Original Paper

Immediate Changes in First-Year Medical Students' Attitudes Toward Home Care Following an Educational Session Incorporating Immersive 360° Video: Single-Group Pre-Post Study

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Abstract

Background: Early exposure to home care can introduce medical students to care within patients' living environments. The attitudinal outcomes of introductory sessions incorporating prerecorded immersive 360° video remain insufficiently understood.

Objective: This study aimed to examine immediate changes in home care attitudes, career interest, and learning motivation following a session incorporating 360° home visit footage, prebriefing, and debriefing.

Methods: A single-group pre-post study was conducted among 110 first-year medical students in Japan. Presession and postsession responses were obtained from 102 and 110 students, respectively; analyses included 83 complete attitude pairs and 81 complete pairs for career interest and motivation to learn about home care. The 60-minute session comprised prebriefing (15 minutes), prerecorded 360° home visit video viewing (15 minutes), and debriefing (30 minutes). Paired *t* tests assessed immediate changes; prior-experience comparisons and correlations were exploratory.

Results: Of the 102 students who completed the presession questionnaire and 110 who completed the postsession questionnaire, 83 had complete data for all 14 attitude items at both time points and could be matched using research IDs. Among 83 paired observations, total attitude scores increased from 56.76 to 64.39 (mean change 7.63, 95% CI 4.20 to 11.06; t_{82}=4.43; *P*<.001). Home care treatment, home care education, and time and reimbursement scores increased, whereas general attitudes did not show a statistically significant change. Among 81 pairs, career interest increased from 60.91 to 74.28 (*P*<.001) and learning motivation increased from 66.67 to 75.31 (*P*=.007).

Conclusions: The educational session was associated with immediate increases in self-reported home care attitudes, career interest, and learning motivation. The design cannot identify effects specific to immersive viewing or establish sustained learning. Comparative studies should test its added value as preparation for direct clinical exposure.

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Keywords: 360-degree video; virtual reality; home care; attitudes; early clinical exposure

Introduction

Population aging and increasing chronic illness have strengthened the need for care within patients' homes and communities [1-5]. Home care requires attention to patients' living environments, family relationships, and available support, in addition to clinical assessment [6-11]. In Japan, medical education is a 6-year undergraduate program, and

early exposure programs introduce students to clinical and community settings [12,13].

Providing direct home care exposure to first-year students presents practical challenges, including travel, supervision, scheduling, and patients' privacy. Recorded visits may provide shared material for introductory discussion, although they cannot replace direct participation in clinical care [6,7,11].

Research in health professions education has examined virtual reality (VR) for knowledge and skills learning [14-16] and, more recently, for factors associated with medical students' willingness to use VR, such as enjoyment, immersion, and flow [17]. Broader educational research includes virtual field trips and reviews of immersive learning design [18-20]. These studies provide context for educational use but do not establish the effects of every immersive format. Prerecorded 360° video should be distinguished from interactive virtual simulations. The present intervention offered observation of a real recorded visit through a head-mounted display, rather than interactive clinical decision-making.

Presence refers to the subjective sense of being in a mediated environment, whereas embodiment concerns experiences of the body or bodily agency. Neither is established simply by using a headset. Previous work has explored perspective-taking in virtual environments [21,22], but the present study did not measure presence, embodiment, empathy, or cognitive load. Acceptance studies of VR and metaverse technology among academics and university students, which identify factors such as telepresence and facilitating conditions, further illustrate that technology acceptance is a separate outcome from demonstrated learning [23,24].

Attitude instruments have previously been used in home care education [25,26]. This study examined immediate changes following an introductory educational session incorporating prerecorded 360° home visit footage, prebriefing, and debriefing. Its objectives were as follows:

1. Assess immediate changes in total home care attitude scores, the primary outcome
2. Explore differences according to prior health care or caregiving experience
3. Examine changes in career interest and learning motivation and exploratory associations among these outcomes

The study evaluated the session as a whole and did not compare immersive viewing with another educational format.

Methods

The primary outcome was immediate change in the total home care attitude score. Secondary outcomes were subscale scores, career interest, and learning motivation. Analyses involving prior experience and correlations were exploratory.

Study Design and Setting

This single-group pre-post study was conducted at Keio University in Tokyo, Japan, in September 2025 as part of the Early Exposure Program 1. The course enrolled 110 first-year medical students. Reporting of this single-group pre-post study was guided by the applicable items of the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement [27]. The completed checklist is provided as a supplementary file (Checklist 1).

