Effect of a wordless, animated, social media video intervention on COVID-19 prevention: an online randomized controlled trial of 15,163 adults in the USA, Mexico, UK, Germany, and Spain

Alain Vandormael, Maya Adam, Merlin Greuel, Jennifer Gates, Caterina Favaretti, Violetta Hachaturyan, Till Bärnighausen

Submitted to: JMIR Public Health and Surveillance
on: March 24, 2021

Table of Contents

Effect of a wordless, animated, social media video intervention on COVID-19 prevention: an online randomized controlled trial of 15,163 adults in the USA, Mexico, UK, Germany, and Spain

Alain Vandormael[1]; Maya Adam[2] PhD; Merlin Greuel[1] MGH; Jennifer Gates[3] BA; Caterina Favaretti[1] MSc; Violetta Hachaturyan[1] MSc; Till Bärnighausen[1, 4, 5] PhD

[1]Heidelberg Institute of Global Health (HIGH), Heidelberg University, Heidelberg Heidelberg DE
[2]Department of Pediatrics, Stanford University School of Medicine Stanford US
[3]Icahn School of Medicine at Mount Sinai New York US
[4]Africa Health Research Institute (AHRI) Durban ZA
[5]Department of Global Health and Population, Harvard T.H. Chan School of Public Health Boston US

Corresponding Author:
Alain Vandormael
Heidelberg Institute of Global Health (HIGH), Heidelberg University, Heidelberg
130.3 Im Neuenheimer Feld
Heidelberg
DE

Abstract

Background: Innovative approaches to the dissemination of evidence-based COVID-19 health messages are urgently needed to counter social media misinformation about the pandemic. To this end, we designed a short, wordless, animated, global health communication video (CoVideo) that was rapidly distributed through social media channels to an international audience.

Objective: The objectives of this study were to: 1) Establish the CoVideo's effectiveness in improving COVID-19 hygiene knowledge, and 2) Establish the CoVideo's effectiveness in increasing behavioral intent toward COVID-19 hygiene.

Methods: In May and June 2020, we enrolled 15,163 online participants from the United States of America, Mexico, United Kingdom, Germany, and Spain. We randomized participants to (i) the CoVideo arm, (ii) an attention placebo control (APC) arm, and (iii) a do-nothing arm, and presented 18 knowledge questions about preventive COVID-19 behaviors, which was our first primary endpoint. To measure behavioral intent, our second primary endpoint, we randomized participants in each arm to five list experiments.

Results: Globally, the video intervention was viewed 1.2 million times within the first 10 days of its release and more than 15 million times within the first four months. Knowledge in the CoVideo arm was significantly higher (mean = 16.95; 95% CI: 16.91, 16.99) than the APC (mean = 16.89; 95% CI: 16.86, 16.93; p = 0.024) and do-nothing (mean = 16.86; 95% CI: 16.83, 16.90; p < 0.001) arms. We observed high baseline levels of behavioral intent to perform many of the preventive behaviors featured in the video intervention. We were only able to detect a statistically significant impact of the CoVideo on one of the five preventive behaviors.

Conclusions: Despite high baseline levels, the intervention was effective at boosting knowledge of COVID-19 prevention. We were only able to capture a measurable change in behavioral intent towards one of the five COVID-19 preventive behaviors examined in this study. The global reach of this health communication intervention and the high voluntary engagement of trial participants highlight several innovative features that could inform the design and dissemination of public health messages. Short, wordless, animated videos, distributed by health authorities via social media, may be an effective pathway for rapid global health communication during health crises. Clinical Trial: The study and its outcomes were registered at the German Clinical Trials Register (www.drks.de) on May 12th, 2020: #DRKS00021582.

(JMIR Preprints 24/03/2021:29060)
DOI: https://doi.org/10.2196/preprints.29060

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?
Please make my preprint PDF available to anyone at any time (recommended).
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
✓ **No, I do not wish to publish my submitted manuscript as a preprint.**
2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?
✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v
Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Original Manuscript

Effect of a wordless, animated, social media video intervention on COVID-19 prevention: an online randomized controlled trial of 15,163 adults in the USA, Mexico, UK, Germany, and Spain

Alain Vandormael, PhD[1*], Maya Adam, PhD[2], Merlin Greuel, MGH[1], Jennifer Gates, BA[3], Caterina Favaretti, MSc[1], Violetta Hachaturyan, MSc[1] & Till Bärnighausen, PhD[1,4,5]

[1] Heidelberg Institute of Global Health (HIGH), Heidelberg University, Heidelberg, 69120, Germany
[2] Department of Pediatrics, Stanford University School of Medicine, Stanford, 94305, USA
[3] Icahn School of Medicine, Mount Sinai, New York, USA
[4] Africa Health Research Institute (AHRI), Private Bag X7, Durban 4013, South Africa
[5] Department of Global Health and Population, Harvard T.H. Chan School of Public Health, Boston, MA 02115, USA
* Corresponding author

Contact Information:

Dr. Alain Vandormael

130.3 Im Neuenheimer Feld,

Heidelberg Institute of Global Health,

University of Heidelberg,

69120, Germany

E-mail: alain.vandormael@uni-heidelberg.de

Tel. number: +46 163 481 3452

Word count < 3,000

Abstract

Background: Innovative approaches to the dissemination of evidence-based COVID-19 health messages are urgently needed to counter social media misinformation about the pandemic. To this end, we designed a short, wordless, animated, global health communication video (CoVideo) that was rapidly distributed through social media channels to an international audience.

Objectives: The objectives of this study were to: 1) establish the CoVideo's effectiveness in improving COVID-19 prevention knowledge, and 2) establish the CoVideo's effectiveness in increasing behavioral intent toward COVID-19 prevention.

Methods: In May and June 2020, we enrolled 15,163 online participants from the United States of America, Mexico, United Kingdom, Germany, and Spain. We randomized participants to (i) the CoVideo arm, (ii) an attention placebo control (APC) arm, and (iii) a do-nothing arm, and presented 18 knowledge questions about preventive COVID-19 behaviors, which was our first primary endpoint. To measure behavioral intent, our second primary endpoint, we randomized participants in each arm to five list experiments.

Results: Globally, the video intervention was viewed 1.2 million times within the first 10 days of its release and more than 15 million times within the first four months. Knowledge in the CoVideo arm was significantly higher (mean = 16.95; 95% CI: 16.91, 16.99) than in the do-nothing (mean = 16.86; 95% CI: 16.83, 16.90; $p < 0.001$) arm. We observed high baseline levels of behavioral intent to perform many of the preventive behaviors featured in the video intervention. We were only able to detect a statistically significant impact of the CoVideo on one of the five preventive behaviors.

Conclusions: Despite high baseline levels, the intervention was effective at boosting knowledge of COVID-19 prevention. We were only able to capture a measurable change in behavioral intent towards one of the five COVID-19 preventive behaviors examined in this study. The global reach of this health communication intervention and the high voluntary engagement of trial participants highlight several innovative features that could inform the design and dissemination of public health messages. Short, wordless, animated videos, distributed by health authorities via social media, may be an effective pathway for rapid global health communication during health crises.
Trial registration: The study and its outcomes were registered at the German Clinical Trials Register (www.drks.de) on May 12th, 2020: #DRKS00021582.

Keywords: social media; cultural and social implications; randomized controlled trial; list experiment; information literacy; COVID-19; pandemic; digital health; infodemiology; global health; public health

Introduction

Soon after the outbreak of the novel coronavirus pandemic (COVID-19) health-related misinformation flooded the social media space [1,2]. Compelling, but often misleading, content captured the attention of a frightened global community [2]. The rapid and widespread dissemination of such misinformation on social media often overshadowed evidence-based recommendations released through more traditional public health communication channels. As a result, dangerous messages that increased the spread of COVID-19 and led to adverse health outcomes were allowed to spread to the estimated 3.8 billion people globally who use social media [3]. Tedros Ghebreyesus, Director-General of the World Health Organization warned: “We’re not just fighting an epidemic; we’re fighting an infodemic” [2].

