

WhatsApp groups to promote childhood seasonal influenza vaccination: a randomised control trial (abridged secondary publication)

Q Liao *, R Fielding, DYT Cheung, J Lian, WWT Lam

KEY MESSAGES

1. Communication about seasonal influenza vaccination (SIV) in a WhatsApp group has no significant effect on promoting parents to take children for SIV but significantly promoted their perceived self-efficacy in taking children for SIV.
2. In the WhatsApp groups, participants mainly shared their negative experience or views about SIV including their concerns over vaccine safety or adverse effects, concerns over vaccine effectiveness, and negative opinions of vaccination.
3. The group moderator played a main role in

sharing knowledge/information and in shifting the discussion about SIV from negative experience/views to positive experience/views.

Hong Kong Med J 2022;28(Suppl 1):S38-41

HMRF project number: 16150752

¹ Q Liao, ¹ R Fielding, ² DYT Cheung, ³ J Lian, ¹ WWT Lam

¹ School of Public Health, The University of Hong Kong

² School of Nursing, The University of Hong Kong

³ School of Optometry, The Hong Kong Polytechnic University

* Principal applicant and corresponding author: qyliao11@hku.hk

Introduction

Seasonal influenza vaccination (SIV) in young children remains low in Hong Kong.¹ Sending vaccination reminders through mobile phone was considered effective in promoting vaccination uptake in children, but the effect size was small.² Current vaccination reminders mainly contain information on the risks of influenza infection, benefits of SIV, and doctors' recommendations for vaccination,² which may be insufficient to address concerns over risks of SIV, an important impediment to SIV.¹ Parental decision-making for children's vaccination can be greatly influenced by other parents' vaccination decisions. Others' behavioural choices provide important behavioural cues for social learning or imitation, indicating social approval and safety of a behavioural choice.^{1,3} Therefore, encouraging positive experience and information sharing among parents in addition to providing vaccination reminders could promote parents to take their children for SIV. WhatsApp is an easily accessible platform for parents to share this kind of information.

Time constraints are likely to increase decision-maker reliance on heuristic cues for decision-making,⁴ but the effect may depend on whether parents will use the positive or negative cues for facilitating their decision making for children's SIV. In Hong Kong, parents are recommended to take their children who are eligible to receive SIV in October each year. Vaccination uptake before the winter influenza season (from January to March) is strongly recommended because it takes around 2 weeks to produce immunity after vaccination. Therefore, decision making for vaccination is naturally time-constrained, and the optimal time for children vaccination is 2 weeks before the winter influenza season.

This preliminary study aims to test the

effect of delivering vaccination reminders and communicating risks and benefits of SIV through WhatsApp groups. Specifically, it aims to test the effect of the WhatsApp groups on promoting childhood SIV uptake, the effect of including the time constraint components (the remaining time for optimal timing of SIV) into the weekly vaccination reminders on promoting childhood SIV uptake, and parental acceptability.

Methods

This study only targeted mothers because they were the main decision makers for their children's immunisation in most Hong Kong families. Inclusion criteria were mothers who had at least one child aged 6 to 72 months, was able to communicate in Chinese or Cantonese and read and type Chinese, and was able to access the internet via mobile phone and willing to use WhatsApp. Mothers were excluded if their eligible children had medical contraindications for immunisation. Mothers were pre-recruited from previous population-based telephone surveys and advertisements. They were invited by trained telephone interviewers to participate in the study. Using block randomisation with a ratio of 5:2:2, they were randomly allocated into the control group or one of the two social-networking intervention (SNI) groups: receiving weekly vaccination reminder with or without time constraint components (SNI+TC or SNI-TC). Participants were asked to complete a ~10-minute baseline assessment.