Participants

All 110 students attended the curricular session. The sample size was the entire first-year cohort (all 110 enrolled students). Research participation was voluntary. Presession and postsession questionnaire responses were matched using research IDs.

Educational Intervention

The intervention consisted of a 60-minute session. The session was delivered 4 times, each to a group of approximately 28 students (110 students in total), by the same facilitator. In each session, all students viewed the footage simultaneously using 1 of 30 dedicated VR headsets. The session comprised 3 phases:

1. Prebriefing (15 minutes): Students received a printed case scenario about an older patient receiving home care and were asked to observe the living environment and clinician-patient interactions. Before viewing, students were informed that they could remove the headset at any time if they experienced motion sickness or other discomfort. Symptoms and headset discontinuations were not systematically recorded.
2. 360° video viewing (15 minutes): Students viewed a 15-minute prerecorded 360° video of an actual physician home visit using JollyGood+ dedicated VR goggles and the accompanying application (model JGPVG-001; Jolly Good Inc). This was an observational experience rather than an interactive virtual simulation. The same session was delivered 4 times to groups of approximately 28 students, with the same facilitator across sessions. The footage included the following:
    - The journey: walking from the entrance and up the stairs to the patient's room (contextualizing the home environment)
    - The entrance: observing the physical barriers (eg, stairs and narrow doorways)
    - The consultation: a physician-eye view of the medical interview and physical examination in the patient's living room
3. Debriefing (30 minutes): Each cohort of approximately 28 students was divided into approximately 5 small groups for discussion, followed by a whole-group discussion facilitated by the same facilitator across all 4 sessions. Discussion prompts included "What adaptations in the home environment accommodated the patient's physical abilities?" and "What might a typical day in this home look like for the patient?"

Measurements

Self-administered questionnaires were administered immediately before and after the educational intervention. The presession questionnaire was administered before the session began, prior to case presentation and prebriefing. The postsession questionnaire was administered after completion of the debriefing, including the small-group and whole-group discussions.

- Home care attitudes: Students' attitudes toward home care were assessed using the 14-item Japanese-language questionnaire used by Yamanaka et al [26]. The 4 subscales were general attitudes (X1-X3), home care treatment (X4-X7), home care education (X8-X11), and time and reimbursement (X12-X14). Each item was rated on a 7-point scale, with higher scores indicating more favorable responses. No reverse scoring was required. Item scores were converted to a 0-100 scale. Total and subscale scores were calculated as the arithmetic means of the corresponding item scores.
- Career interest and learning motivation: Two single-item questions assessed interest in home care as a career option and motivation to learn about home care in the future. Before the session, students were asked: "Are you interested in home care as a career option?" and "Would you like to learn about home care in the future?" After the session, each question was prefaced with "Based on the VR experience." Responses were recorded on 7-point scales ranging from 1 (not interested) to 7 (interested) and from 1 (do not wish to learn) to 7 (wish to learn), respectively. Scores were converted to a 0-100 scale.
- Prior experience: Information on prior experience in health care or caregiving was collected to analyze its influence on baseline attitudes.

Total and subscale scores required complete responses to the relevant items. Change was defined as postsession minus presession. Career interest and learning motivation were additional researcher-developed items and were analyzed separately from the 14-item questionnaire. The complete questionnaire is provided in Multimedia Appendix 1.

Statistical Analysis

Descriptive statistics and Cronbach α coefficients were calculated using complete responses to all relevant attitude items at each time point (85 students before and 83 after the session). SDs were calculated from participant-level total and subscale scores. Pre-post comparisons used outcome-specific complete pairs: 83 students for attitude scores and 81 for career interest and learning motivation. Records with missing values required for a given analysis were excluded from that analysis; no missing values were imputed.

Immediate changes were assessed using 2-tailed paired *t* tests. For each outcome, presession and postsession means were calculated from the same paired sample. We report the mean change (post–pre), its 95% CI, the *t* statistic with *df*, and the *P* value. Paired-sample effect sizes were calculated as Cohen d_z, defined as the mean individual change divided by the SD of individual change scores. The total attitude score was the primary outcome; subscale scores, career interest, and learning motivation were secondary outcomes.