There is a critical need to rapidly disseminate evidence-based informational videos on social media channels to counteract the epidemic of COVID-19 misinformation. To date, public health efforts have focused on correcting the misinformation and debunking myths [4]. As such, these measures have almost exclusively been reactive rather than proactive. The corrective content has not, itself, been designed to incorporate the very characteristics that support the viral spread of content on social media [5]. For this reason, social media interventions designed to correct misinformation have unfortunately demonstrated far less impact than the content they aim to correct [4]. Researchers studying this emerging global health communication approach urge health authorities to enter the social media arena more intentionally, with the aim of disseminating valid information, evaluating its impact and reducing the knowledge translation gap [3]. Social media health messaging interventions need to do more than convey reliable information. They must be as emotionally compelling as they are evidence-based, if public health authorities are to reach broad, global audiences [5]. They also need to be accessible and tailored for cross-cultural acceptability [6].

In March 2020, we designed a short, wordless, and animated video to disseminate information about preventing the spread of COVID-19 [7,8]. The intervention video (the CoVideo) promotes evidence-based messages that focus on a set of preventive behaviours such as hand-washing, social distancing and the sanitation of kitchen surfaces, among others. Importantly, the CoVideo incorporates audience engagement characteristics that motivate widespread sharing on social media [5]. For example, it includes a compelling, familiar narrative and characters that are culturally agnostic; and the soundtrack is designed to evoke high-arousal emotions [9], which reflects the anxiety, altruism and solidarity [10] of the global community. The CoVideo was released on Stanford Medicine’s YouTube channel on March 21, 2020 and within 10 days reached 332,000 views on YouTube, 220,000 views on Instagram, 294,000 views on Facebook, and 402,000 views on Twitter, with a cumulative count of 1.2 million [6]. It continued to spread organically across social media channels, due to re-posting by several global health authorities, including government departments of health, community health organizations and media channels around the world [6]. Within four months, the CoVideo had reached more than 5.8 million people through their social media accounts.

In this study, we evaluate the effectiveness of the CoVideo to improve knowledge and behavioral intent toward COVID-19 prevention. According to the Theory of Planned Behavior (TPB), the intention to act is considered to be the immediate determinant of action [11]. Here, we frame behavioral intent as representing the participant’s commitment to undertake COVID-19 prevention behaviors in the next seven days, which is the first outcome of our study [12,13]. As the secondary outcome of our study, we aim to measure changes in knowledge about COVID-19 prevention. Knowledge is often considered to be a necessary but not sufficient condition for motivating a healthy behavior [14]. Specifically, TPB posits that knowledge is more likely to be correlated with behavior if correct answers on the knowledge test support the practice of that behavior [15]. Results from this study, which incorporates several innovations in global health communication, can inform the development of future videos to disseminate evidence-based recommendations related to COVID-19 and other public health emergencies.

Materials and Methods

Trial Design

This is a multi-site, parallel group, randomized controlled trial comparing the effectiveness of a short informational video on COVID-19 prevention. To evaluate the effectiveness of the CoVideo, we enrolled participants from five countries into a large, online randomized controlled trial (RCT). We randomly assigned participants to the CoVideo [7], an attention placebo control (APC) video [16] or no video (do-nothing) and measured change in knowledge of COVID-19 prevention behaviors (first endpoint) and change in self-reported behavioral intent toward COVID-19 prevention (second endpoint). Our RCT included two innovative experimental approaches. First, we used the APC to isolate the content effect of the CoVideo (the active component of the COVID-19 related health messaging and its delivery design) from the attention effect of watching a video (the inactive component of the intervention). Second, we nested a list experiment in each trial arm to reduce socially desirable responses to the behavioral intent questions. Both approaches were leveraged to improve the accuracy of our estimates. The study and its outcomes were registered at the German Clinical Trials Register [17] on May 12th, 2020: #DRKS00021582. Ethical approval was obtained from the Stanford University IRB on April 12, 2020, #55820. There were no changes to the trial outcomes or methods after the trial commenced.

Participants

We used an online platform called Prolific [18] to enroll participants from the United States of America (USA), Mexico, the United Kingdom (UK), Germany, and Spain into the randomized controlled trial [8]. Participant eligibility included being 18 to 59 years of age (male, female, or other), having residence in one of the five countries and having proficiency in English, German, or Spanish. The trial was hosted and deployed on Gorilla [19], which is a cloud platform that provides versatile tools to undertake online, experimental, and behavioural research [20]. Participants were compensated an equivalent of £1 for a 10-minute completion time. To prevent duplicate participation, Prolific uses a number of tracking mechanisms - including IP and ISP address detection [21].

Procedures

Participants began by answering basic demographic questions about their age, sex, primary language, country of residence, and highest education completed.

The Gorilla algorithm then randomly assigned participants 1:1:1 to the CoVideo, APC video, or do-nothing. Participants were required to watch the CoVideo or the APC video once from start to finish. The CoVideo is animated with sound effects but does not include any words, speech, or text. It explains how the novel coronavirus is spread (airborne, physical contact) and recommends best practices to prevent onward transmission (staying at home, not congregating in public spaces, and sanitizing hands/surfaces). It also covers the mass media coverage of the outbreak and the public's response to this media coverage, which includes a subplot on the stockpiling of essential goods, and the impact thereof on health-care services and resources (e.g., doctors being unable to access protective equipment). The total duration of the CoVideo is 2.30 minutes.

The APC is also a wordless, animated video with the same duration as the CoVideo. Its content describes how small choices become actions, which become habits, which become a way of life. We included an APC to account for possible attention effects elicited by the video format. APC conditions should mimic the “inactive” components of an intervention—the effect of watching the video—while not containing any of the “active” intervention components—the content delivered by the video [22]. We did not make the assumption that the CoVideo is better than nothing (i.e., no video). It is possible that the CoVideo could motivate reactance to our COVID-19 prevention message [23–25].

After completing the intervention (CoVideo, APC, do-nothing), participants answered 18 knowledge questions on preventive COVID-19 behaviors. All items required True or False responses and all participants received the knowledge items. After completing the knowledge questions, participants then completed five list experiments. For each list experiment, we randomized participants 1:1 to a control list or a control list plus a sensitive item about behavioral intent toward social distancing, washing hands, cleaning dishes, cleaning kitchen surfaces, and the stockpiling of essential goods. The control group received a list of five items that were unrelated to COVID-19. For example, in the first list experiment we asked: “How many of the five statements do you agree with? We don’t want to know which ones, just answer how many: 1. Spend time watching TV, 2. Do the vacuuming, 3. Pick a fight with my partner, 4. Eat a low sugar diet, 5. Rinse my nose with salt water daily.” The treatment group received the same five items and one additional ‘sensitive’ item: “Go out with my friends”, which indicates behavioral intent to social distance (or not) during lockdown restrictions. We used the list experiments to reduce social desirability bias [26,27] and designed them in line with best practices [28].

Statistical Analysis

We summarized the participant characteristics by obtaining means and standard deviations of age, gender, primary language, country of residence, and education status. Using the Gorilla platform, we identified and excluded participants from the analysis who were lost, defined as those who did not complete the survey from start to finish. Because we could not determine if participants watched some or all of the CoVideo or APC, we used an intention to treat analysis (ITT).

For the first endpoint, we calculated a knowledge score for each participant by adding the correct responses (min. = 0, max. = 18). Participants had a time limit of 30 seconds to answer each knowledge item, preventing them from searching for answers on the internet. If the participant timed out, they received a missing value of 9. This missing value was recoded as an incorrect answer to the knowledge item, since the participant could not correctly answer the question in the allotted time. We used an analysis of variance (ANOVA) model with and Tukey's ‘Honest Significant Difference’ to test for statistically significant differences (with $\alpha = 0.05$) in mean knowledge between the CoVideo, APC, and do-nothing arms. The ANOVA model is: $y = b_1$ VideoArm, where y is the number of knowledge statements that the participant correctly answered and VideoArm represents the treatment arm

For the second endpoint, we calculated the prevalence of behavioral intent to perform COVID-19 preventive behaviors for each list experiment. Let C_j denote the number of items that the jth participant selected from the control list (min. = 0, max. = 5), and let T_j be the number of items that the jth participant selected from the treatment list (min. = 0, max. = 6). We calculated the mean score for the control list, denoted by $\bar{C}$, and treatment list, denoted by $\bar{T}$, for the ith list experiment ($i = 1, \cdots, 5$). Let the superscripts *cov* denote the CoVideo, *apc* denote the APC, and *no* denote the do-nothing arms, and let k denote the kth trial arm ($k \in$ [cov ,apc, no]). For list experiment i and trial arm k, we then estimated the prevalence of behavioral intent, denoted by P_i^k, as the difference between the treatment and control, such that $P_i^k = (T_i^k - C_i^k)$ x 100. From these estimates, we calculated the total, content, and attention effect of the CoVideo. Let D_i^{Tot} denote the total effect, which is estimated by $P_i^{cov} - P_i^{no}$; and let D_i^{Att} denote the attention effect, which is estimated by $P_i^{apc} - P_i^{no}$. These analyses are analogous to difference-in-difference analyses, which we implemented by specifying the main and interaction terms in an ordinary least squares (OLS) regression model. The OLS equation for the ith list experiment is given as:

$$y = b_0 + b_1 \text{VideoArm} + b_2 \text{TreatList} + b_3 (\text{VideoArm} \times \text{TreatList}),$$

where y is the number of statements in the list that the participant agreed with, VideoArm indicates the kth arm, and TreatList indicates assignment to the treatment or control list. We calculated standard errors, 95% confidence intervals, and p-values (with $\alpha = 0.05$) for linear combinations of coefficients from the OLS model.