The vaccination reminders comprised three messages: message 1 introduced the childhood SIV subsidy scheme and doctors' recommendation for children's SIV; message 2 was about risks of seasonal influenza to children, benefits and safety of SIV; and message 3 was about the remaining days for optimal

timing of SIV for children (for SNI+TC group only). Between October and December 2017, vaccination reminders were sent to the intervention groups at afternoon times of different weekdays once per week. A total of eight vaccination reminders were sent over 8 weeks. A total of four WhatsApp groups were established including two SNI-TC groups and two SNI+TC groups, each comprised ~40 participants. The moderator also sent messages on a weekly basis to encourage positive experience and information exchange, vaccination planning, and information seeking. The moderator also addressed mothers' questions, concerns, or misunderstandings about influenza and influenza vaccination. The WhatsApp groups were closed by the moderator by the end of December 2017. All respondents were contacted again between April and May 2018 for a follow-up assessment on children's SIV uptake, perceptions related to SIV, and opinions about using social networking intervention to promote childhood SIV uptake.

Generalised estimating equations (GEE) logistic regression model was conducted to examine the effect of social-networking intervention and the effect of including time constraint into vaccination reminders on children's SIV uptake. GEE was also used to examine changes in perceptions regarding influenza and SIV by intervention arm. If participants had more than one child aged 6 to 72 months, the youngest one's SIV uptake was used as the main outcome in the GEE logistic regression model. Content analysis was conducted to analyse all posts in the WhatsApp group to understand how participants interacted with each other and the moderator during the communication process. Each post was coded according to the following categories: role (moderator or participant), format (text, picture, emoji, or hyperlink), cyber support (eg, sharing views, experiences, or emotions), and discussion topics (eg, vaccine effectiveness, vaccine safety, adverse effects). A coding scheme was entered into the QRS Nvivo 12.0 and independently coded by two researchers. Opinions about the benefits and barriers of the implemented interventions were summarised to determine the acceptability and usefulness of the interventions.

Results

A total of 205, 80, and 80 mothers were allocated to the control, SNI-TC, and SNI+TC groups, respectively. The three groups were comparable in terms of demographics, target child's characteristics, and the past-12-month SIV uptake. At the follow-up, 174, 60, and 57 participants completed the outcome assessment, with a dropout rate of 15.1%, 28.7%, and 25.0%, respectively.

Respectively in the three groups, 37.4%, 33.3%, and 38.3% of the participants reported that all their target child(ren) received SIV, whereas their youngest target child's SIV uptake was similar: 37.9%, 33.3%, and 38.3%, respectively. GEE logistic regression models revealed that the WhatsApp groups had no significant effect on children's SIV uptake but had

significant effect on promoting parents' perceived self-efficacy in taking children for SIV in the SNI-TC group (OR=2.57, 95% CI=1.06-6.23) and the SNI+TC group (OR=2.39, 95% CI=1.13-5.06) [Fig 1]. In addition, including the time constraint component into the vaccination reminders did not have significant effect on children's SIV uptake.

Of 434 mothers' posts, 52.1% were coded as sharing experience/views, 27.4% as seeking information/opinions, 24.4% as sharing knowledge/information, and 15.2% as emotional exchange. Approximately 44.7% of the experience/views shared were coded as negative, including concerns over vaccine safety, adverse effects, and effectiveness, as well as negative opinions of vaccination. Participants mainly sought information/opinions about vaccine safety or adverse effects, medical eligibility of SIV, first SIV for children, vaccination clinic or cost, and vaccine effectiveness. Of the knowledge/information shared by participants, 45.3% was about vaccination clinics and cost and 17.9% was about the medical eligibility of SIV (Table).

Of 203 moderator's posts, 70.9% were coded as sharing knowledge/information, 20.7% as encouraging information and experience sharing, 10.3% as encouraging vaccination planning, 9.9% as encouraging information seeking, 6.9% as sharing experience/views, and 3.9% emotional exchange. Most knowledge or information shared by the moderator was on vaccine effectiveness (20.8%), vaccination clinic and cost (18.8%), and vaccine safety or adverse effects (17.4%). Although participants mainly shared about their negative experience/views/emotions regarding SIV at the beginning of the discussion, the moderator's involvement resulted in more frequent posts about sharing positive experience/views, sharing knowledge/information, and sharing positive emotional exchange (Fig 2).