Exploratory analyses examined differences according to prior health care or caregiving experience among the 83 students with complete attitude pairs (43 with and 40 without prior experience). The 2-group, 2-time-point mixed design was analyzed using participant-level averages and change scores. The main effect of prior experience was tested by comparing participants' pre-post average scores between experience groups using a pooled-variance independent-samples *t* test. The experience-by-time interaction was tested by comparing individual change scores between groups. The main effect of time tested whether the equally weighted mean of the 2 group-specific mean changes differed from zero, using the pooled within-group variance of change scores. Squared *t* statistics were expressed as *F* statistics with *df* of (1,81). Partial eta squared was calculated as $F/(F+81)$.

Pearson correlation coefficients were calculated to explore associations among attitude scores, career interest, and learning motivation at baseline, after the session, and for change scores. Each correlation used complete observations for the variables involved, and its sample size was reported. Secondary and exploratory analyses were not adjusted for multiple comparisons and were interpreted cautiously. Analyses were conducted using Python (version 3.12.14) with *pandas*, *NumPy*, and *SciPy* by an analyst who was unaware of participant identities; the analysis dataset contained research IDs rather than direct participant identifiers. No masking to measurement time point or prior-experience status was implemented. All tests were 2-sided, with $P<.05$ used as the significance threshold. The individual student was the unit of analysis; no adjustment was made for clustering within teaching sessions or discussion groups.

Ethical Considerations

The study was approved by the Ethics Review Committee of Keio University School of Medicine (20261059). Information about the study was disclosed to students, who were given the opportunity to opt out of the use of their data for research. Participation was voluntary and did not influence grades or academic evaluation. No participant compensation was provided. Consent for filming and educational use was obtained from the patients and family members appearing in the footage. Participant identifiers were replaced with research IDs. Access to the data was restricted to the research team, and the data were stored on a password-protected university server. The study adhered to the principles of the Declaration of Helsinki.

Results

Participant Flow and Analysis Samples

The participant flowchart is shown in Figure 1. The course enrolled 110 students (37 female and 73 male). Presession and postsession questionnaire responses were obtained from 102 and 110 students, respectively. Out of the 102 baseline

respondents, 85 (83.3%) completed all 14 attitude items and were included in the baseline descriptive analyses in Table 1. Of the 110 postsession respondents, 83 (75.5%) completed all 14 attitude items, and all 83 also had complete baseline responses; these 83 students were matched using research IDs and included in the paired attitude analyses. Twenty-seven postsession respondents (24.5%) had incomplete postsession attitude responses. Overall, 19 of the 102 baseline respondents (18.6%) were excluded from the paired attitude analyses (17 with incomplete baseline attitude items and 2 with incomplete postsession attitude items). Incomplete responses were due to skipped items. Prior experience was recorded for all 85 baseline-complete students (45 yes and 40 no); the paired subset used for analysis (n=83) included 43 with (51.8%) and 40 without experience (48.2%). Career-interest and learning-motivation analyses each included 81 complete pairs. Figure 1 summarizes the analysis populations.

Figure 1. Participant flowchart. Questionnaire response does not imply completeness of every item. Out of 102 baseline respondents, 19 (18.6%) were excluded from paired attitude analyses. All analysis sample sizes are outcome specific.