Informed Consent

All participants underwent a process of informed consent on the Prolific platform. The consent form explained the purpose of the study, the risks and benefits of the research, and how to contact the study investigators (or Stanford University ethics review board). By clicking the link, participants agreed to participate in our study, and were redirected to the Gorilla platform, where additional information was given. Participants could withdraw the study at recruitment or at any point during the experiment.

Confidentiality

Each participant was assigned a unique, anonymized ID on Prolific and had no identifying information associated with it. We informed participants that their names could be revealed to us if they emailed the study investigators. The study investigators kept this information confidential.

Blinding

Because Prolific handled the interaction between the study investigators and participants, the participants were completely anonymous to the study investigators. Participants self-responded to the survey questions and self-submitted their responses anonymously on the Gorilla platform. Only the participant's unique, anonymized ID was used to manage the linking between the Prolific and Gorilla platforms. The study investigators were blinded to the group allocation [8].

Results

Between 13 May 2020 and 23 June 2020, 15,163 participants from the USA, Mexico, UK, Germany, and Spain were enrolled in our RCT. Between recruitment and randomization, 171 participants were lost; 14,992 participants were randomly assigned to the CoVideo (4,940), APC (4,954), and do-nothing (5,081) arms (Figure 1). After randomization another 173 (do-nothing), 177 (APC), and 143 (CoVideo) participants were lost for unknown reasons (possibly due technical issues, such as a lost internet connection, difficulties linking to the video host, YouTube, server complications, etc). A total of 14,482 participants completed the trial and contributed data to the final analysis.

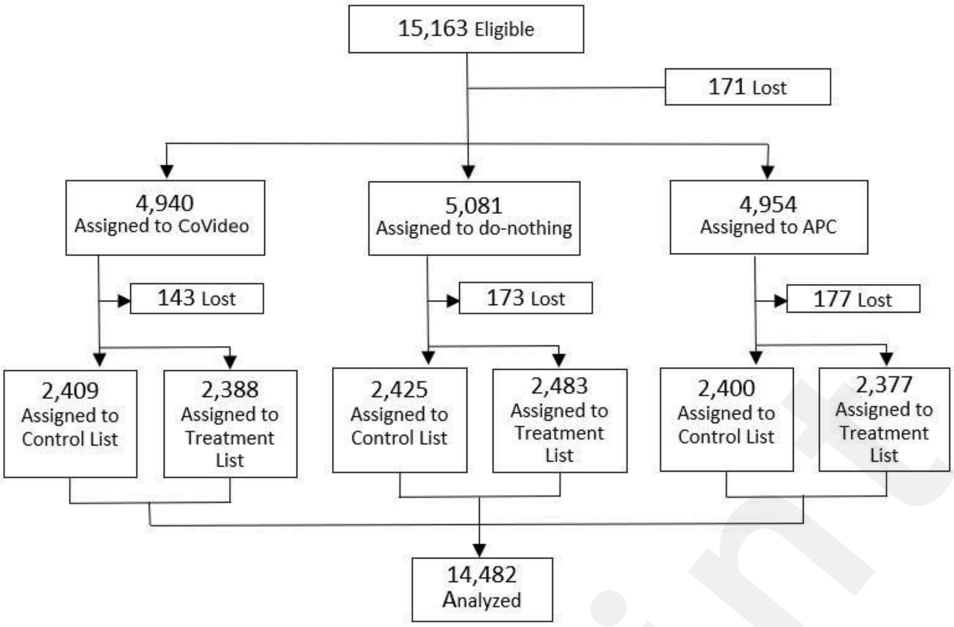


Figure 1. Trial design.

The majority of participants reported their residence in the UK (58.8%) or the USA (26%), and 84.9% of participants reported English as their first language. The sample was relatively well educated, with 81.6% having some college education or higher (BA, MA equivalent or PhD). Table 1 shows the percentage of participants in each arm and treatment list by age, gender, country of residence, educational status, and primary language.

Table 1. Baseline demographic characteristics of participants by trial and list experiment arms (collected from *N* = 14,482 between May 2020 and June 2020).

	Do-nothing				**APC**				**CoVideo**				
	Control List		Treatment List		Control List		Treatment List		Control List		Treatment List		
	N	%	N	%	N	%	N	%	N	%	N	%	*P* value
Age													.975
18-24 years	672	27.7	691	27.8	649	27.0	640	26.9	656	27.2	667	27.9	
25-34 years	877	36.2	902	36.3	866	36.1	880	37.0	884	36.7	848	35.5	
35-44 years	475	19.6	502	20.2	484	20.2	456	19.2	479	19.9	470	19.7	
45-54 years	285	11.8	295	11.9	297	12.4	279	11.7	280	11.6	299	12.5	
55-59 years	116	4.8	93	3.7	104	4.3	122	5.1	110	4.6	104	4.4	
Gender													.377
Female	1,316	54.3	1,298	52.3	1,353	56.4	1,269	53.4	1,306	54.2	1,310	54.9	
Male	1,090	44.9	1,167	47.0	1,037	43.2	1,092	45.9	1,088	45.2	1,063	44.5	
Other	19	0.8	18	0.7	10	0.4	16	0.7	15	0.6	15	0.6	
Country of residence													.998
Germany	118	4.9	135	5.4	132	5.5	116	4.9	130	5.4	124	5.2	
Mexico	116	4.8	119	4.8	119	5.0	117	4.9	114	4.7	117	4.9	
Spain	124	5.1	126	5.1	125	5.2	121	5.1	123	5.1	122	5.1	
UK	1,418	58.5	1,453	58.5	1,384	57.7	1,437	60.5	1,429	59.3	1,398	58.5	
US	649	26.8	650	26.2	640	26.7	586	24.7	613	25.4	627	26.3	
Education status													.347
Primary school	66	2.7	90	3.6	66	2.8	61	2.6	83	3.4	87	3.6	
High school	360	14.8	377	15.2	383	16.0	360	15.1	364	15.1	373	15.6	
BA, Some college	1,551	64.0	1,570	63.2	1,529	63.7	1,507	63.4	1,526	63.3	1,497	62.7	
MA/PhD	448	18.5	446	18.0	422	17.6	449	18.9	436	18.1	431	18.0	
First language													1.0
German	117	4.8	135	5.4	130	5.4	116	4.9	128	5.3	124	5.2	
English	2,068	85.3	2,103	84.7	2,026	84.4	2,022	85.1	2,044	84.8	2,025	84.8	
Spanish (Mexico)	124	5.1	126	5.1	125	5.2	123	5.2	123	5.1	122	5.1	
Spanish	116	4.8	119	4.8	119	5.0	116	4.9	114	4.7	117	4.9	

The knowledge questionnaire had an acceptable reliability correlation coefficient of 0.65 (split-half). Overall, there was extraordinarily high attainment of COVID-19 knowledge. In the do-nothing arm, participants correctly answered 16.86 (95% confidence interval (CI): 16.83 – 16.90) out of 18 items, which is a 93.7% correct response rate (Figure 2). With this high baseline score, the CoVideo could therefore only increase knowledge by a maximum of 1.14 points. Relative to the do-nothing arm, the CoVideo increased knowledge by 0.09 points (Mean = 16.95, 95% CI: 16.91 – 16.99; p = 0.002), which represents an increase of 0.09/1.14 = 7.6% (Figure 2). The average score for the APC arm was 16.89 (95% CI: 16.86, 16.93), a correct response rate of 93.8%. When we removed the attention effect of the video format, the CoVideo increased overall knowledge by 0.06 points (p = 0.063), which represents an increase of 0.06/1.11 = 5.3%. Figure 3 shows the proportion of correct responses to each of the 18 knowledge items (see also Supplementary Table S1). The highest correctly answered item was 99.4% ("An effective way to prevent COVID-19 spread is to wash your hands frequently with soap and water"), with most items having a > 90% correct response rate.

