Effect of a Mobile App Chatbot and an Interactive Small Group Webinar on COVID-19 Vaccine Intention and Confidence in Japan: A Randomized Controlled Trial

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Introduction: We investigated the effect of social media-based interventions on COVID-19 vaccine intention and confidence in Japan.

Methods: We conducted a three-arm, randomized controlled trial between 5 November 2021 and 9 January 2022. Japanese citizens aged ≥20 who had not received any COVID-19 vaccine and did not intend to be vaccinated were randomly assigned to one of the following three groups: 1) a control group without any intervention, 2) a group using a mobile app chatbot providing information on COVID-19 vaccines, and 3) a group using interactive webinars with health professionals. The vaccine intention (VI) and pre-defined vaccine confidence index (VCI) measuring confidence in the importance, safety, and effectiveness of COVID-19 vaccination were compared before and after the interventions.

Results: VI increased from 0% to 18.7% in the control group, 14.7% in the chatbot group, and 18.8% in the webinar group after the interventions. There was no significant difference in VI between the control group and the chatbot group or the webinar group. There was no significant difference in VCI between the control group and the chatbot group. VCI significantly increased in the webinar group compared to the control group for importance (-2.2% vs. 8.7%, p<0.01) and effectiveness (-8.1% vs. 5.3%, p<0.01), while VCI for safety was not significantly different (1.9% vs. 4.8%, p=0.30). VCI for importance and effectiveness in the control group decreased without any interventions.

Conclusion: While this study demonstrated that neither the chatbot nor the webinar changed VI, interactive webinars could be an effective tool to change vaccine confidence.

Figure 1: Study Flow

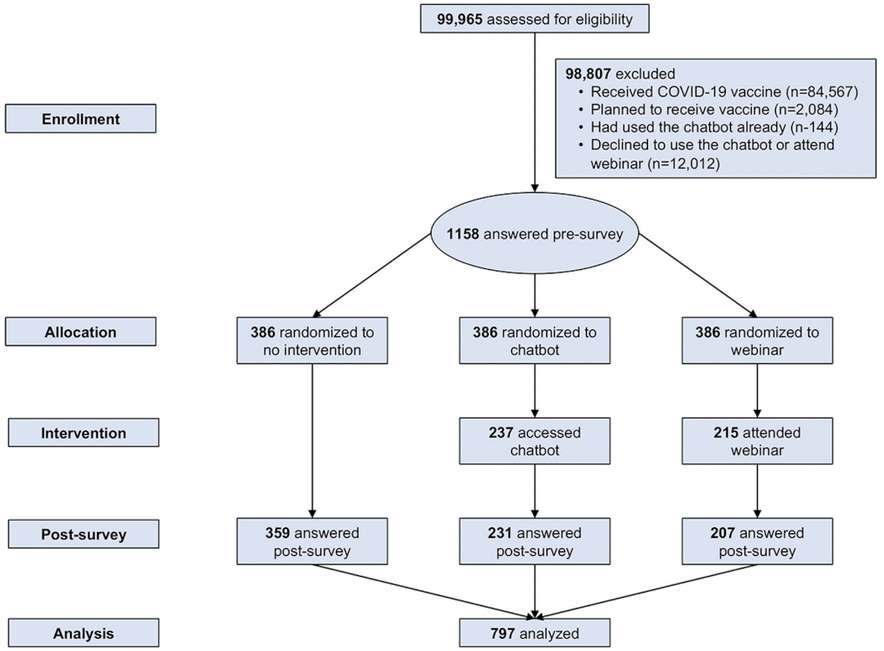

Table 1: Baseline participant characteristics and perceptions of COVID-19 vaccines by intervention groups

All participants n=797	Group 1 (control) n=359	Group 2 (chatbot) n=231	Group 3 (webinar) n=207	p-value
Characteristics				
Age (y), mean	44.7	45.0	44.6	0.920
Gender, % male	53.2	51.5	50.7	0.834
Do you want to receive a COVID-19 vaccine in the future? (%)				0.788
Yes, definitely (Screened out)	0	0	0	
Unsure, but leaning towards yes	22.0	18.2	20.8	
Unsure, but leaning towards no	35.4	36.4	33.3	
No, definitely not.	42.6	45.5	45.9	
COVID-19 vaccines are important, %				0.958
Strongly agree	7.5	8.2	5.3	
Tend to agree	29.5	29.0	31.4	
Do not know	32.0	35.1	32.9	
Tend to disagree	15.0	13.4	15.0	
Strongly disagree	15.9	14.3	15.5	
COVID-19 vaccines are safe, %				0.953
Strongly agree	0.6	0.9	0.5	
Tend to agree	8.6	10.0	9.2	
Do not know	38.4	39.4	36.2	
Tend to disagree	26.5	26.8	30.9	
Strongly disagree	25.9	22.9	23.2	
COVID-19 vaccines are effective, %				0.505
Strongly agree	4.2	5.6	2.4	
Tend to agree	37.0	38.1	40.1	
Do not know	33.4	33.8	30.4	
Tend to disagree	10.6	10.0	15.0	
Strongly disagree	14.8	12.6	12.1	

Table 2: Vaccine intention and confidence after interventions

All participants (n=797)	Group 1 (control) n=359 (%)	Group 2 (chatbot) n=231 (%)	Group3 (webinar) n=207 (%)	Group 1 vs. Group 2 p-value[a] (%)	Group 1 vs. Group 3 p-value[a] (%)
Willing to be vaccinated [b]	18.7	14.7	18.8	0.259	1.000
Change in vaccine confidence [c]					
COVID-19 vaccines are important	-2.2	-0.8	8.7	0.729	0.009
COVID-19 vaccines are safe	1.9	1.8	4.8	0.865	0.303
COVID-19 vaccines are effective	-8.1	-3.4	5.3	0.249	0.002

[a] Difference in willingness to be vaccinated was assessed by Chi-square test; changes in VCI were assessed by mixed effects logistic regression model.
[b] Including those who have received a COVID-19 vaccine or not received a COVID-19 vaccine but are willing
[c] Difference in % (post-intervention vs. pre-intervention) of those who responded, “strongly agree” or “tend to agree.” (Other responses were “do not know,” “tend to disagree,” “strongly disagree”)