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Motivation for participating in phase 1 vaccine trials: Comparison of an influenza and an Ebola randomized controlled trial

A. Cattapan [a,b,*], K. Browne [a,c,1], D.M. Halperin [d,e,f], A. Di Castri [e], P. Fullsack [e], J. Graham [e,f], J.M. Langley [e,f], B.A. Taylor [e,f,g], S.A. McNeil [e,h], S.A. Halperin [e,f]

[a] Novel Tech Ethics, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada
[b] Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
[c] Department of Philosophy, Langara College, Vancouver, British Columbia, Canada
[d] School of Nursing, St. Francis Xavier University, Antigonish, Nova Scotia, Canada
[e] Canadian Center for Vaccinology, Dalhousie University, IWK Health Centre, and the Nova Scotia Health Authority, Halifax, Nova Scotia, Canada
[f] Department of Pediatrics, Dalhousie University, Halifax, Nova Scotia, Canada
[g] School of Nursing, Dalhousie University, Halifax, Nova Scotia, Canada
[h] Department of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

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ABSTRACT

Introduction/Hypothesis: Recruitment of participants into phase 1 vaccine clinical trials can be challenging since these vaccines have not been used in humans and there is no perceived benefit to the participant. Occasionally, as was the case with a phase 1 clinical trial of an Ebola vaccine in Halifax, Canada, during the 2014–2016 West African Ebola virus outbreak, recruitment is less difficult. In this study, we explored the motivations of participants in two phase 1 vaccine trials that were concurrently enrolling at the same centre and compared the motivations of participants in a high-profile phase 1 Ebola vaccine trial to those in a less high-profile phase 1 adjuvanted seasonal influenza vaccine study.
Methods: An online survey which included participants' prior experience with clinical trials, motivations to participate (including financial incentives), and demographic information was developed to examine the motivations of healthy participants in two phase 1 clinical vaccine trials conducted at the Canadian Center for Vaccinology in Halifax, Nova Scotia. Participants were invited via email to complete the online survey. Readability and clarity were assessed through pilot testing.
Results: A total of 49 (55.7%) of 88 participants of the two studies completed the survey (22 [55%] of 40 participants from the Ebola vaccine study and 27 [56.3%] of 48 from the adjuvanted influenza vaccine study). Motivations that were most frequently ranked among participants' top three in both trials were (1) wanting to contribute to the health of others, (2) wanting to participate in something important, (3) wanting to contribute to the advancement of science, and (4) wanting to receive an incentive such as money or a tablet.
Conclusions/Recommendations: Although media attention and financial compensation were more often cited by Ebola vaccine trial participants as a reason to participate, both altruistic and self-interested factors were important motivations for participants in their decision to participate in a phase 1 vaccine clinical trial.

1. Introduction

The recruitment of healthy volunteers into phase 1 clinical trials poses significant challenges [1,2]. Unlike patient volunteers who have a pre-existing medical condition, healthy volunteers may have no personal or relational engagement with the disease to be prevented and are unlikely to receive any therapeutic benefits. Indeed, at this early stage of testing, they may be putting themselves at risk of harm of a reduced health state, however temporary or rare. To mitigate risk and maximize safety, first-in-human phase 1 vaccine trials are characterized more frequently than later phase studies by small sample sizes, slow and/or staggered enrolment, supervision by external safety review boards, and stopping rules [3]. While healthy volunteers for vaccine trials generally receive

* Corresponding author at: Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan, 101 Diefenbaker Place, Saskatoon, SK S7H 0J7.
E-mail address: alana.cattapan@usask.ca (A. Cattapan).
[1] Current address: Department of Philosophy, Langara College, 100 W 49th Avenue, Vancouver, BC V5Y 2Z6.

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incentives (monetary, gift vouchers, laptops, etc.) to participate, there is the potential of benefitting from disease prevention that is not present in therapeutic trials. What research exists on phase 1 clinical trial participation with healthy volunteers reveals that such participants are likely to be motivated by additional factors including: making a contribution to science, contributing to the health of others, accessing healthcare benefits (in attending requisite medical checkups), meeting people, and wanting to participate in something they perceive to be important [2,4]. Research on the motivations of healthy volunteers in clinical trials has often excluded vaccine trials because of concerns that potential volunteers might see the benefits of immunization as a reason to participate [4]. With few exceptions, [5] the limited number of existing studies on the motivations of healthy volunteers in vaccine trials focus on very specific populations, such as those at risk for HIV/AIDS [6].

Despite the expected challenge of recruitment into phase 1 vaccine trials, there are instances when recruitment occurs relatively easily. This was the case at the height of the 2014–16 West African Ebola epidemic when the Public Health Agency of Canada and Health Canada announced that the Canadian Center for Vaccinology (CCfV) in Halifax, Nova Scotia, would be the site for a phase 1 Ebola vaccine trial [7]. Within days, approximately 300 people expressed interest in participating in the research, although only 40 volunteers were needed [8]. Whereas recruitment for clinical trials at CCfV typically occurs through social media, radio, newspaper ads, and emails, in this case, no recruitment advertisement was necessary.