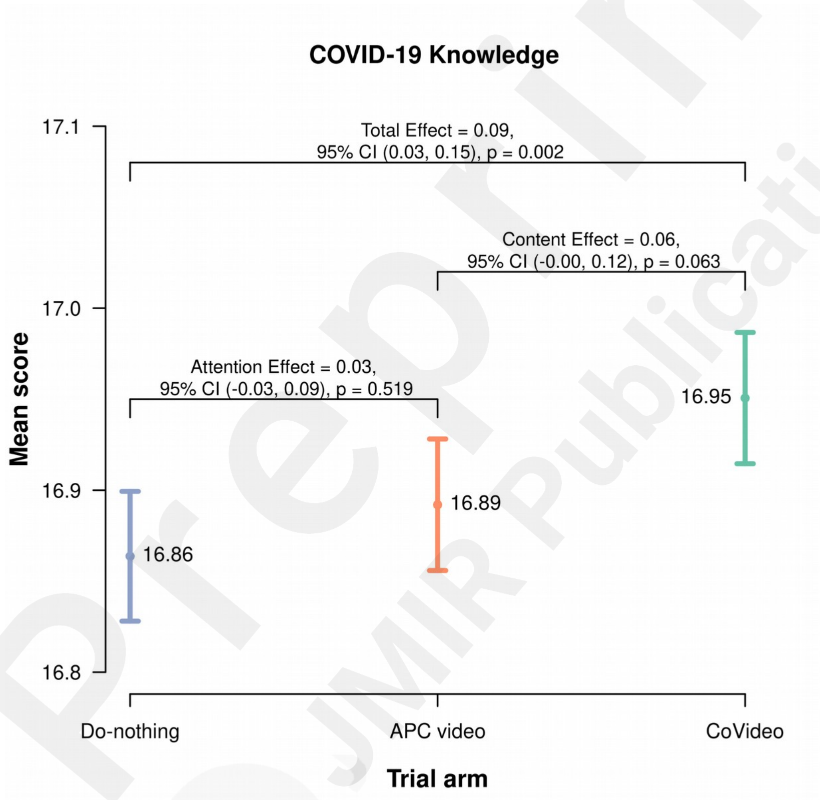


Figure 2. Mean scores for the COVID-19 knowledge questions by trial arm (collected from *N* = 14,482 between May 2020 and June 2020). Differences between the CoVideo, attention placebo control, and do-nothing arms are reported with p-values.

Figure 3. The proportion of correct answers for each COVID-19 knowledge item in the CoVideo, attention placebo control, and do-nothing arms (collected from N = 14,482 between May 2020 and June 2020).

Supplementary Figure S1 shows the mean scores for the five list experiments by trial arm and list group. These mean scores were used to calculate the prevalence of behavioral intent for each preventive COVID-19 behavior, including the total and content effects with 95% CIs and p-values (Figure 4). Scores for the treatment list are higher because the treatment list has six items and the control list has five items. For a given trial arm, the difference between the treatment and control means represents the prevalence of intent to undertake the preventive COVID-19 behavior. For example, for the first list experiment in the CoVideo arm ('this week I will go out with friends'), $\bar{T}^{cov}$ = 2.20 is the treatment mean and $\bar{C}^{cov} =$ 2.03 is the control mean. The prevalence is then $\bar{T}^{cov} - \bar{C}^{cov} \times$ 100 = (2.20 – 2.03) x 100 = 17.2, as shown in Figure 2. Similarly, the prevalence for the APC arm is $\bar{T}^{apc} - \bar{C}^{no} \times$ 100 = (2.33 – 2.03) x 100 = 29.4. For our primary outcome, we report that participants in the CoVideo arm had lower behavioral intent to go out with friends when compared with the APC (content effect = -0.123, p < 0.001) and do-nothing (total effect = -0.045, p = 0.240) arms.

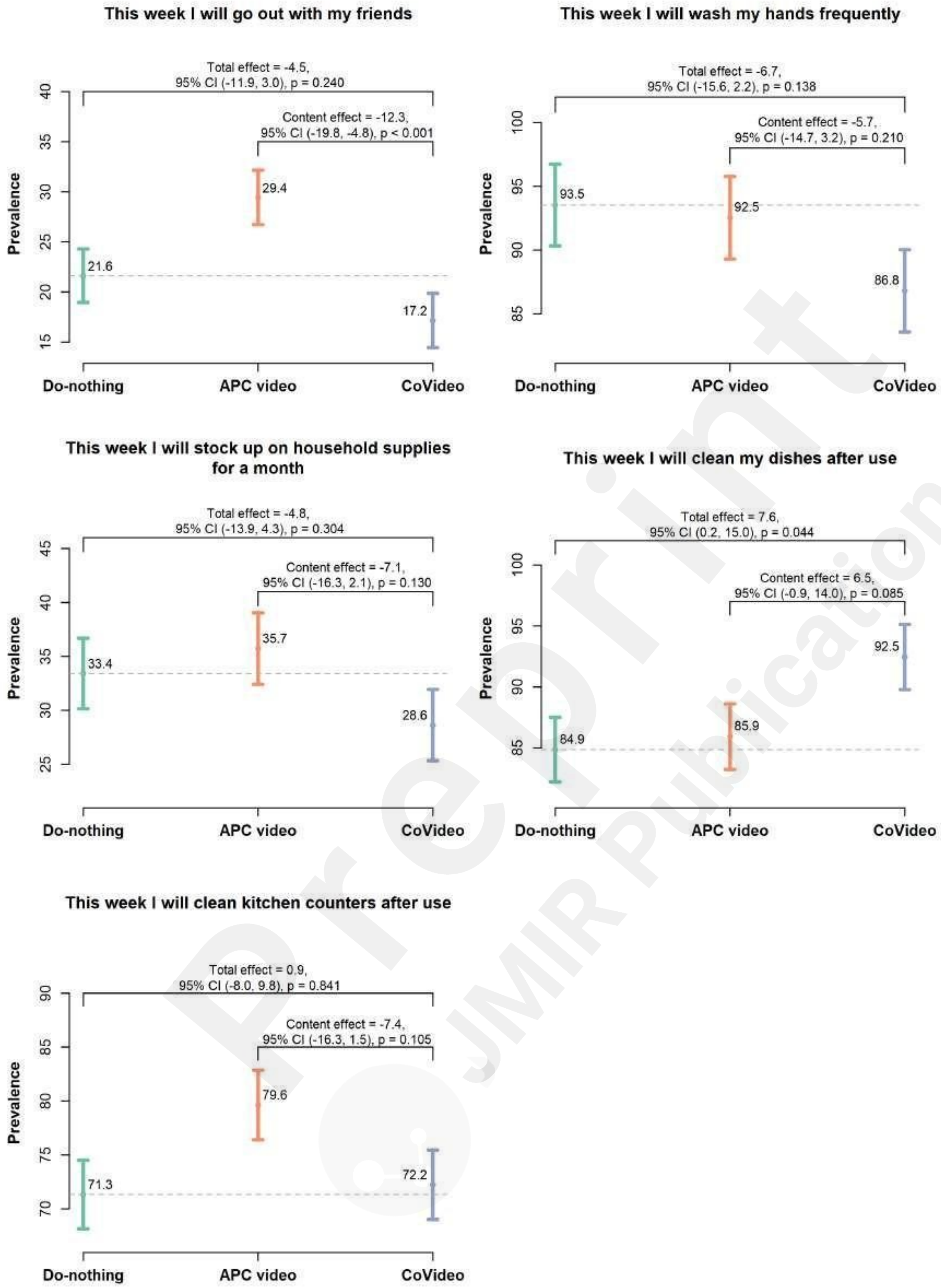


Figure 4. The prevalence of behavioral intent toward COVID-19 prevention for five list experiments with 95% confidence intervals and p-values (collected from N = 14,482 between May 2020 and June 2020).