Of participants in the SNI groups, 81.2% reported no concerns with the intervention. Among those who reported being a bit or somewhat/very concerned, the most common concerns were receiving misinformation, privacy concerns, and receiving irrelevant information. 79.4% of participants agreed or strongly agreed that the information could

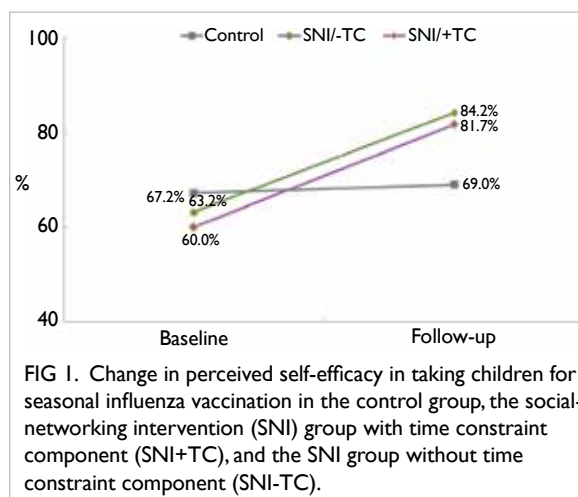


FIG 1. Change in perceived self-efficacy in taking children for seasonal influenza vaccination in the control group, the social-networking intervention (SNI) group with time constraint component (SNI+TC), and the SNI group without time constraint component (SNI-TC).

TABLE. Discussion topics and quotes of posts from participants

Discussion topics	No. (%) of posts	Quotes
Vaccination decision or plan	134 (30.9)	
Positive	69 (15.9)	I will take my child for flu vaccination.
Negative	40 (9.2)	I won't take my child for flu vaccination because there is still some negative news.
Uncertain	25 (5.8)	Then, should I take my child for flu vaccination? I am considering (whether to take my child for flu vaccination)
Vaccination clinics and costs	63 (14.5)	Dr Ng Chin Nang at Kwai Fong, trivalent vaccine is free and quadrivalent vaccine cost HK\$60. My child just took the vaccination yesterday and they still have some available vaccines.
Vaccine safety and adverse effects	62 (14.3)	
Concerns over vaccine effectiveness	40 (9.2)	Is it true that all family members should receive influenza vaccination once one member of the family receives the flu vaccination (otherwise it can be worse)?
Clarify misperception or providing information for vaccine safety/ adverse effects	6 (1.4)	It is the misinformation that vaccination can cause autism. This rumour has been dismissed many years before.
Mixed/neutral	16 (3.7)	What can be the side effects of flu vaccination?
Vaccine effectiveness	51 (11.8)	
Concerns over vaccine effectiveness	26 (6.0)	Now there are too many viruses/bacteria and they change very quickly. This time, we take the flu vaccination for this virus but then there may be another new virus. How can we ensure that the vaccination is effective?
Clarify misperception or providing information for vaccine effectiveness	15 (3.5)	Although there is mismatch, the vaccine is still effective for preventing influenza H1N1 or influenza B viruses
Mixed/neutral	15 (3.5)	Can flu vaccination help to avoid severe complications? Different children may have different reactions to the flu vaccination.
Medical eligibility of vaccination	40 (9.2)	I thought to take my daughter for flu vaccination today but she has running nose and some cough. Is it OK for her to take vaccination?
Vaccination experience	33 (7.6)	
Positive	16 (3.7)	My child has taken the flu vaccination and he still feels very good now.
Negative	12 (2.8)	My elder daughter took the flu vaccination for once but got more and severe sicknesses that year. Since then, she has never taken flu vaccination.
Mixed or neutral	5 (1.2)	My two sons have taken the flu vaccination. One is three years old. He was given injection at the hip and he said no pain. Another is seven years old. He was given injection at arm. He said it was very painful and the pain lasted for two days.
Opinions or general attitudes relating to vaccination	26 (6.0)	
Negative	23 (5.3)	Vaccination=Injecting bacteria/viruses into our body
Positive	1 (0.2)	It is an additional protection for our children.
Mixed or uncertain	2 (0.5)	Is it necessary to take flu vaccination if my child is always healthy?
First-time flu vaccination	20 (4.6)	I would like to ask: it is my baby's first flu vaccination. The doctor said he needs to take two doses of vaccines. Then what's the maximum time interval between the two vaccinations?
Influenza risks and consequences	20 (4.6)	But my daughter got flu as soon as she entered pre-nursery school in early September. Then, she had been hospitalized for three days and had to be quarantined.
Eligibility of receiving vaccination subsidy and application procedure	12 (2.8)	In fact, is it only family with low income can receive the vaccination with subsidy?
Influenza vaccine (trivalent/quadrivalent etc.)	10 (2.3)	Which is better? The quadrivalent vaccine or the trivalent one? Which one do you choose? The quadrivalent vaccine or the trivalent one?
Timing of vaccination	10 (2.3)	Is it better to take my child for flu vaccination after he enters a school?
Other influenza preventive measures	6 (1.4)	Actually, I used natural methods, herb oil and food therapy to help my child prevent flu
Mechanism of flu vaccination	4 (0.9)	In fact, it is because that it is to inject the viruses into your body to help your body generate antibody. Therefore, some can get a fever after taking vaccination.
Treatment of influenza	3 (0.7)	I heard that many people got flu vaccination cannot recover without treatment and had to take Tamiflu but Tamiflu has a lot of side effects.

