	158 500	64 700	139 400
Meat and fish intake	<1 time a day	63 100	128 200	55 300	129 000
	≥1 time a day	78 000	168 100	65 900	134 800
Frequency of going out	<4 times a week	62 300	127 500	53 100	119 000
	≥4 times a week	73 400	156 700	63 000	135 300
Frequency of eating together	<1 time a month	59 700	100 500	51 700	98 700
	≥1 time a month	72 900	157 500	62 400	136 400
Depression status	No depression	75 200	157 700	65 000	135 400
	Depressive symptoms/Depression	56 600	124 900	46 400	119 100
BMI	<25	73 100	152 900	63 600	139 200
	≥25	66 100	147 300	53 600	109 300
Population density	Low	59 700	118 300	53 900	125 900
	High	82 200	176 800	67 900	137 900
Total		71 300	151 600	61 100	132 300

BMI, Body Mass Index; JPY, Japanese Yen.

Number rounded to nearest hundred.

Social connections, including frequency of meeting friends and current working status, were also significant predictors, especially for anterior teeth. Although the

authors are unaware of studies that directly investigated social participation and WTP amounts, frequent social participation has been linked to increased use of dental

Table 3. Relative importance of factors contributing to willingness to pay (binary) by dominance analysis (n=4616)

Anterior Teeth				Posterior Teeth			
Ranking	Variable	Standardized Dominance Statistic	Cumulative Percentage	Ranking	Variable	Standardized Dominance Statistic	Cumulative Percentage
1	Depression status	18.3%	18.3%	1	Depression status	22.4%	22.4%
2	Preventive dental visit within 1 year	10.5%	28.8%	2	Preventive dental visit within 1 year	8.8%	31.2%
3	Sex	9.9%	38.7%	3	Tooth brushing frequency	8.7%	39.8%
4	Smoking status	8.9%	47.6%	4	Sex	8.4%	48.2%
5	Tooth brushing frequency	7.3%	54.9%	5	Smoking status	7.5%	55.7%
6	Wealth	7.1%	62.0%	6	Income	6.7%	62.4%
7	Income	6.5%	68.5%	7	Population density	5.9%	68.3%
8	Age	5.7%	74.2%	8	Wealth	5.5%	73.8%
9	Dental prosthesis use	3.9%	78.1%	9	Age	3.2%	76.9%
10	Dental pain	3.7%	81.9%	10	Number of teeth	2.8%	79.7%
11	Number of teeth	3.7%	85.5%	11	Self-rated health	2.4%	82.1%
12	Population density	2.6%	88.2%	12	Drinking status	1.9%	84.1%
13	Drinking status	2.1%	90.3%	13	Frequency of meeting friends	1.9%	85.9%
14	Dental treatment visit within 1 year	1.4%	91.7%	14	Dental pain	1.6%	87.5%
15	Vegetable and fruit intake	1.1%	92.8%	15	Meat and fish intake	1.4%	88.9%
16	Walking time	1.1%	93.9%	16	Dental prosthesis use	1.4%	90.2%
17	Frequency of going out	0.9%	94.8%	17	Dental treatment visit within 1 year	1.2%	91.5%
18	Marital status	0.8%	95.6%	18	Vegetable and fruit intake	1.1%	92.5%
19	Self-rated health	0.8%	96.4%	19	Periodontal disease	1.1%	93.6%
20	Frequency of meeting friends	0.6%	97.0%	20	Educational level	0.9%	94.5%
21	Dry mouth	0.4%	97.4%	21	Frequency of going out	0.8%	95.3%
22	Comorbidity	0.4%	97.8%	22	Current working status	0.8%	96.1%
23	Current working status	0.4%	98.2%	23	Walking time	0.7%	96.8%
24	Occlusal status	0.3%	98.5%	24	Marital status	0.6%	97.4%
25	Periodontal disease	0.3%	98.8%	25	Comorbidity	0.6%	98.0%
26	Mastication difficulty	0.3%	99.1%	26	BMI	0.6%	98.6%
27	Swallowing difficulty	0.2%	99.3%	27	Mastication difficulty	0.5%	99.1%
28	Meat and fish intake	0.2%	99.5%	28	Occlusal status	0.4%	99.5%
29	Educational level	0.2%	99.7%	29	Frequency of eating together	0.2%	99.7%
30	Frequency of eating together	0.1%	99.8%	30	Dry mouth	0.2%	99.9%
31	Health examination within 1 year	0.1%	99.9%	31	Health examination within 1 year	0.1%	100.0%
32	BMI	0.1%	100.0%	32	Swallowing difficulty	0.1%	100.0%

BMI, Body Mass Index.
Overall Fit statistics: 0.045 (Anterior teeth), 0.039 (Posterior teeth).