Discussion

In this study, we tested an intervention with several innovations in global health communication that catalyzed a broad, organic global reach on social media [6,8–10]. The intervention, called the CoVideo, packaged critical health messages about COVID-19 prevention within a compelling, familiar narrative, using characters that were free of cultural identifiers and a soundtrack designed to evoke high-arousal emotions. Our results show that baseline levels of COVID-19 prevention were high, and that the CoVideo intervention increased this prevention knowledge by another 7.6% and 5.3% relative to the do-nothing and APC arms, respectively. We further report that the CoVideo intervention improved behavioral intent toward COVID-19 prevention when compared with the APC and do-nothing arms.

To evaluate the effectiveness of the CoVideo on knowledge and behavioral intent toward COVID-19 prevention, we used a large, online RCT to enroll 15,163 participants from the US, Spain, Germany, the UK, and Mexico. The results for our first endpoint show high knowledge of COVID-19 prevention behaviors across the five countries. For the three trial arms, the average number of correct answers was nearly 17 out of 18 items, a correct response rate of approximately 94%. Moderate to high knowledge levels about COVID-19 prevention measures among the general public were also observed earlier in Ecuador [29] and the United States [30–32]. On the other hand, a recent systematic on knowledge, attitude, and practices towards the COVID-19 pandemic on the American continent concluded that many people have insufficient knowledge about the virus, highlighting the need to develop effective educational tools and materials on COVID-19 prevention [33]. The high baseline levels of COVID-19 knowledge in our study could be due to the delay of several weeks that occurred between the original release of the CoVideo and the launch of our online trial, as we awaited ethics approval, designed and registered the trial. This lag likely facilitated exposure of our participants to COVID-19 prevention messages from other sources. Our results suggest, as we drift deeper into the pandemic, that it may be unnecessary to spend more money on public health campaigns to improve COVID-19 prevention knowledge in the five countries from which we enrolled participants.

An important study finding is that the CoVideo improved already high levels of COVID-19 prevention knowledge. In the do-nothing and APC arms, only 1.14 and 1.11 additional correct items were needed to reach a perfect (100%) score, respectively. Our results show that the CoVideo boosted COVID-19 prevention knowledge by another 7.6% relative to the do-nothing ceiling and by 5.3% relative to the APC ceiling. It seems plausible, therefore, that the CoVideo could significantly improve COVID-19 prevention knowledge in countries where baseline knowledge levels are currently low or moderate .

For our second endpoint, we nested a list experiment in each trial arm to evaluate the effect of the CoVideo on self-reported behavioral intent toward COVID-19 prevention. We used this experimental approach because it is likely that participants (at the time of enrollment) were already primed to give socially desirable responses to questions about COVID-19 prevention. The indirect questions (i.e., how many statements do you agree with) give protection to participants who have no behavioral intent toward COVID-19 prevention, without revealing this intention directly [27]. Our results show that behavioral intent to go out with friends during stay-at-home recommendations and to stockpile household goods was lower in the CoVideo arm when compared with the APC and do-nothing arms, but not significantly so. We also observed that participants had higher behavioral intent to prevent COVID-19 spread by cleaning dishes after use when compared with the do-nothing arm (significantly different) and APC arm (not significantly different). Several studies have used the list experiment technique in the context of COVID-19 and found that list experiments were less favourable than simpler, traditional measurements, concluding that social desirability had no impact on the reported compliance with COVID-19 regulations [34,35]. On the contrary, other scholars have argued that the list experiment approach counters social desirability and is, therefore, less likely to introduce measurement errors presented by direct questions that measure self-reported compliance with COVID-19 guidance [36,37].

Our study is innovative in the use of both a list experiment and an APC video. Our APC video was selected to account for the possible attention effects elicited by the CoVideo intervention. The APC was designed to mimic the inactive components of the CoVideo intervention (the effect of watching a video of the same length), while not containing the active intervention component (the content of the COVID-19 related health messaging and its delivery design) [22]. The APC therefore enabled us to decompose the total intervention effect, which is the difference in knowledge means between the CoVideo and do-nothing, into the sum of the content and attention effects. We are not aware of any study that has used this approach to isolate the active component (the content effect) of the intervention video itself. For this purpose, we advise researchers using APCs to choose their APC topic carefully, and to avoid any potential effect of the placebo content on the outcomes being studied.

Our study had several limitations. At the time of our study, no validated scale on COVID-19 knowledge prevention existed. Nevertheless, we used best practices from the survey methods field to inform the design and development of the knowledge questions [38]. Another limitation is that we could not determine if participants watched some or all of the CoVideo or APC. Once participants were randomized to a video, they could not skip to the end or fast-forward without ending the study. However, it is possible in some cases that the participants could have been engaged in other activities while the video was playing. Because of potential non-compliance, we used an intention to treat analysis (ITT). One possible limitation is that high baseline knowledge likely reflects the high educational status of our online sample, with 81.6% having some college education or higher (BA, MA, PhD equivalent). Our sample was likely more educated than the general populations of the USA, the UK, Germany, Spain, and Mexico. A similar educational distribution has been reported in a recent web-based study on COVID-19 knowledge in the USA and UK [39].

Together, the findings of this study present innovative propositions for content design, dissemination and evaluation of rapid, global health communication interventions. Content designs that emphasize cultural accessibility, convey a compelling narrative and elicit high-arousal emotions, could fuel rapid dissemination across the 3.8 billion global citizens currently using social media. The wordless, animated approach also minimizes barriers traditionally associated with underlying differences in language and literacy levels. Given the massive global penetration of social media, short animated, wordless video messages, designed to spread organically, may help public health authorities reach people where they are, which is on social media. Evaluating these interventions using online trials, APCs and list experiments can help expedite results and strengthen our efficacy evaluations. The value of such an approach becomes especially apparent during global crises in which lost weeks translate into lost lives. Accessible and compelling video health messages that lean on the shared characteristics of our global community, could facilitate the spread of time-sensitive health messages. Public health authorities poised to implement these innovative health communication solutions, could better support a global community facing unprecedented, shared challenges.

Data Availability

The data that support the findings of this study are available from the corresponding author upon request.

Adverse Event Reporting and Harms

No adverse events or harms were observed given the online format of the trial.

Role of the Funding Source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. All authors had full access to all the data in the study and accepted responsibility to submit for publication.

Contributors

AV, MA, VH wrote the paper. AV and CF undertook the statistical analysis. MA designed, produced, and created the CoVideo. TB, AV, and MA designed the trial. AV, TB, MA, and MG contributed to the questionnaire development. All authors provided comments and feedback.

Declaration of Interests

We declare no competing interests.

Acknowledgments

TB is funded by the Alexander von Humboldt University Professor Prize.

Materials and Correspondence

Correspondence to AV.

