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Short communication

The impact of financial incentives on COVID-19 vaccination intention among a sample of U.S. adults

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ABSTRACT

Financial incentives are one of several strategies that have been explored to enhance COVID-19 vaccine uptake. Although widely discussed, it is unclear how much of an incentive and for which subset of individuals incentives would be effective. This study explored the impact of hypothetical $600 or $1200 incentives on COVID-19 vaccination intention. From a nationally representative panel of U.S. adults, 346 individuals reported hesitance towards COVID-19 vaccination and were then asked about their willingness to accept a vaccine if offered hypothetical incentives. Results indicated 26.89% would get vaccinated if offered $600, and 30.06% if offered $1200. In the multivariable model that included sociodemographic and attitudinal predictors of vaccine uptake, those classified as 'wait-and-see' compared to those classified as non-acceptors were more likely to accept COVID-19 vaccines when given financial incentives, and those who believed more strongly in the benefits of COVID-19 vaccines were more likely to accept a vaccine when first offered hypothetical $600 and then $1200 incentives. Individuals unsure if they ever had COVID-19 were significantly less likely to be willing to get the vaccine for $1200 as compared to those who believed they previously had COVID-19. These results suggest that financial incentives can increase intention to receive a COVID-19 vaccine.

1. Introduction

Widespread uptake of COVID-19 vaccination is crucial to achieving maximum public health benefits. Although vaccines are now readily available in the U.S., uptake remains suboptimal, with significant segments of the population remaining hesitant about receiving a COVID-19 vaccine (Kaiser Family Foundation, n.d.). Many strategies for enhancing uptake have been implemented, including employer mandates, requiring proof of vaccination for access to desirable activities (e.g., concerts, indoor dining), and financial incentives/disincentives. Previously, financial incentives have been found to increase vaccine uptake in several countries (e.g., the U.S., Kenya, Australia) targeting a variety of infections including Human Papillomavirus, Measles, Polio, and Hepatitis B (Caskey et al., 2017; Gibson et al., 2019; Kagucia et al., 2021; Mantzari et al., 2015). Studies in the U.S., Germany, and Sweden found that hypothetical incentives increased COVID-19 vaccination intentions (Carpio et al., 2021; Duch et al., 2021; Klüver et al., 2021; Sprengholz et al., 2021). Each of these studies was structured differently, with the largest range offered being 0 to 10,000 Euros. In other studies, the value of incentives ranged from $25 to $600. One study, which used cost (defined as free, $20 co-pay, $10 or $100 incentive) in a multivariable model of vaccine acceptability, found no increased willingness to accept COVID-19 vaccination (Kreps et al., 2021). Another study found no significant differences in vaccination trends between states with and without statewide incentive programs in the fourteen days before or after incentives were introduced (Thirumurthy et al., 2021). However, this study examined a variety of incentives in aggregate which were unlikely to be equally effective.

Though some of these studies demonstrated the potential effectiveness of financial incentives, less is known about the target groups for whom incentives are effective. Thus, we examined the attitudinal and sociodemographic characteristics associated with intention to receive a

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COVID-19 vaccine with offers of hypothetical incentives ($600 and $1200) among those who were hesitant about, or opposed to, COVID-19 vaccination. The findings could be used to inform development of tailored/targeted approaches when offering incentives.

2. Methods

Using a nationally representative panel of U.S. adults (Ipsos KnowledgePanel®), 1208 participants completed a survey in English or Spanish from April 7–21, 2021 (Harris et al, 2022). Of note, the survey was administered to panel members during the early months of vaccine rollout. Panel members were recruited using an Address-Based Sampling method based on the latest Delivery Sequence File (DSF) of the U.S. Postal Service. To increase the inclusion of individuals with historically low participation rates, complimentary tablets/laptops and internet access were provided to participants. The present study examined a subset from the parent study (Harris et al, 2022); for this reason, we did not use weighted data, and focused on associations rather than prevalence estimates. This study was approved by the Columbia University Irving Medical Center Institutional Review Board (IRB-AAAT5154).

Of the 1208 participants who completed the survey, a total of 354 participants were categorized as 'wait-and-see' (those that responded 'yes' when asked if they would get the vaccine after there has been more experience with it) or non-acceptor and were included in this analysis, and the remaining 854 were excluded (14 with missing data and 840 who were classified as vaccine acceptors). The 'wait-and-see' and non-acceptor groups were asked the following yes/no questions in this order regarding incentives: 'If you were offered $600 in cash for getting a COVID-19 vaccine, would you be willing to get the vaccine?' and 'If you were offered $1200 in cash for getting a COVID-19 vaccine, would you be willing to get the vaccine?'. These values were selected because the U.S. Federal Government issued COVID-19 stimulus payments to eligible U.S. residents in December 2020 for $1200 and in April 2021 for $600.

Of these 354 participants, eight individuals did not have complete data for the incentive questions and thus, for the bivariate analysis the sample size was 346 participants. In the final multivariable adjusted model the sample size is 319, given that 27 participants were dropped due to missing at least one predictor question.