Table 4. Relative importance of factors contributing to willingness to pay amount (continuous) by dominance analysis (n=4616)

Anterior Teeth				Posterior Teeth			
Ranking	Variable	Standardized Dominance Statistic	Cumulative Percentage	Ranking	Variable	Standardized Dominance Statistic	Cumulative Percentage
1	Wealth	21.3%	21.3%	1	Wealth	19.2%	19.2%
2	Educational level	14.0%	35.3%	2	Preventive dental visit within 1 year	15.2%	34.4%
3	Preventive dental visit within 1 year	13.7%	49.1%	3	Educational level	12.8%	47.2%
4	Income	8.1%	57.2%	4	Income	6.2%	53.5%
5	Population density	7.7%	64.9%	5	Frequency of meeting friends	5.8%	59.2%
6	Frequency of meeting friends	5.0%	69.9%	6	Drinking status	3.8%	63.0%
7	Current working status	3.8%	73.7%	7	Population density	3.4%	66.4%
8	Comorbidity	3.7%	77.4%	8	Vegetable and fruit intake	3.4%	69.8%
9	Self-rated health	2.8%	80.1%	9	Current working status	3.3%	73.1%
10	Swallowing difficulty	1.8%	82.0%	10	Dental pain	3.1%	76.2%
11	Dental treatment visit within 1 year	1.8%	83.8%	11	Age	3.0%	79.2%
12	Dental pain	1.8%	85.6%	12	Dental prosthesis use	2.9%	82.1%
13	Mastication difficulty	1.6%	87.2%	13	Depression	2.7%	84.7%
14	Meat and fish intake	1.6%	88.8%	14	Comorbidity	2.2%	87.0%
15	Tooth brushing frequency	1.6%	90.3%	15	Dental treatment visit within 1 year	1.9%	88.9%
16	Depression	1.3%	91.6%	16	Choking	1.6%	90.5%
17	Vegetable and fruit intake	1.2%	92.9%	17	BMI	1.6%	92.0%
18	Drinking status	0.9%	93.8%	18	Mastication difficulty	1.2%	93.2%
19	Dry mouth	0.8%	94.6%	19	Health examination within 1 year	1.2%	94.4%
20	Dental prosthesis use	0.8%	95.4%	20	Self-rated health	1.2%	95.6%
21	Health examination within 1 year	0.8%	96.2%	21	Meat and fish intake	0.8%	96.3%
22	Marital status	0.7%	96.9%	22	Tooth brushing frequency	0.7%	97.0%
23	Occlusal status	0.6%	97.4%	23	Dry mouth	0.5%	97.5%
24	Frequency of eating together	0.6%	98.0%	24	Sex	0.5%	98.0%
25	Age	0.4%	98.4%	25	Frequency of eating together	0.4%	98.3%
26	Frequency of going out	0.3%	98.7%	26	Smoking status	0.4%	98.7%
27	Smoking status	0.3%	99.0%	27	Frequency of going out	0.4%	99.1%
28	Number of teeth	0.3%	99.3%	28	Number of teeth	0.3%	99.4%
29	BMI	0.3%	99.5%	29	Walking time	0.2%	99.6%
30	Sex	0.2%	99.7%	30	Periodontal disease	0.2%	99.8%
31	Periodontal disease	0.2%	99.9%	31	Occlusal status	0.1%	99.9%
32	Walking time	0.1%	100.0%	32	Marital status	0.1%	100.0%

BMI, Body Mass Index.
Overall Fit statistics: 0.041 (Anterior teeth), 0.039 (Posterior teeth).

services^{33,34} and fewer missing teeth.^{35,36} Moreover, consistent with earlier studies,^{18–21,25} recent dental visits were associated with higher WTP amounts. In addition, the findings indicate that the population density, as a proxy of living area, was also associated with WTP amount, particularly for anterior teeth, consistent with previous studies reporting geographical variations in WTP.¹⁸ While overall differences between anterior and posterior teeth were modest, certain factors emerged as more influential for one than the other. For example, current working status emerged as a key determinant of WTP amount for anterior teeth (seventh in ranking), whereas vegetable and fruit intake was more influential for posterior teeth (eighth in ranking), suggesting that the subtle domain-specific differences are more pronounced, such as esthetics and social interactions for anterior teeth, while functional considerations are more important for posterior teeth.