References

1. Sharma K, Seo S, Meng C, Rambhatla S, Liu Y. COVID-19 on Social Media: Analyzing Misinformation in Twitter Conversations. ArXiv200312309 Cs 2020 Oct 21
2. Pennycook G, McPhetres J, Zhang Y, Lu JG, Rand DG. Fighting COVID-19 Misinformation on Social Media: Experimental Evidence for a Scalable Accuracy-Nudge Intervention. Psychol Sci 2020 Jul;31(7):770–780. doi: 10.1177/0956797620939054
3. Cuello-Garcia C, Pérez-Gaxiola G, van Amelsvoort L. Social media can have an impact on how we manage and investigate the COVID-19 pandemic. J Clin Epidemiol 2020 Nov;127:198–201. doi: 10.1016/j.jclinepi.2020.06.028
4. Walter N, Brooks JJ, Saucier CJ, Suresh S. Evaluating the Impact of Attempts to Correct Health Misinformation on Social Media: A Meta-Analysis. Health Commun 2020 Aug 6;1–9. doi: 10.1080/10410236.2020.1794553
5. Guadagno RE, Rempala DM, Murphy S, Okdie BM. What makes a video go viral? An analysis of emotional contagion and Internet memes. Comput Hum Behav 2013 Nov;29(6):2312–2319. doi: 10.1016/j.chb.2013.04.016
6. Adam M, Bärnighausen T, McMahon SA. Design for extreme scalability: A wordless, globally scalable COVID-19 prevention animation for rapid public health communication. J Glob Health 2020 Jun;10(1):010343. doi: 10.7189/jogh.10.010343
7. Stanford Medicine. Global COVID-19 Prevention [Online]. 2020 [accessed 2021 Jun 7]. Available from: https://www.youtube.com/watch?v=rAj38E7vrS8
8. Vandormael A, Adam M, Greuel M, Bärnighausen T. A short, animated video to improve good COVID-19 hygiene practices: a structured summary of a study protocol for a randomized controlled trial. Trials 2020 Dec;21(1):469. doi: 10.1186/s13063-020-04449-1
9. Berger J, Milkman KL. What Makes Online Content Viral? J Mark Res 2012 Apr;49(2):192–205. doi: 10.1509/jmr.10.0353
10. Cheng KK, Lam TH, Leung CC. Wearing face masks in the community during the COVID-19 pandemic: altruism and solidarity. The Lancet 2020 Apr;S0140673620309181. doi: 10.1016/S0140-6736(20)30918-1
11. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process 1991 Dec;50(2):179–211. doi: 10.1016/0749-5978(91)90020-T
12. Lin N, Roberts KR. Predicting and explaining behavioral intention and hand sanitizer use among US Army soldiers. Am J Infect Control 2017 Apr;45(4):396–400. doi: 10.1016/j.ajic.2016.11.008
13. Conner M, Sparks P. Theory of planned behaviour and the reasoned action approach. In: Conner M, Norman P, editors. Predict Chang Health Behav Res Pract Soc Cogn Models Open University Press; 2015. p. 142–188.
14. Helweg-Larsen M, Collins BE. A social psychological perspective on the role of knowledge about AIDS in AIDS prevention. Curr Dir Psychol Sci SAGE Publications Sage CA: Los Angeles, CA; 1997;6(2):23–25.
15. Ajzen I, Joyce N, Sheikh S, Cote NG. Knowledge and the Prediction of Behavior: The Role of Information Accuracy in the Theory of Planned Behavior. Basic Appl Soc Psychol 2011 Apr;33(2):101–117. doi: 10.1080/01973533.2011.568834
16. Project Better Self. THE CHOICE (Short Animated Movie) [Online]. 2018 [accessed 2021 Jun 7]. Available from: https://www.youtube.com/watch?v=_HEnohs6yYw
17. German Clinical Trials Register. German Clinical Trials Register [Online]. 2021 [accessed 2021 Apr 15]. Available from: www.drks.de
18. Prolific [Online]. 2021 [accessed 2021 Apr 14]. Available from: https://www.prolific.co/
19. Gorilla [Online]. 2021 [accessed 2021 Apr 14]. Available from: https://app.gorilla.sc/
20. Anwyl-Irvine AL, Massonnié J, Flitton A, Kirkham N, Evershed JK. Gorilla in our midst: An

online behavioral experiment builder. Behav Res Methods 2020 Feb;52(1):388–407.
21. Bradley P. Bots and data quality on crowdsourcing platforms [Online]. blog.prolific.co. 2018 [accessed 2021 Jun 7]. Available from: https://blog.prolific.co/bots-and-data-quality-on-crowdsourcing-platforms/
22. Freedland KE, Mohr DC, Davidson KW, Schwartz JE. Usual and Unusual Care: Existing Practice Control Groups in Randomized Controlled Trials of Behavioral Interventions. Psychosom Med 2011 May;73(4):323–335. doi: 10.1097/PSY.0b013e318218e1fb
23. Dillard JP, Shen L. On the Nature of Reactance and its Role in Persuasive Health Communication. Commun Monogr 2005 Jun;72(2):144–168. doi: 10.1080/03637750500111815
24. Miller CH, Lane LT, Deatrick LM, Young AM, Potts KA. Psychological Reactance and Promotional Health Messages: The Effects of Controlling Language, Lexical Concreteness, and the Restoration of Freedom. Hum Commun Res 2007 Apr;33(2):219–240. doi: 10.1111/j.1468-2958.2007.00297.x
25. Richards AS, Bessarabova E, Banas JA, Bernard DR. Reducing Psychological Reactance to Health Promotion Messages: Comparing Preemptive and Postscript Mitigation Strategies. Health Commun 2020 Oct 27;1–9. doi: 10.1080/10410236.2020.1839203
26. Kramon E, Weghorst K. (Mis)Measuring Sensitive Attitudes with the List Experiment. Public Opin Q 2019 Jul 19;83(S1):236–263. doi: 10.1093/poq/nfz009
27. Corstange D. Sensitive Questions, Truthful Answers? Modeling the List Experiment with LISTIT. Polit Anal 2009;17(1):45–63. doi: 10.1093/pan/mpn013
28. Glynn AN. What Can We Learn with Statistical Truth Serum? Public Opin Q 2013;77(S1):159–172. doi: 10.1093/poq/nfs070
29. Bates BR, Moncayo AL, Costales JA, Herrera-Cespedes CA, Grijalva MJ. Knowledge, Attitudes, and Practices Towards COVID-19 Among Ecuadorians During the Outbreak: An Online Cross-Sectional Survey. J Community Health 2020 Dec;45(6):1158–1167. doi: 10.1007/s10900-020-00916-7
30. O'Conor R, Opsasnick L, Benavente JY, Russell AM, Wismer G, Eifler M, Marino D, Curtis LM, Arvanitis M, Lindquist L, Persell SD, Bailey SC, Wolf MS. Knowledge and Behaviors of Adults with Underlying Health Conditions During the Onset of the COVID-19 U.S. Outbreak: The Chicago COVID-19 Comorbidities Survey. J Community Health 2020 Dec;45(6):1149–1157. doi: 10.1007/s10900-020-00906-9
31. Geana MV. Kansans in the Middle of the Pandemic: Risk Perception, Knowledge, Compliance with Preventive Measures, and Primary Sources of Information about COVID-19. Kans J Med 2020;13:160–164. PMID:32612749
32. Quandt SA, LaMonto NJ, Mora DC, Talton JW, Laurienti PJ, Arcury TA. COVID-19 Pandemic among Latinx Farmworker and Nonfarmworker Families in North Carolina: Knowledge, Risk Perceptions, and Preventive Behaviors. Int J Environ Res Public Health 2020 Aug 10;17(16):5786. doi: 10.3390/ijerph17165786
33. Sarria-Guzmán Y, Fusaro C, Bernal JE, Mosso-González C, González-Jiménez FE, Serrano-Silva N. Knowledge, Attitude and Practices (KAP) towards COVID-19 pandemic in America: A preliminary systematic review. J Infect Dev Ctries 2021 Jan 31;15(01):9–21. doi: 10.3855/jidc.14388
34. Larsen M, Nyrup J, Petersen MB. Do Survey Estimates of the Public's Compliance with COVID-19 Regulations Suffer from Social Desirability Bias? J Behav Public Adm [Internet] 2020 Aug 24 [accessed 2021 Jun 8];3(2). doi: 10.30636/jbpa.32.164
35. Selb P, Munzert S. Can we directly survey adherence to non-pharmaceutical interventions? Surv Res Methods Survey Research Methods; 2020 Jun 2;205-209 Pages. doi: 10.18148/SRM/2020.V14I2.7759
36. Becher M, Stegmueller D, Brouard S, Kerrouche E. Comparative Experimental Evidence on Compliance with Social Distancing During the Covid-19 Pandemic. SSRN Electron J [Internet]