The rush to participate in the Halifax Ebola vaccine trial suggests that there may be particular participant motivations at play in high-profile vaccine trials, or trials related to high-profile conditions [9]. The present comparative study examined the motivations of healthy volunteers in this high profile phase 1 Ebola vaccine study and in a concurrently enrolling phase 1 adjuvanted seasonal influenza vaccine trial. The goals were twofold. First, the study aimed to contribute to the scarce existing data concerning motivations of healthy volunteers in phase 1 vaccine trials. Second, by comparing the motivations in a high-profile and a less high-profile vaccine trial, the study aimed to identify whether patient motivation is influenced by characteristics of the vaccine being developed and the disease to be prevented. Given the intensity of media coverage related to the Ebola vaccine, for example, we hypothesized that motivation to participate would vary between the two trials, and that the high-profile nature of the Ebola epidemic would contribute to participant motivation.

2. Methods

2.1. Study setting, population and design

The present study conducted an online survey of healthy participants in two randomized, controlled, phase 1 vaccine studies conducted at CCfV in Halifax, Nova Scotia, Canada: an Ebola vaccine trial (Phase 1 trial to assess the safety, tolerability, and immunogenicity of an Ebola virus vaccine (VSVΔG-ZEBOV), NCT02374385), and an adjuvanted influenza vaccine trial (Safety and reactogenicity of PAL combined with seasonal flu vaccine in healthy adults, NCT02188810). The study was approved by the IWK Health Centre Research Ethics Board (Halifax, Nova Scotia).

The two trials were chosen as comparators for three reasons. First, both trials occurred at approximately the same time, in the same place, and were administered by CCfV. These factors limited the potential influence that differences in timing, location, and administration might have on participant motivations. Second, the trials were designed with similar populations in mind, that is, healthy volunteers, and women and men of similar ages (18–65 years of age for the Ebola vaccine trial and 18–50 years for the influenza vaccine trial). Both studies had a similar number of visits and venipunctures (11 visits in the Ebola vaccine trial and 10 visits and two phone calls in the influenza vaccine trial), although twice as much blood was taken in the Ebola vaccine study (588 mL vs. 245 mL). Finally, both trials involved clearly defined, albeit different incentives—$1125 distributed over the course of the Ebola vaccine trial, and $250 and a computer tablet (provided for electronic entry of symptoms by participants and given to them at the end of the study; value $180) in the case of the adjuvanted influenza vaccine trial. These incentives were deemed to reflect the time commitment and risk involved in each study as well as trial characteristics (i.e., the tablet facilitated data collection in the influenza trial; the higher remuneration for the Ebola trial reflected a perception of higher risk).

2.2. Participant recruitment

In the spring of 2015, while the Ebola vaccine trial and the adjuvanted influenza trial were underway, an invitation to participate in the survey was sent by email to all trial participants who had agreed to future contact from the study site. One week later, a second email, which included a link to the online survey questionnaire, was sent. The survey link was functional for a total of eight weeks, during which time two reminder emails were sent to all potential study participants. The survey was administered using Opinio software (ObjectPlanet Inc., Oslo, Norway) and all information was held on a secure, dedicated server at Dalhousie University. The survey was anonymous.

2.3. Survey tool

The survey included three discrete sections. The first section asked in which trial the participant had engaged, their previous experiences with clinical trials, and how they had found out about the clinical trial. The second section consisted of questions that addressed motivations to participate in a clinical vaccine trial, the importance of incentives to participant engagement, and overall experience with the trial. In this section, participants were asked to respond to 24 pre-identified motivations (apparent in the relevant literature) with a five-point Likert scale and then to rank their top three motivations. Participants were provided with a free text field to identify additional motivations (other than those listed) or to comment further. The final section asked participants for demographic information. Content validity of the survey tool was assessed through review by a multidisciplinary group with expertise in infectious diseases, anthropology, nursing, philosophy, public policy, and bioethics. Readability and clarity were assessed by pilot-testing with five people who were working in the health research sector but who were not associated with the study.

2.4. Data management and analysis

Data were exported from the Opinio web-server into a password-protected Microsoft Excel spreadsheet and then into SAS version 9.4 (SAS Institute, Cary, NC) for statistical analysis. The first level of analysis comprised a review of the descriptive, summative statistics. Categorical variables were summarized by frequency distributions (i.e., frequency counts, percentages and their two-sided 95% exact binomial confidence intervals). Responses to open-ended questions regarding motivations to participate in the clinical trials were examined for any additional themes. A cumulative logit model was fit to the ordinal outcomes (disagree/strongly disagree, neither agree nor disagree, agree/strongly agree). The univariate analyses included only the trial type

(adjuvanted influenza vaccine vs. Ebola vaccine trial) as a predictor variable. In order to assess whether responses were modified by age and gender, multivariate analyses were also carried out, including three binary predictor variables: trial type, gender (male vs. female), and age (18–34 years vs. ≥35 years). P-values of <0.05 were considered statistically significant.