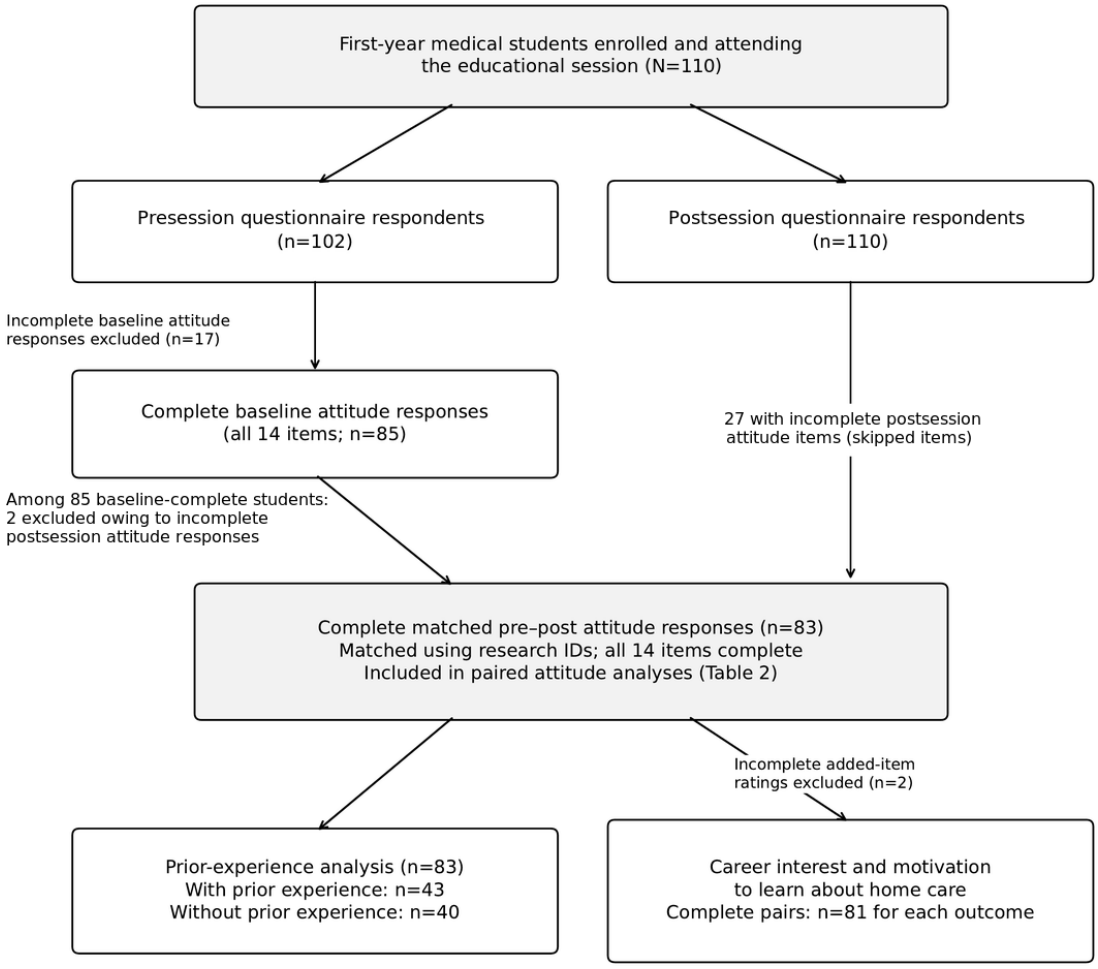


Table 1. Home care attitude score distributions and internal consistency before and after the session.

Outcome and subscale (items)	Presession score (n=85), mean (SD)	Postsession score (n=83), mean (SD)	Cronbach α (pre/post)
Home care attitude total (X1-X14)	57.14 (13.43)	64.39 (13.67)	0.834/0.856
General attitudes (X1-X3)	81.44 (17.52)	84.00 (16.03)	0.871/0.858
Home care treatment (X4-X7)	59.12 (14.02)	65.01 (16.19)	0.519/0.716
Home care education (X8-X11)	36.23 (26.46)	47.49 (24.57)	0.935/0.888
Time and reimbursement (X12-X14)	58.10 (16.74)	66.47 (15.65)	0.578/0.563

Reliability of the Attitude Scale

Table 1 reports score distributions and internal consistency for 85 students with complete baseline attitude responses and 83 with complete postsession responses. Cronbach α for home care education (X8-X11) was 0.935 before and 0.888 after the session. For time and reimbursement (X12-X14), Cronbach α was 0.578 and 0.563, respectively; this subscale therefore requires cautious interpretation.

Pre-Post Changes in Attitudes, Career Interest, and Learning Motivation

The paired total attitude mean increased from 56.76 to 64.39 (mean change 7.63, 95% CI 4.20-11.06; t_{82}=4.43; P<.001; Cohen d_z=0.49). Home care treatment increased from 58.79 to 65.01 (mean change 6.22, 95% CI 2.53-9.92; P=.001). Home care education increased from 35.69 to 47.49 (mean change 11.80, 95% CI 5.65-17.95; t_{82}=3.82; P<.001; Cohen d_z=0.42), and time and reimbursement increased from 57.90 to 66.47 (mean change 8.57, 95% CI 3.88-13.25; t_{82}=3.64; P<.001; Cohen d_z=0.40). General attitudes did not show a statistically significant change. Career interest increased by 13.37 (t_{80}=3.66; P<.001), and learning motivation increased by 8.64 (t_{80}=2.75; P=.007). Table 2 uses the same complete pairs for all summaries within each outcome.