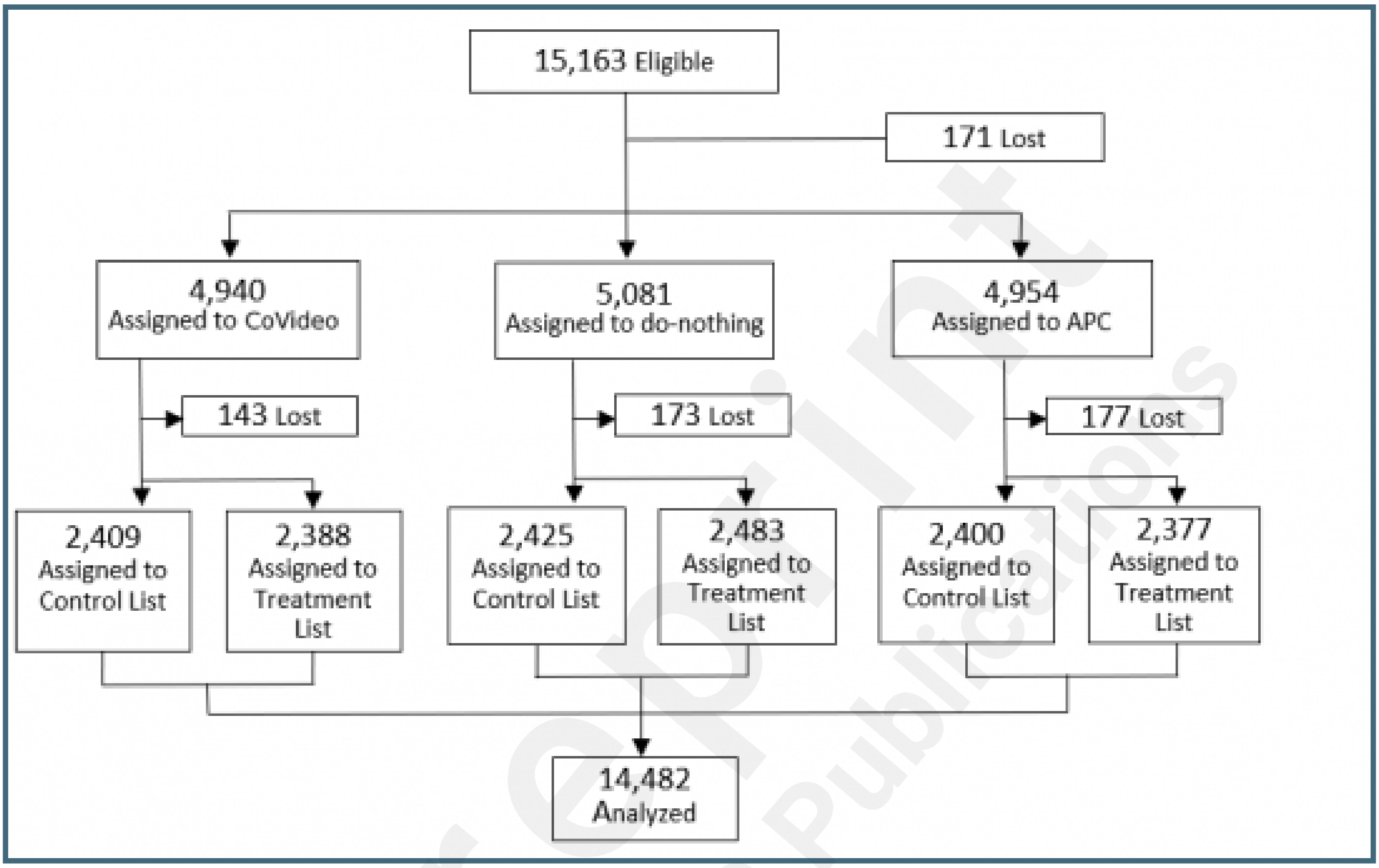
2020 [accessed 2021 Jun 8]; doi: 10.2139/ssrn.3652543

37. Timmons S, McGinnity F, Belton C, Barjaková M, Lunn P. It depends on how you ask: measuring bias in population surveys of compliance with COVID-19 public health guidance. J Epidemiol Community Health 2021 Apr 1;75(4):387. doi: 10.1136/jech-2020-215256
38. Saris WE. Design, evaluation, and analysis of questionnaires for survey research. Second Edition. Hoboken, New Jersey: Wiley; 2014. ISBN:978-1-118-63461-5
39. Geldsetzer P. Knowledge and Perceptions of COVID-19 Among the General Public in the United States and the United Kingdom: A Cross-sectional Online Survey. Ann Intern Med 2020 Jul 21;173(2):157–160. doi: 10.7326/M20-0912