improve their understanding about the risks of influenza and benefits of influenza vaccination for children, but only 59.8% agreed that the information was useful to make children's vaccination decision, and 19.7% reported that information was not sufficient. 87.2% of participants were satisfied with the information provided by the moderator. 84.6%

of participants were willing to recommend other mothers to participate in the discussion group.

Discussion

The WhatsApp group was not effective to promote children's SIV uptake, likely because the interventions

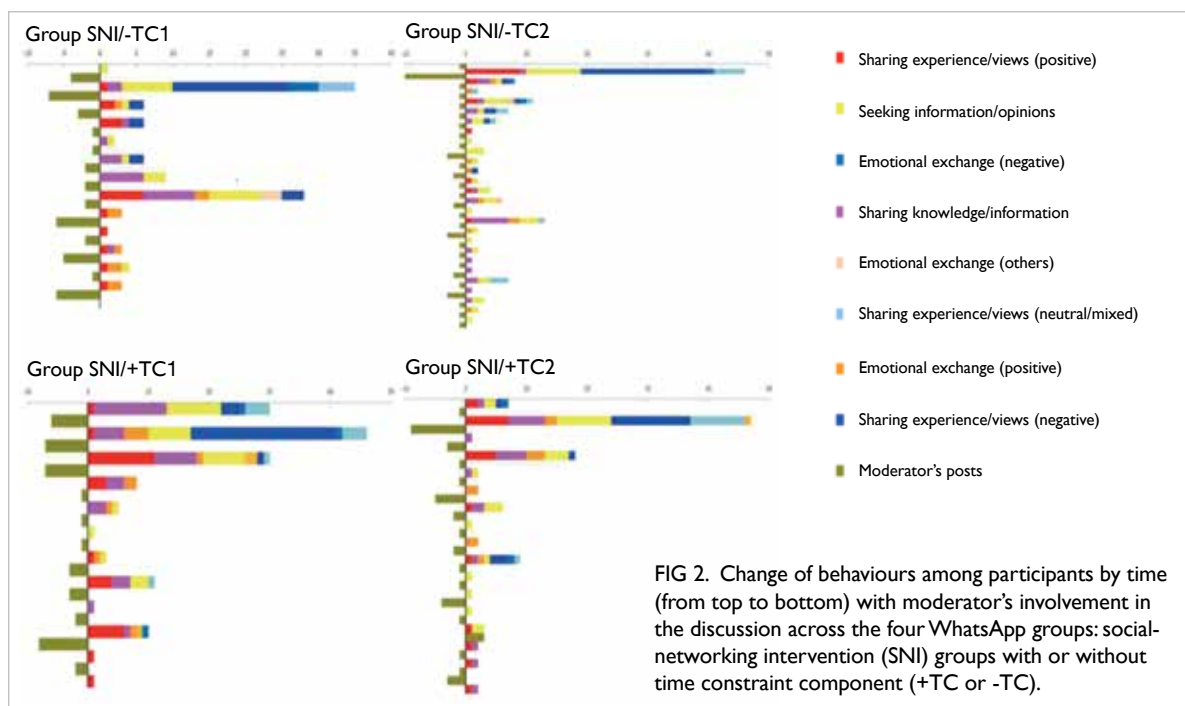


FIG 2. Change of behaviours among participants by time (from top to bottom) with moderator's involvement in the discussion across the four WhatsApp groups: social-networking intervention (SNI) groups with or without time constraint component (+TC or -TC).

did not adequately address participants' concerns over vaccine safety, adverse effects, and effectiveness, as well as negative opinions of vaccination. Incorporating a time constraint component into the vaccination reminder did not have a significant effect on changing children's SIV uptake. This is likely because the time constraint component was not highly valued and that the weekly change in the remaining time for optimal timing of vaccination was not easily noticed by participants. Participants shared various concerns over SIV which seemed to link to their belief that SIV could weaken human immunity, general distrust in how the vaccine strain was estimated and a perception that vaccination is not a natural preventive measure. The WhatsApp group significantly promoted parents' perceived self-efficacy in taking their children for SIV, which is likely to motivate future SIV uptake.¹ However, peer information support (eg information about vaccination clinic and cost and medical eligibility of SIV) may be mainly useful for mothers who had considered taking their child for SIV but should not be able to capture the attention of those who had strong negative views about SIV. The information shared in the WhatsApp groups