Table 2. Immediate changes using complete outcome-specific pairs. Table 1 uses all available complete item records at each time point, so its baseline means differ from the paired means in Table 2.

Outcome and subscale (n)	Score (pre/post)	Change[a] (95% CI)	*t* test[b] (*df*)	*P* value	Cohen d_z[c]
Home care attitude total (83)	56.76/64.39	7.63 (4.20 to 11.06)	4.43 (82)	<.001	0.49
General attitudes (83)	80.99/84.00	3.01 (–0.78 to 6.80)	1.58 (82)	.12	0.17
Home care treatment (83)	58.79/65.01	6.22 (2.53 to 9.92)	3.35 (82)	.001	0.37
Home care education (83)	35.69/47.49	11.80 (5.65 to 17.95)	3.82 (82)	<.001	0.42
Time and reimbursement (83)	57.90/66.47	8.57 (3.88 to 13.25)	3.64 (82)	<.001	0.40
Career interest (81)	60.91/74.28	13.37 (6.11 to 20.64)	3.66 (80)	<.001	0.41
Learning motivation (81)	66.67/75.31	8.64 (2.39 to 14.89)	2.75 (80)	.007	0.31

[a]Change is post–pre.
[b]Positive *t* test values indicate an increase.
[c]Cohen d_z uses the SD of individual changes.

Differences by Prior Experience (Mixed ANOVA)

Exploratory mixed-design comparisons included 83 students (n=43, 51.8% with prior experience and n=40, 48.2% without). For the total score, the effects of experience ($F_{1,81}$=4.97; P=.03) and time ($F_{1,81}$=20.27; P<.001) were significant, while the interaction was not ($F_{1,81}$=2.06; P=.16). For home care education, experience and time effects were significant ($F_{1,81}$=14.66; P<.001 and $F_{1,81}$=15.19; P<.001, respectively), while the interaction was not statistically significant (P=.14). For time and reimbursement, the time effect was significant ($F_{1,81}$=13.30; P<.001); the experience effect (P=.66) and interaction (P=.52) were not statistically significant. Effect sizes and all subscale results are reported in Table 3. Nonsignificant interactions do not establish equivalent changes between groups.

Table 3. Exploratory experience and time comparisons using the 2-time-point mixed-design decomposition.

Outcome and subscale	Experience[a]			Time			Interaction		
	F test (*df*)	*P* value	η_p^2	*F* test (*df*)	*P* value	η_p^2	*F* test (*df*)	*P* value	η_p^2
Home care attitude total	4.97 (1,81)	.03	0.058	20.27 (1,81)	<.001	0.200	2.06 (1,81)	.16	0.025
General attitudes	0.41 (1,81)	.53	0.005	2.63 (1,81)	.11	0.031	1.16 (1,81)	.28	0.014
Home care treatment	0.64 (1,81)	.43	0.008	11.32 (1,81)	.001	0.123	0.51 (1,81)	.48	0.006
Home care education	14.66 (1,81)	<.001	0.153	15.19 (1,81)	<.001	0.158	2.24 (1,81)	.14	0.027
Time and reimbursement	0.19 (1,81)	.66	0.002	13.30 (1,81)	<.001	0.141	0.41 (1,81)	.52	0.005

[a]Experience is a participant characteristic, not an intervention allocation.

Correlations Among Attitudes, Career Interest, and Learning Motivation

Exploratory correlations with total attitude scores were significant for baseline career interest (n=83; r=.292; P=.007), change in career interest vs change in attitudes (n=81; r=.352; P=.001), baseline learning motivation (n=83; r=.269; P=.01), and change in motivation vs change in attitudes (n=81; r=.303; P=.006). Correlated changes do not establish a causal mechanism. Complete correlation results are provided in Table S1 in Multimedia Appendix 2.

Discussion

Principal Findings

The educational session was associated with immediate increases in total home care attitudes, career interest, and learning motivation. Increases were observed in home care treatment, home care education, and time and reimbursement, whereas general attitudes did not show a statistically significant change. These findings describe self-reported outcomes after a single session and do not establish durable learning or effects specific to VR.

The session combined preparatory material, observation of an actual recorded home visit, and facilitated discussion. Each component may have contributed to the observed changes. The footage provided common material for discussion of care in patients' living environments, but understanding of those environments was not directly assessed. Previous home care education studies provide relevant context [25,26], although differences in learners, interventions, and measures preclude a direct comparison of effect magnitude.