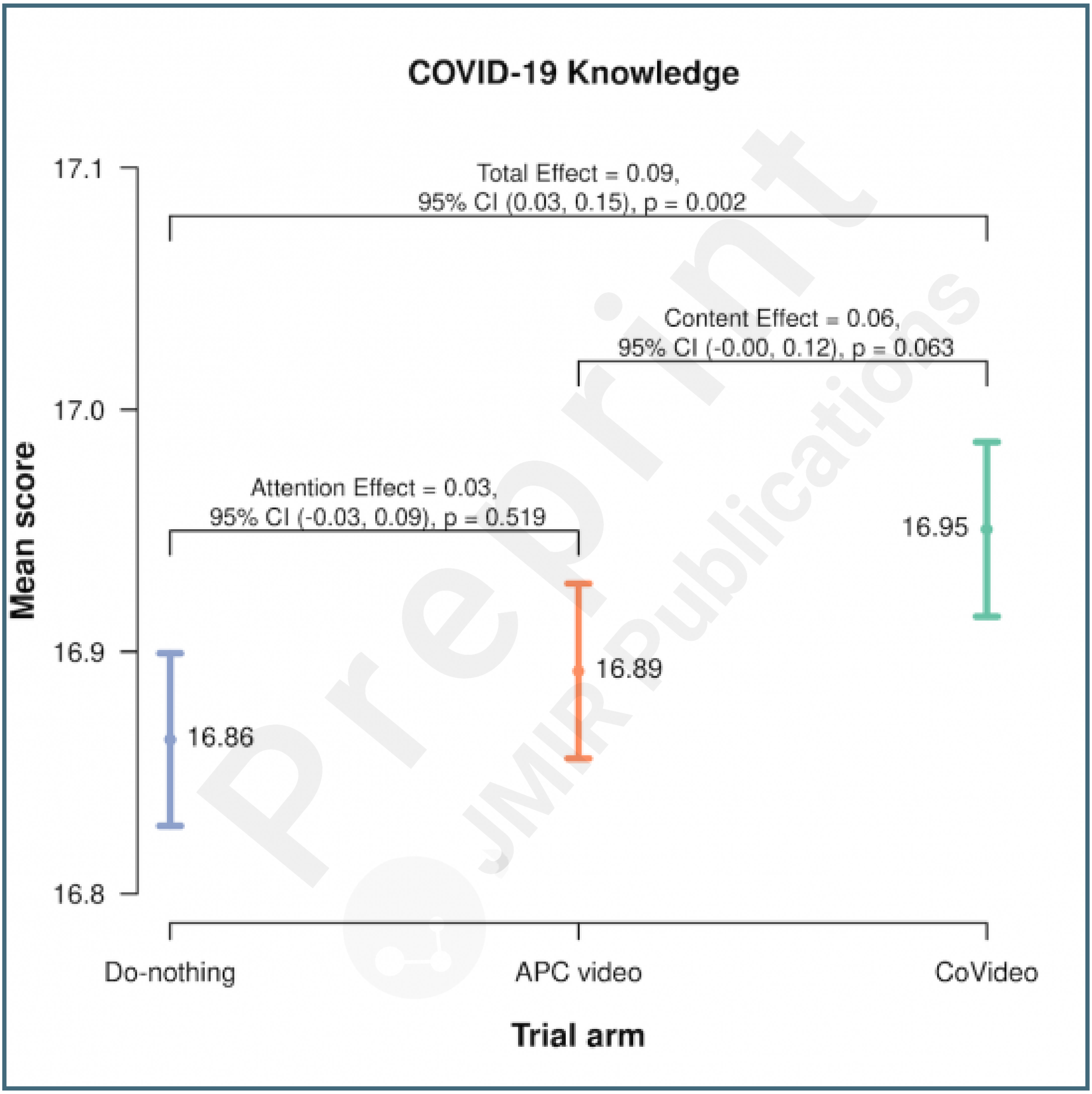
Supplementary Files

Figures

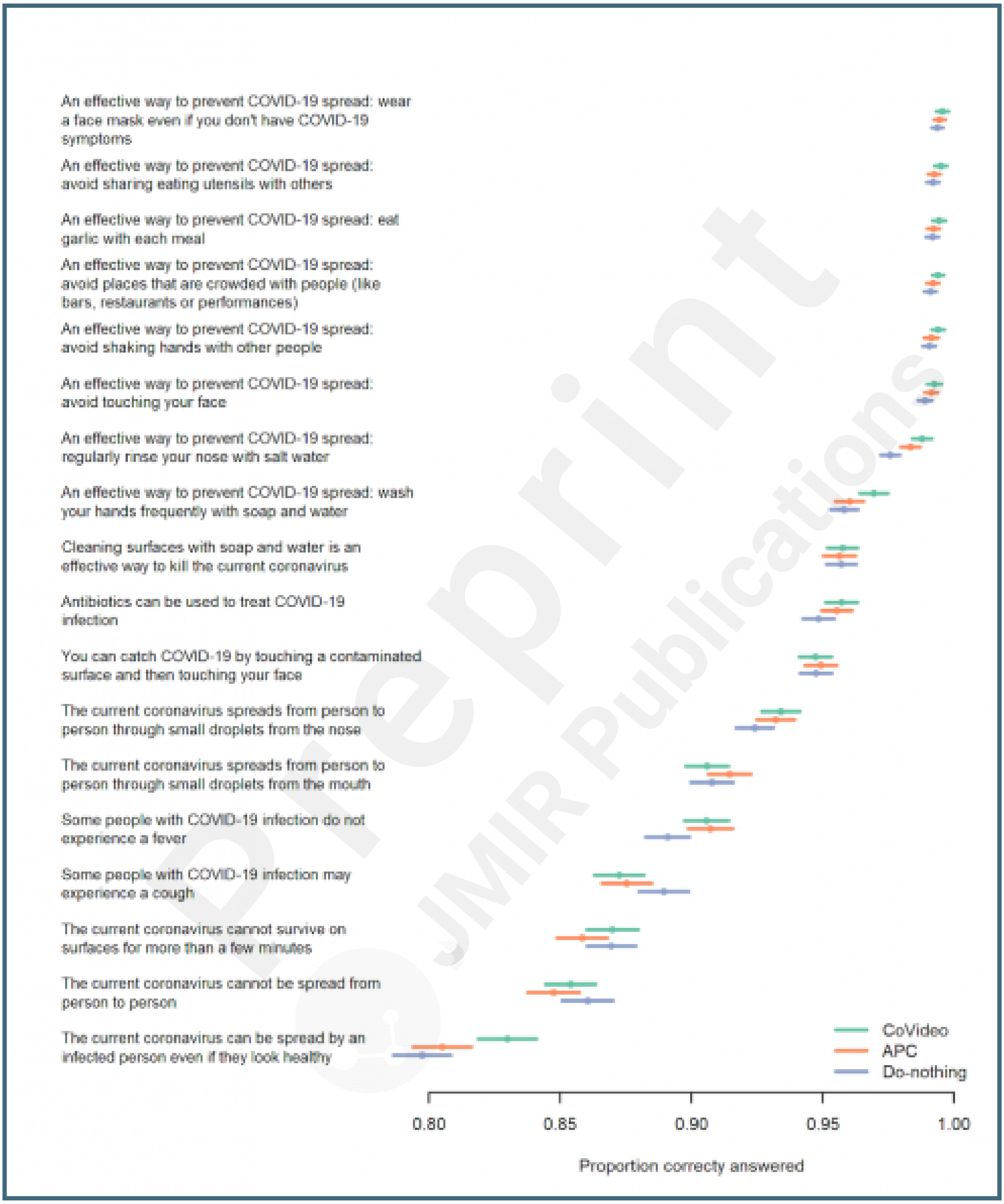
Trial design. After recruitment, participants were randomly assigned (1:1:1) to the CoVideo, attention placebo control (APC), or do-nothing arms. Participants in each trial arm were also randomized (1:1) to a control list (5 items; no sensitive item) or a treatment list (6 items; with sensitive item) about behavioral intent toward social distancing, washing hands, cleaning dishes, cleaning kitchen surfaces, and the stockpiling of essential goods.



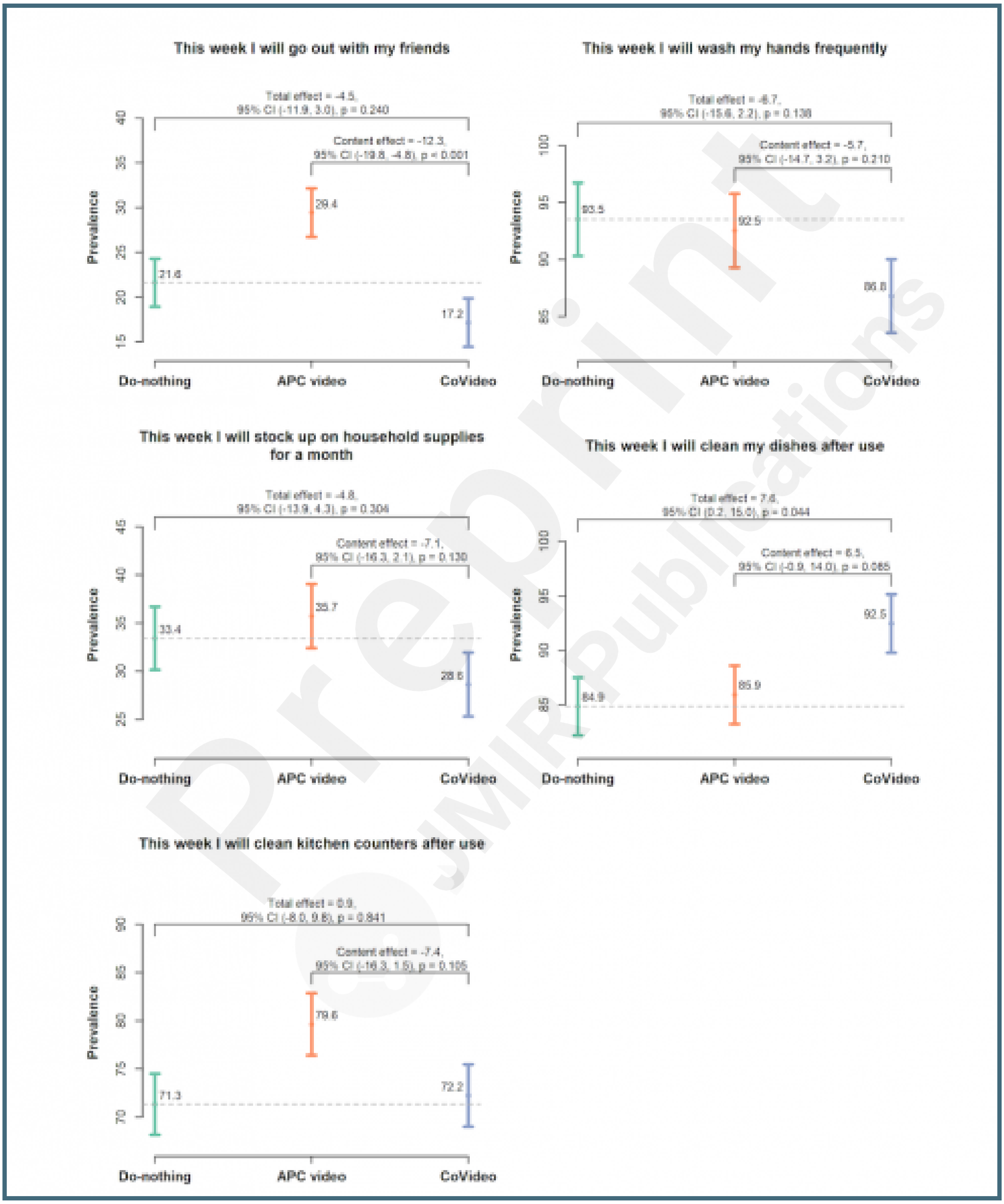
Mean scores for the COVID-19 knowledge questions by trial arm (N = 14,482). Differences between the CoVideo, attention placebo control (APC), and do-nothing arms are reported with p-values. Total effect represents the difference in means between the CoVideo and the do-nothing arm; Attention effect represents the difference in means between the APC and do-nothing arm; and Content effect represents the difference in means between the CoVideo and the APC arm.



The proportion of correct answers for each knowledge item in the CoVideo, attention placebo control (APC), and do-nothing arms (N = 14,482).



The prevalence of behavioral intent for each of the five list experiments with 95% CIs. Differences between the CoVideo, attention placebo control (APC), and do-nothing arms are reported with p-values. Total effect represents the difference in means between the CoVideo and the do-nothing arm; Attention effect represents the difference in means between the APC and do-nothing arm; and Content effect represents the difference in means between the CoVideo and the APC arm.



Multimedia Appendixes

Supplementary material.
URL: http://asset.jmir.pub/assets/2bc17dd676dc4bd3e7bc0f50a8c6b2b3.docx