To further explore reasons for participation, volunteers were asked to rank their top three motivations for participating in the trial. Survey questions related to motivation were classified as altruistic, self-interested, or other (see Table 3 for survey statements and categorization), and the distributions of the numbers of subjects choosing a particular motivation type were compared between trials. Multivariate analyses of equality of distributions were also carried out, including gender and age group as additional factors.

Because of the defined population available (total participants in the two clinical trials), a prestudy sample size calculation was not performed. With a total of 49 participants in this study (N = 27 for the adjuvanted influenza trial and N = 22 for the Ebola vaccine trial), testing at a level of 0.05, the power to detect a 30% difference for relatively common events (e.g., p = 0.35 vs. p = 65) was 45%, while the power to detect the same difference for relatively rare events (e.g., p = 0.1 vs. p = 0.4) was 57%.

3. Results

3.1. Demographics

Overall, 55 (62.5%) of the 88 volunteers in the two phase 1 clinical trials started the online survey, with 49 (55.7%) completing it (22 [55%] of 40 volunteers from the Ebola vaccine trial and 27 [56.3%] of 48 volunteers from the adjuvanted influenza vaccine trial). The mean age of those who completed the survey was just under 38 years (37.9 years in the Ebola trial, 37.8 years in the influenza trial) (Table 1). There was wide variance in education in both groups, and there was relatively even representation from people with higher and lower incomes in both groups. All but three participants were born in Canada. In both groups, there was an overrepresentation of students and people in health care professions. Some differences were noted between the two groups. More participants in the adjuvanted influenza vaccine trial were female, married, had previously participated in a clinical trial, and were employed in health care professions and sales and service, while the Ebola vaccine trial had more participants who were male, never married, and students.

3.2. Attitudes and beliefs

Most participants in both trials agreed that clinical trial research was essential to improve prevention and control of disease and the basis for most improvements in health care (Table 2). Participants tended to believe that the disease being studied in the trial in which they were participating posed a significant risk and that vaccination was the best way to control it.

3.3. Motivations to participate in the clinical trial

Participants expressed strong agreement with altruistic motivations (e.g., "I wanted to contribute to the advancement of science," "I wanted to contribute to the health of others," "I wanted to participate in something important," "I wanted to help society", and "I wanted to help control this disease/infection") (Table 3).

In the univariate analysis (Table 3), a personal and or community (i.e., a relational) connection to influenza had an impact on motivation for participants in the adjuvanted influenza vaccine trial; 15.4% of adjuvanted influenza vaccine trial participants compared to 4.5% of Ebola vaccine trial participants reported that they had a personal/community connection to the disease (p = 0.022). Significantly, more Ebola vaccine trial participants identified media coverage (90.9% of Ebola vaccine compare to 8.0% of adjuvanted influenza vaccine participants; p < 0.0001) and the offer of compensation (22.7% of Ebola virus compared to 3.8% of adjuvanted influenza vaccine participants; p = 0.004) as reasons for participation. Access to health care professionals, influence of friends or family, how one was viewed by others, a sense of obligation to the study personnel requesting participation, and advance access to the vaccine were similar and infrequent motivations for participation in both vaccine trials. In the multivariate model, when response distributions were allowed to vary by age and gender, there were only minimal differences from the univariate analysis. Trial type (adjuvanted vaccine vs. Ebola virus vaccine) was again significant for the outcome related to compensation for injury (p = 0.0026) and for media coverage (p < 0.0001), while the personal connection to the disease became marginally non-significant (p = 0.0579). Trial type was weakly significant for predicting "I felt an obligation to the person who requested my participation" (p = 0.047) in the multivariate analysis. Age was not a significant predictor for any of the outcomes, but gender was significant for predicting "I felt a duty to participate" (p = 0.0232), with the distribution for males shifted toward agree/strongly agree relative to females.

Motivations that were most frequently ranked as the top three in both trials were (1) wanting to contribute to the health of others, (2) wanting to participate in something important, (3) wanting to contribute to the advancement of science, and (4) wanting to receive an incentive such as money or a tablet. More participants in the Ebola vaccine trial ranked "wanting to contribute to something important" or "wanting to receive an incentive" among their top three motivations, when compared with the adjuvanted influenza vaccine trial group. The most frequent primary motivation, however, was either "contributing to something important," or "contributing to the health of others". Participants in the adjuvanted influenza vaccine trial most often ranked "contributing to the advancement of science" and "contributing to the health of others" among their top three motivations. Their secondary and tertiary motivations included incentives and contributing to something important, as was the case with the Ebola group, but to a lesser extent. The distribution of altruistic, self-interested, or other motivators in the top three motivations listed by participants was similar in both vaccine studies, with most participants having two altruistic and one self-interested motivator (Table 4). In the multivariate analysis, none of the factors included (trial type, gender, age group) was found to be significant for the three motivational types (all p values ≥ 0.18).

Thematic analysis of the open-ended questions about motivation were consistent with the structured survey results; no new themes emerged. People expressed both altruistic and mixed materialistic and altruistic statements about their motivations for participating.