were mainly useful for improving participants' understanding about SIV but not adequate for some to make vaccination decision. However, the interaction between moderator and participants indicates that health professional active participation and responses can create a more positive discussion about vaccination. This is an important direction for combating vaccine hesitancy in the future.

This study had several limitations. First, our study only recruited participants who used WhatsApp and thereby not be representative for the target population. Second, a WhatsApp group specified for discussing influenza vaccination may

automatically exclude those who were not interested in the topic, causing in-group biases. Third, this is a preliminary study and thereby the sample size was not sufficient with a small effect size.

Acknowledgements

We thank Mr Koon Ken Fung for assisting in development of vaccination reminders, testing of the questionnaire, data collection, and data entry. We also thank Miss Ripple Yuan for her assistance in qualitative data analysis. We also thank MVA Hong Kong Ltd for recruiting subjects and conducting baseline telephone interviews.

Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#16150752). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

References

1. Liao Q, Lam WW, Cowling BJ, Fielding R. Psychosocial influences on parental decision-making regarding vaccination against seasonal influenza for young children in Hong Kong: a longitudinal study, 2012-2013. *Int J Behav Med* 2016;23:621-34.
2. Odone A, Ferrari A, Spagnoli F, et al. Effectiveness of interventions that apply new media to improve vaccine uptake and vaccine coverage. *Hum Vaccin Immunother* 2015;11:72-82.
3. Wang LD, Lam WW, Wu JT, Liao Q, Fielding R. Chinese immigrant parents' vaccination decision making for children: a qualitative analysis. *BMC Public Health* 2014;14:133.
4. Maule AJ, Hockey GR, Bdzola L. Effects of time-pressure on decision-making under uncertainty: changes in affective state and information processing strategy. *Acta Psychol (Amst)* 2000;104:283-301.