General attitudes had relatively high baseline scores, which may have limited the scope for an increase. This is a possible explanation rather than a demonstrated ceiling effect. Changes in practical and systemic attitude domains warrant further study, particularly given variable subscale reliability and the exploratory nature of these comparisons.

Recorded visits could be evaluated as preparatory material before supervised home visits. The present study did not measure cost, accessibility, scalability, comparative safety, or clinical performance and therefore does not establish implementation advantages in these domains.

Interpretation and Educational Implications

The sequence of observation followed by discussion can be interpreted in relation to experiential learning [28]. However, the present design did not test the Kolb learning cycle or compare reflection across instructional formats. Presence, embodiment, perspective-taking, engagement, and cognitive load were not measured and cannot explain the results as demonstrated mechanisms.

Future studies should compare the same home visit content presented through a headset or conventional 2D video, while holding preparatory materials, teaching time, and debriefing constant. Validated presence measures, and embodiment measures where appropriate to the intervention, could test proposed mechanisms. Measures of knowledge, observed performance, and subsequent clinical engagement would help distinguish immediate attitude change from educational benefit. Follow-up should establish whether changes persist.

Modest correlations between changes in interest, motivation, and attitudes indicate concurrent variation in self-reported responses. They do not establish mediation or validate the attitude instrument. Similarly, a nonsignificant experience-by-time interaction should not be interpreted as evidence of equal benefit across learner groups.

Limitations

This study has several limitations. First, the uncontrolled design cannot distinguish the effects of individual teaching components, immersive viewing, repeated testing, or social desirability. Second, it involved one cohort at one institution and measured outcomes immediately after the session. Third, outcomes were self-reported rather than behavioral or performance-based. Fourth, complete-pair analyses excluded respondents with missing data and may be biased if missingness relates to student characteristics or outcomes. Baseline characteristics were not compared between included and excluded respondents. Fifth, variable subscale reliability, particularly for time and reimbursement, and multiple unadjusted exploratory tests limit interpretation. The two additional single-item outcomes were researcher-developed and were not independently validated. In addition, the postsession versions of the two additional items explicitly referred to the VR experience, which may have influenced responses. Presence, embodiment, empathy, and cognitive load were not measured. Adverse events, including motion sickness and discontinuation of headset use, were not systematically recorded; safety and tolerability therefore could not be evaluated. Students participated in shared teaching sessions and small-group discussions, but analyses did not account for potential clustering within these groups, which may affect the precision of estimates.

Conclusions

A session incorporating prerecorded immersive 360° home visit footage was associated with immediate increases in self-reported attitudes toward home care, career interest, and learning motivation. These findings suggest that recorded home visits could be evaluated as preparatory material before supervised direct home visit experiences. Comparative studies with longer follow-up should determine whether immersive viewing adds value beyond other presentations of the same material and whether these changes translate into sustained learning or clinical engagement.

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Generative AI Use

Generative AI tools were used during manuscript preparation. ChatGPT (GPT-6.1; OpenAI) was used to assist with manuscript revision, English language editing, drafting responses to reviewers, and generating code for statistical recalculation. Claude (Claude Sonnet 5.5; Anthropic) was used to check consistency among the manuscript, tables, figure, and response letter and to assist with drafting and editing the response letter and revised wording. The authors reviewed and verified the analyses, references, and final text and take full responsibility for the content of the manuscript.

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Data Availability

The dataset analyzed in this study is available from the corresponding author on reasonable request, subject to applicable consent and institutional requirements.

Authors' Contributions

Conceptualization: JH, RO
Data curation: JH
Formal analysis: JH
Funding acquisition: JH
Investigation: JH, RO
Methodology: JH, RO
Project administration: JH, RO
Resources: JH, RO
Supervision: RO
Writing – original draft: JH
Writing – review & editing: JH, RO

Conflicts of Interest

None declared.

Multimedia Appendix 1

Japanese questionnaire and English translations for reader reference.
[DOCX File (Microsoft Word File), 34 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Pearson correlations between career interest, learning motivation, and home care attitude scores.
[DOCX File (Microsoft Word File), 26 KB-Multimedia Appendix 2]

Checklist 1

TREND checklist.
[PDF File (Adobe File), 112 KB-Checklist 1]

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Abbreviations

TREND: Transparent Reporting of Evaluations with Nonrandomized Designs
VR: virtual reality

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