Regarding altruistic motivations, participants stated:

> "...I wanted to make sure that the Canadian Ebola Vaccine Trial had sufficient resources to ensure a good result and the resultant vaccine used to help poorer countries who have no infrastructure to produce their own."
>
> [Ebola vaccine trial participant]

> "Too many people are anti-vaccine and the word needs to get out that vaccines are needed and required to make everyone in the community safe."
>
> [Adjuvanted influenza vaccine trial participant]

Table 1
Demographics and description of study population.

Characteristics	Parameters or Categories	Adjuvanted Influenza Vaccine Trial N = 27		Ebola Vaccine Trial N = 22		Total Participants N = 49		p value*
		value or n	%	value or n	%	value or n	%	
Age	18–24 y	3	11.54	3	15.79	6	13.33	0.213
	25–34 y	5	19.23	5	26.32	10	22.22	
	35–44 y	13	50.00	4	21.05	17	37.78	
	45–54 y	5	19.23	5	26.32	10	22.22	
	≥55 y	0	0.00	2	10.53	2	4.44	
	Missing	1		3		4		
Gender	Male	7	25.93	12	54.55	19	38.78	0.041
	Female	20	74.07	10	45.45	30	61.22	
Ethnicity	White	9	33.33	8	36.36	17	34.69	1.00
	Black	0	0.00	1	4.55	1	2.04	
	Hispanic	0	0.00	1	4.55	1	2.04	
	First Nations, Inuit, Metis	1	3.70	0	0	1	2.04	
	Do not wish to respond	17	60.96	12	54.55	29	59.18	
Education	High school diploma	5	19.23	7	31.82	12	25.00	0.243
	College	10	38.46	5	22.73	15	31.25	
	Undergraduate university degree	8	30.77	8	36.36	16	33.33	
	Master's	0	0.00	2	9.09	2	4.17	
	Health care diploma	2	7.69	0	0.00	2	4.17	
	Doctorate	1	3.85	0	0.00	1	2.08	
	Missing	1		0		1		
Marital status	Never legally married	4	14.81	11	50.00	15	30.61	0.057
	Legally married (and not separated)	10	37.04	4	18.18	14	28.57	
	Separated, but still legally married	0	0.00	1	4.55	1	2.04	
	In a common-law relationship	8	29.63	3	13.64	11	22.45	
	Divorced	3	11.11	3	13.64	6	12.24	
	Widowed	2	7.41	0	0.00	2	4.08	
Occupation	Management	0	0.00	3	14.29	3	6.25	0.024
	Business/Finance	4	14.81	2	9.52	6	12.50	
	Natural and applied science	0	0.00	1	4.76	1	2.08	
	Health	9	33.33	2	9.52	11	22.92	
	Education, law, social, government services	2	7.41	3	14.29	5	10.42	
	Sales and services	7	25.93	0	0.00	7	14.58	
	Trades, transport	0	0.00	2	4.76	2	2.08	
	Student	2	7.41	5	23.81	7	14.58	
	Unemployed	0	0.00	1	4.76	1	2.08	
	Retired	0	0.00	1	4.76	1	2.08	
	Other	3	11.11	2	9.52	5	10.42	
Household income	Up to $20,000	4	15.38	2	9.09	6	12.50	0.619
	$20,001 to $40,000	4	15.38	6	27.27	10	20.83	
	$40,001 to $60,000	4	15.38	4	18.18	8	16.67	
	$60,001 to $85,000	5	19.23	2	9.09	7	14.58	
	$85,001 to $125,000	7	26.92	4	18.18	11	22.92	
	Over $125,000	2	7.69	4	18.18	6	12.50	
	Missing	1		0		1		
Prior participation in a clinical trial	Yes	16	59.26	6	27.27	22	44.90	0.025

* Statistical comparisons were between vaccine groups and included all respondents who submitted the survey (N = 27 for the adjuvanted influenza vaccine trial and N = 22 for the Ebola vaccine trial).

> "It is important to participate in clinical trials as it is important to advance prevention and treatment of illnesses."
>
> [Adjuvanted influenza vaccine trial participant]

> "I saw a need to develop a way to battle this disease and wanted to be able to help in its development."
>
> [Ebola vaccine trial participant]

Some acknowledged the importance of an economic incentive, although presented as an added-plus to a scientific humanitarian effort rather than the primary driver:

> "I'm hoping that by volunteering in this study and being able to participate, that there will be an antidote produced that can save lives. It was also very minimal risk to myself with a nice money incentive that tipped the scale for me…"
>
> [Ebola vaccine trial participant]

> "I saw this as an opportunity to do my part in the science community in order to make a positive improvement and help with health research. The money was also a huge plus, if I'm being honest…"
>
> [Adjuvanted influenza vaccine trial participant]

4. Discussion

Trials requiring healthy volunteers have historically relied on "informed and consenting volunteers who appreciate the potential risks" [10] but who participate with the added benefit of some measure of (usually financial, but sometimes other) incentive. Incentives are permitted by the research ethics boards that approve such studies, with the intention that such incentives will be set at a level that is not coercive. While it should be expected

Table 2
Attitudes and beliefs about Ebola, influenza, and clinical research.