In Japan, most older adults have been covered by public health care insurance, with out-of-pocket payments of 10% to 30%.¹⁴ Removable dentures and FPDs are mainly covered; patients generally pay several tens of thousands of JPY, whereas an implant-supported prosthesis is not covered and typically costs JPY 300 000 to 500 000 JPY (2290 to 3817 USD). These results show that the mean WTP for anterior teeth was 71 300 JPY and 61 100 JPY for posterior teeth (544 and 466 USD), suggesting that willingness does not reach the level required for implant-supported prostheses, reflecting economic constraints for older adults. The relatively higher WTP for anterior teeth may reflect the importance of esthetics and social interaction in older age.

These findings suggest that promoting oral health in older adults requires an extensive strategy that includes economic support, mental health care, and social engagement. Reducing financial barriers is crucial, since SES measures, particularly wealth, were primary determinants of WTP amount, highlighting the persistent role of economic barriers even in countries with relatively low-cost dental visits.^{37,38} Expanding insurance coverage and subsidies may mitigate financial burdens and enhance motivation to seek dental care.¹⁹

Encouraging mental health and social support are important. The findings indicated that mental health and social engagement, such as frequent social interaction and current working status, were closely tied to WTP, suggesting the need for integrated strategies to address psychological distress and social isolation among older adults. Community-based interventions—such as community salons or other local social initiatives—may foster engagement and play a critical role in boosting oral health motivation and outcomes.^{39,40} Furthermore, digital innovations, including teledentistry, might help address barriers to dental care, especially for individuals with depressive symptoms and mobility problems.⁴¹

A dental visit, especially for preventive care, was positively associated with a higher WTP amount, underscoring the importance of reinforcing preventive dental care behaviors. As of 2016, the annual dental examination rate in Japan was around 52.9%,⁴² indicating room for improvement. Expanding periodic dental examination managed by municipalities may improve motivation for dental treatment. Participation in public periodontal screening has been reported to be associated with an increase in subsequent regular dental examination.⁴³

Limitations of this study included that the analysis was based on a cross-sectional design; therefore, causal relationships or underlying mechanisms could not be inferred. Those with missing values were excluded from the analysis because of the analytical restriction; therefore, the analyzed participants might be healthier than the general population.⁴⁴ As individuals with depressive symptoms are more likely to have incomplete data, the contribution of depression to WTP might have been underestimated in this analysis. Although face-to-face interviews and mixed payment card methods have been recommended for eliciting WTP amount,^{18,19,45} a self-administered questionnaire was used, consisting of open-ended items. The possibility exists that the prosthodontic treatment imagined by the participants might differ, for example, implant-supported prostheses, removable dentures, or FPDs.

However, this study applied dominance analysis, allowing for a comprehensive assessment of the relative importance of multiple explanatory variables, and the sample included participants from a wide range of municipalities spanning both urban and rural areas in Japan. This enhanced the generalizability of the findings to the broader older Japanese population.

CONCLUSIONS

Based on the findings of this cross-sectional study, the following conclusions were drawn:

1. Key determinants of WTP for missing tooth replacement among older adults in Japan, were determined, emphasizing the roles of mental health, SES, and social engagement.
2. While the absence of depressive symptoms emerged as the strongest predictor for whether individuals expressed WTP, wealth emerged as the most influential factor in determining the WTP amount.
3. These findings highlight the need for comprehensive strategies to promote oral health among aging populations, including mental health support, financial assistance, and initiatives to enhance social participation and preventive dental care.

PATIENT CONSENT

All participants provided informed consent before participating in the study.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors used ChatGPT 3.5 to correct grammatical errors and improve readability in the first author's early draft. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

APPENDIX A. SUPPORTING INFORMATION

Supplemental data associated with this article can be found in the online version at [doi:10.1016/j.prosdent.2025.10.041](https://doi.org/10.1016/j.prosdent.2025.10.041).

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All authors gave their final approval and agree to be accountable for all aspects of the work.

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