Question	Response	Adjuvanted Influenza Vaccine Trial N = 27 % (95% CI)	Ebola Vaccine Trial N = 22 % (95% CI)	Total Participants N = 49 % (95% CI)	p value*
Ebola infection poses a serious threat to human health	Strongly agree/agree	85.2 (66.3, 95.8)	90.9 (70.8, 98.9)	87.8 (75.2, 95.4)	0.548
	Neither agree/disagree	7.4 (0.9, 24.3)	4.5 (0.1, 22.8)	6.1 (1.3, 16.9)	
	Disagree/strongly disagree	7.4 (0.9, 24.3)	4.5 (0.1, 22.8)	6.1 (1.3, 16.9)	
Vaccination is the best possibility to control Ebola infection	Strongly agree/agree	77.8 (57.7, 91.4)	86.4 (65.1, 97.1)	81.6 (68.0, 91.2)	0.398
	Neither agree/disagree	14.8 (4.2, 33.7)	13.6 (2.9, 34.9)	14.3 (5.9, 27.2)	
	Disagree/strongly disagree	7.4 (0.9, 24.3)	0.0 (0.0, 15.4)	4.1 (0.5,14.0)	
Influenza poses a serious threat to human health	Strongly agree/agree	88.9 (70.8, 97.6)	77.3 (54.6, 92.2)	83.7 (70.3, 92.7)	0.335
	Neither agree/disagree	3.7 (0.1, 19.0)	18.2 (5.2, 40.3)	10.2 (3.4, 22.2)	
	Disagree/strongly disagree	7.4 (0.9, 24.3)	4.5 (0.1, 22.8)	6.1 (1.3, 16.9)	
Vaccination is the best method to control influenza infection	Strongly agree/agree	92.6 (75.7, 99.1)	77.3 (54.6, 92.2)	85.7 (72.8, 94.1)	0.158
	Neither agree/disagree	3.7 (0.1, 19.0)	18.2 (5.2, 40.3)	10.2 (3.4, 22.2)	
	Disagree/strongly disagree	3.7 (0.1, 19.0)	4.5 (0.1, 22.8)	4.1 (0.5, 14.0)	
Clinical trial research is essential to improve the prevention and control of disease	Strongly agree/agree	96.3 (81.0, 99.9)	95.5 (77.2, 99.9)	95.9 (86.0, 99.5)	0.906
	Neither agree/disagree	0.0 (0.0, 12.8)	4.5 (0.1, 22.8)	2.0 (0.1, 10.9)	
	Disagree/strongly disagree	3.7 (0.1, 19.0)	0.0 (0.0, 15.4)	2.0 (0.1, 10.9)	
Clinical research is the basis for most improvements in health care	Strongly agree/agree	96.3 (81.0, 99.9)	86.4 (65.1, 97.1)	91.8 (80.4, 97.7)	0.257
	Neither agree/disagree	0.0 (0.0, 12.8)	13.6 (2.9, 34.9)	6.1 (1.3, 16.9)	
	Disagree/strongly disagree	3.7 (0.1, 19.0)	0.0 (0.0, 15.4)	2.0 (0.1, 10.9)	

* Statistical comparisons were between vaccine groups and included all respondents who submitted the survey (N = 27 for the adjuvanted influenza vaccine trial and N = 22 for the Ebola vaccine trial).

that financial remuneration plays a central role in motivating healthy volunteers to participate in clinical trials, [11,12] the existing literature reveals that financial motivations are not the *sole* motivators; our study confirms this finding in the context of phase 1 vaccine trials [13,14]. This finding is consistent across the two trials examined in our study, evident in both the quantative analysis and the open-ended portion of the survey where participants were given space to describe their motivations in their own words. The open-ended question served as a means of corroborating the answers in the closed questions [15] and confirmed the mix of altruistic and self-interested motivations selected by participants in the quantitative analysis.

Our survey shows that the desire to contribute to the advancement of science is a primary motivation of both Ebola and influenza vaccine trial participants. This result is in line with Costas et al.'s study of motivations for participation in a phase 1 trial for an avian influenza vaccine, where "collaboration with science" was a key motivator for participants. Interestingly, however, Costas and colleagues suggest that older participants were more likely to report altruistic motivations than younger participants, who were more likely to report economic reasons for participation [16].

The high-profile nature of the Ebola vaccine trial in Halifax in light of the international emergency epidemic and the potential for comparison with an experimental vaccine for the more common influenza disease offered a unique opportunity to identify whether motivations to participate in phase 1 vaccine clinical trials differ depending on the disease under investigation. The study was, however, limited in many ways, particularly in its small sample size (as is expected for early phase trials), the relatively low response rate (55.7%), and reliance on self-reported data without secondary validation. As the majority of the participants chose not to respond to the question on race/ethnicity, we were unable to explore that potential influence on the decision to participate in these phase 1 studies. However, those who did respond reflected the makeup of the population of Nova Scotia and did not differ between the two studies. Furthermore, the classification of motivations as either altruistic, self-interested, and other, relies on assumptions about underlying reasoning for self-articulated motivations. It is possible, for example, that someone participated in the Ebola vaccine trial for the primary purpose of receiving an incentive, which is characterized as a self-interested motivation, but with the very altruistic intention to donating all of the money to a local charity.

Yet, the findings—both qualitative and quantitative—suggest that the mixed motivations of phase 1 clinical vaccine trial participants may vary depending on the vaccine in question and its profile. The media coverage of the Ebola vaccine trial and the ease of recruitment of participants (and subsequent discussion of participant motivations on television and in print media) suggested that there may be an association with the high-profile nature of the Ebola trial as well as general public concern about the pandemic. The perception of Ebola virus disease being uniformly fatal compared to the more routine, annual risk of influenza disease may also have influenced participation decisions. The results show some variance in motivations of those engaged in the Ebola and influenza vaccine trials. Incentives were slightly more likely to factor into the top three motivations of Ebola vaccine trial volunteers who participated in our study. It is worth noting that the incentive (s) offered in the Ebola vaccine trial were nearly 2½-fold higher than those in the adjuvanted influenza vaccine trial.

Overall, the findings of our study affirm the findings of the existing literature that healthy volunteers have mixed motivations for engaging in phase 1 clinical trials; these motivations often include a desire to "give back" or contribute to science and/or medicine as well as to receive financial or other incentives. Our comparative analysis of two different vaccine trials also reveals that the profile of the disease may be a motivating factor and that this profile may have an impact on the extent that study volunteers identify financial or other self-interested incentives as a motivation.

While Ebola posed no imminent threat to Nova Scotians, the immediate and enormous response by citizens of Halifax to the efforts to develop a vaccine is noteworthy. This study points to participant motivations and recruitment as a critical area for future research. The strong signals of some form of community responsibility and/or identification with the community affected by a disease, what we suggest are a relational motivation, play a role in participation. This may well contribute to decisions of where clinical trials should take place. Future research on the ethics of incentives for clinical trial participation may want to take into account

Table 3
Motivation to participate in a clinical trial.

Question (Motivation Category)*	Response	Adjuvanted Influenza Vaccine Trial N = 27 % (95% CI)	Ebola Vaccine Trial N = 22 % (95% CI)	Total Participants N = 49 % (95% CI)	p value**
I felt a duty to participate (other)	Strongly agree/agree	57.7 (36.9, 76.6)	63.6 (40.7, 82.8)	60.4 (45.3, 74.2)	0.837
	Neither agree/disagree	34.6 (17.2, 55.7)	22.7 (7.8, 45.4)	29.2 (17.0, 44.1)	
	Disagree/strongly disagree	7.7 (0.9, 25.1)	13.6 (2.9, 34.9)	10.4 (3.5, 22.7)	
I wanted access to or time with medical professionals (self-interested)	Strongly agree/agree	0.0 (0.0, 13.2)	9.1 (1.1, 29.2)	4.2 (0.5, 14.3)	0.379
	Neither agree/disagree	26.9 (11.6, 47.8)	27.3 (10.7, 50.2)	27.1 (15.3, 41.8)	
	Disagree/strongly disagree	73.1 (52.2, 88.4)	63.6 (40.7, 82.8)	68.8 (53.7, 81.3)	
I felt an obligation to the person who requested my participation (other)	Strongly agree/agree	3.8 (0.1, 19.6)	13.6 (2.9, 34.9)	8.3 (2.3, 20.0)	0.052
	Neither agree/disagree	15.4 (4.4, 34.9)	31.8 (13.9, 54.9)	22.9 (12.0, 37.3)	
	Disagree/strongly disagree	80.8 (60.6, 93.4)	54.5 (32.2, 75.6)	68.8 (53.7, 81.3)	
I wanted to be with a friend or family member who is participating (other)	Strongly agree/agree	3.8 (0.1, 19.6)	0.0 (0.0, 15.4)	2.1 (0.1, 11.1)	0.363
	Neither agree/disagree	11.5 (2.4, 30.2)	27.3 (10.7, 50.2)	18.8 (8.9, 32.6)	
	Disagree/strongly disagree	84.6 (65.1, 95.6)	72.7 (49.8, 89.3)	79.2 (65.0, 89.5)	
I wanted to contribute to the advancement of science (altruistic)	Strongly agree/agree	81.5 (61.9, 93.7)	90.9 (70.8, 98.9)	85.7 (72.8, 94.1)	0.381
	Neither agree/disagree	14.8 (4.2, 33.7)	4.5 (0.1, 22.8)	10.2 (3.4, 22.2)	
	Disagree/strongly disagree	3.7 (0.1, 19.0)	4.5 (0.1, 22.8)	4.1 (0.5, 14.0)	
I wanted to contribute to the health of others (altruistic)	Strongly agree/agree	88.9 (70.8, 97.6)	90.9 (70.8, 98.9)	89.8 (77.8, 96.6)	0.802
	Neither agree/disagree	3.7 (0.1, 19.0)	4.5 (0.1, 22.8)	4.1 (0.5, 14.0)	
	Disagree/strongly disagree	7.4 (0.9, 24.3)	4.5 (0.1, 22.8)	6.1 (1.3, 16.9)	
I was curious about the study (other)	Strongly agree/agree	77.8 (57.7, 91.4)	76.2 (52.8, 91.8)	77.1 (62.7, 88.0)	1.000
	Neither agree/disagree	11.1 (2.4, 29.2)	19.0 (5.4, 41.9)	14.6 (6.1, 27.8)	
	Disagree/strongly disagree	11.1 (2.4, 29.2)	4.8 (0.1, 23.8)	8.3 (2.3, 20.0)	
I wanted to receive an incentive (e.g., money, tablet) (self-interested)	Strongly agree/agree	63.0 (42.4, 80.6)	59.1 (36.4, 79.3)	61.2 (46.2, 74.8)	0.835
	Neither agree/disagree	3.7 (0.1, 19.0)	22.7 (7.8, 45.4)	12.2 (4.6, 24.8)	
	Disagree/strongly disagree	33.3 (16.5, 54.0)	18.2 (5.2, 40.3)	26.5 (14.9, 41.1)	
I wanted to participate in something important (altruistic)	Strongly agree/agree	81.5 (61.9, 93.7)	90.9 (70.8, 98.9)	85.7 (72.8, 94.1)	0.381
	Neither agree/disagree	14.8 (4.2, 33.7)	4.5 (0.1, 22.8)	10.2 (3.4, 22.2)	
	Disagree/strongly disagree	3.7 (0.1, 19.0)	4.5 (0.1, 22.8)	4.1 (0.5, 14.0)	
I wanted to have a new experience/something to do (other)	Strongly agree/agree	44.0 (24.4, 65.1)	54.5 (32.2, 75.6)	48.9 (34.1, 63.9)	0.438
	Neither agree/disagree	36.0 (18.0, 57.5)	31.8 (13.9, 54.9)	34.0 (20.9, 49.3)	
	Disagree/strongly disagree	20.0 (6.8, 40.7)	13.6 (2.9, 34.9)	17.0 (7.6, 30.8)	
I was influenced by my friends/family (other)	Strongly agree/agree	3.8 (0.1, 19.6)	9.1 (1.1, 29.2)	6.3 (1.3, 17.2)	0.635
	Neither agree/disagree	26.9 (11.6, 47.8)	13.6 (2.9, 34.9)	20.8 (10.5, 35.0)	
	Disagree/strongly disagree	69.2 (48.2, 85.7)	77.3 (54.6, 92.2)	72.9 (58.2, 84.7)	
I knew that I would receive compensation for any injury resulting from the trial (self-interested)	Strongly agree/agree	3.8 (0.1, 19.6)	22.7 (7.8, 45.4)	12.5 (4.7, 25.2)	0.004
	Neither agree/disagree	19.2 (6.6, 39.4)	40.9 (20.7, 63.6)	29.2 (17.0, 44.1)	
	Disagree/strongly disagree	76.9 (56.4, 91.0)	36.4 (17.2, 59.3)	58.3 (43.2, 72.4)	
I saw media coverage of the issue/illness (other)	Strongly agree/agree	8.0 (1.0, 26.0)	90.9 (70.8, 98.9)	46.8 (32.1, 61.9)	0.000
	Neither agree/disagree	24.0 (9.4, 45.1)	4.5 (0.1, 22.8)	14.9 (6.2, 28.3)	
	Disagree/strongly disagree	68.0 (46.5, 85.1)	4.5 (0.1, 22.8)	38.3 (24.5, 53.6)	
I have a personal connection to the issue/ illness (other)	Strongly agree/agree	19.2 (6.6, 39.4)	13.6 (2.9, 34.9)	16.7 (7.5, 30.2)	0.453
	Neither agree/disagree	23.1 (9.0, 43.6)	18.2 (5.2, 40.3)	20.8 (10.5, 35.0)	
	Disagree/strongly disagree	57.7 (36.9, 76.6)	68.2 (45.1, 86.1)	62.5 (47.4, 76.0)	
I felt that others will view my participation positively (other)	Strongly agree/agree	16.0 (4.5, 36.1)	22.7 (7.8, 45.4)	19.1 (9.1, 33.3)	0.296
	Neither agree/disagree	32.0 (14.9, 53.5)	40.9 (20.7, 63.6)	36.2 (22.7, 51.5)	
	Disagree/strongly disagree	52.0 (31.3, 72.2)	36.4 (17.2, 59.3)	44.7 (30.2, 59.9)	
I wanted to participate in the development of a new vaccine (altruistic)	Strongly agree/agree	70.4 (49.8, 86.2)	90.9 (70.8, 98.9)	79.6 (65.7, 89.8)	0.097
	Neither agree/disagree	18.5 (6.3, 38.1)	4.5 (0.1, 22.8)	12.2 (4.6, 24.8)	
	Disagree/strongly disagree	11.1 (2.4, 29.2)	4.5 (0.1, 22.8)	8.2 (2.3, 19.6)	
I wanted advance access to the vaccine (self-interested)	Strongly agree/agree	26.9 (11.6, 47.8)	27.3 (10.7, 50.2)	27.1 (15.3, 41.8)	0.991
	Neither agree/disagree	23.1 (9.0, 43.6)	22.7 (7.8, 45.4)	22.9 (12.0, 37.3)	
	Disagree/strongly disagree	50.0 (29.9, 70.1)	50.0 (28.2, 71.8)	50.0 (35.2, 64.8)	
I wanted to help my community (altruistic)	Strongly agree/agree	77.8 (57.7, 91.4)	63.6 (40.7, 82.8)	71.4 (56.7, 83.4)	0.402
	Neither agree/disagree	11.1 (2.4, 29.2)	31.8 (13.9, 54.9)	20.4 (10.2, 34.3)	
	Disagree/strongly disagree	11.1 (2.4, 29.2)	4.5 (0.1, 22.8)	8.2 (2.3, 19.6)	
I wanted to help society (altruistic)	Strongly agree/agree	77.8 (57.7, 91.4)	81.8 (59.7, 94.8)	79.6 (65.7, 89.8)	0.708
	Neither agree/disagree	14.8 (4.2, 33.7)	13.6 (2.9, 34.9)	14.3 (5.9, 27.2)	
	Disagree/strongly disagree	7.4 (0.9, 24.3)	4.5 (0.1, 22.8)	6.1 (1.3, 16.9)	
I wanted to help to control this disease/ infection (altruistic)	Strongly agree/agree	76.9 (56.4, 91.0)	90.9 (70.8, 98.9)	83.3 (69.8, 92.5)	0.211
	Neither agree/disagree	11.5 (2.4, 30.2)	4.5 (0.1, 22.8)	8.3 (2.3, 20.0)	
	Disagree/strongly disagree	11.5 (2.4, 30.2)	4.5 (0.1, 22.8)	8.3 (2.3, 20.0)	
I wanted to receive reimbursement of my out-of-pocket expenses (self-interested)	Strongly agree/agree	34.6 (17.2, 55.7)	22.7 (7.8, 45.4)	29.2 (17.0, 44.1)	0.851
	Neither agree/disagree	19.2 (6.6, 39.4)	45.5 (24.4, 67.8)	31.3 (18.7, 46.3)	
	Disagree/strongly disagree	46.2 (26.6, 66.6)	31.8 (13.9, 54.9)	39.6 (25.8, 54.7)	

Table 3 (*continued*)

Question (Motivation Category)*	Response	Adjuvanted Influenza Vaccine Trial N = 27 % (95% CI)	Ebola Vaccine Trial N = 22 % (95% CI)	Total Participants N = 49 % (95% CI)	p value**
I wanted psychological benefits (feeling good about myself) (other)	Strongly agree/agree	37.0 (19.4, 57.6)	36.4 (17.2, 59.3)	36.7 (23.4, 51.7)	0.762
	Neither agree/disagree	33.3 (16.5, 54.0)	27.3 (10.7, 50.2)	30.6 (18.3, 45.4)	
	Disagree/strongly disagree	29.6 (13.8, 50.2)	36.4 (17.2, 59.3)	32.7 (19.9, 47.5)	
I have a connection to the issue/illness through a friend/family member (other)	Strongly agree/agree	15.4 (4.4, 34.9)	4.5 (0.1, 22.8)	10.4 (3.5, 22.7)	0.022
	Neither agree/disagree	30.8 (14.3, 51.8)	9.1 (1.1, 29.2)	20.8 (10.5, 35.0)	
	Disagree/strongly disagree	53.8 (33.4, 73.4)	86.4 (65.1, 97.1)	68.8 (53.7, 81.3)	

* Motivational statements were categorized into three categories: altruistic, self-interested, or other.
** Statistical comparisons were between vaccine groups and included all respondents who submitted the survey (N = 27 for the adjuvanted influenza vaccine trial and N = 22 for the Ebola vaccine trial).

Table 4
Number (%) of participants ranking 0, 1, 2, or 3 of each type of motivator in their top three motivations for participating in the clinical trial.

Motivation type*	Adjuvanted Influenza Vaccine Trial (N = 27)				Ebola Vaccine Trial (N = 22)				p value
	Number (%) of participants choosing 0, 1, 2, or 3 of each type of motivator in their top 3 motivations for participating				Number (%) of participants choosing 0, 1, 2, or 3 of each type of motivator in their top 3 motivations for participating				
	0	1	2	3	0	1	2	3	
Altruistic	3 (11.1)	3 (11.1)	13 (48.1)	8 (29.6)	1 (4.5)	1 (4.5)	16 (72.7)	4 (18.2)	0.76
Self-interested	15 (55.6)	12 (44.4)	0 (0)	0 (0)	10 (45.5)	12 (54.5)	0 (0)	0 (0)	0.74
Other	16 (59.3)	7 (25.9)	4 (14.8)	0 (0)	15 (68.2)	5 (22.7)	2 (9.1)	0 (0)	0.61

* Participants were asked to rank their top three motivations for participating in the clinical trial. The individual motivations were classified as altruistic (7 motivators), self-interested (5 motivators), or other (11 motivators). Classification of the motivators is provided in Table 3.

how media attention to a trial and/or disease outbreak affects participant engagement.

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