The survey assessed a range of sociodemographic characteristics, influenza vaccination history, perceptions of COVID-19, experiences with COVID-19, and COVID-19 vaccine uptake. Sociodemographic characteristics included gender, age, race/ethnicity, income, education, political views, region of U.S. residence, and having a household member over 65 years old. Experiences with COVID-19 included believing one had a pre-existing health condition that may cause COVID-19 to be more severe, that one has had COVID-19 or historically tested positive for COVID-19, and viewing COVID-19 as a serious problem in their community. In addition, the following scales were included: a) general vaccine acceptability (Sturm et al., 2021); b) perceived severity of COVID-19 (Head et al., 2020); c) perceptions of behavioral strategies to prevent infection and transmission of COVID-19 (Kasting et al., 2020); d) COVID-19 vaccine acceptability (Helmkamp et al., 2021); and e) reasons impacting decision-making with regard to the COVID-19 vaccination (see Tables 1 and 2 for response choices). The data were analyzed using SAS ® Software v. 9.4 (SAS Institute Inc., Cary, NC). All possible predictors were first analyzed using bivariate logistic regression models. All predictors were included in the multivariable adjusted logistic regression model, except for age, which was excluded due to overlap with the variable of having a household member over age 65, including oneself.

3. Results

Participant characteristics are presented in Tables 1 and 2. Among the 346 participants, 93 (26.87 %) reported that they would get

Table 1
Demographic and Health-Related Characteristics of Respondents, Bivariate & Final Model Association for Willingness to Receive the COVID-19 Vaccination with a $600 Incentive.[1,2,3]

Categorical Variables	Frequency	Bivariate Unadjusted OR [95 % CI]	Multivariable Adjusted OR [95 % CI]
Gender (N = 346)			
Male	169 (48.8 %)	*Ref*	*Ref*
Female	177 (51.2 %)	0.86 (0.53, 1.38)	0.98 (0.51, 1.89)
Age (years) (N = 346)			
60+	80 (23.1 %)	*Ref*	–[4]
45–49	92 (26.6 %)	1.28 (0.61, 2.70)	–
30–44	115 (33.2 %)	1.90 (0.95, 3.77)	–
18–29	59 (17.1 %)	**2.58 (1.20, 5.57)***	–
Race/Ethnicity (N = 346)			
Non-Hispanic White	245 (70.8 %)	*Ref*	*Ref*
Non-Hispanic Black	42 (12.1 %)	**2.21 (1.13, 4.35)***	0.93 (0.34, 2.58)
Hispanic	40 (11.6 %)	0.98 (0.46, 2.13)	0.47 (0.15, 1.48)
2 + races or other, non-Hispanic	19 (5.5 %)	0.55 (0.16, 1.96)	0.41 (0.09, 1.86)
Annual Income (N = 346)			
More than $150,000	53 (15.3 %)	*Ref*	*Ref*
$100,000–149,999	59 (17.0 %)	1.17 (0.49, 2.78)	0.79 (0.27, 2.30)
$75,000–99,999	50 (14.5 %)	0.38 (0.12, 1.17)	0.27 (0.07, 1.10)
$50,000–74,999	73 (21.1 %)	1.57 (0.70, 3.54)	0.85 (0.28, 2.52)
Less than $50,000	111 (32.1 %)	1.78 (0.84, 3.78)	0.92 (0.30, 2.84)
Education (N = 346)			
Bachelor's degree or higher	62 (17.9 %)	*Ref*	*Ref*
Some college	133 (38.5 %)	1.10 (0.53, 2.29)	2.40 (0.82, 6.92)
High school degree or less	151 (43.6 %)	1.87 (0.93, 3.75)	3.11 (1.03, 9.42)
Political views (N = 342)			
Very Conservative/ Conservative	154 (45.0 %)	*Ref*	*Ref*[5]
Moderate/Middle of the Road	101 (29.6 %)	1.18 (0.66, 2.11)	0.90 (0.40, 2.04)
Very Liberal/ Liberal	35 (10.2 %)	**4.04 (1.88, 8.67)*****	4.25 (1.31, 13.80)
Prefer not to answer	52 (15.2 %)	1.13 (0.55, 2.36)	1.56 (0.55, 4.40)
Region of the country (N = 346)			
Northeast	53 (15.3 %)	*Ref*	*Ref*
Midwest	83 (24.0 %)	1.20 (0.56, 2.59)	1.51 (0.52, 4.33)
South	143 (41.3 %)	1.01 (0.49, 2.06)	1.38 (0.50, 3.83)
West	67 (19.4 %)	0.87 (0.38, 2.00)	1.32 (0.43, 4.11)
Household member ≥ age 65 (N = 345)			
No	255 (73.9 %)	*Ref*	*Ref*
Yes	90 (26.1 %)	0.67 (0.38, 1.19)	0.55 (0.26, 1.17)
Ever had a flu vaccine (N = 346)			
No	169 (48.8 %)	*Ref*	*Ref*

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Table 1 (*continued*)

Categorical Variables	Frequency	Bivariate Unadjusted OR [95 % CI]	Multivariable Adjusted OR [95 % CI]
Yes	177 (51.2 %)	0.97 (0.60, 1.56)	0.92 (0.47, 1.80)
Health condition making COVID-19 more severe (N = 346)			
No	243 (70.2 %)	*Ref*	*Ref*
Yes	72 (20.8 %)	1.49 (0.84, 2.64)	0.97 (0.41, 2.30)
Not sure	31 (9.0 %)	1.04 (0.44, 2.44)	1.05 (0.31, 3.58)
Positive for COVID-19 (N = 343)			
Believe to have had or tested positive for COVID-19	94 (27.4 %)	*Ref*	*Ref*
Do not believe to have had COVID-19	182 (53.1 %)	0.82 (0.48, 1.42)	0.76 (0.36, 1.60)
Unsure if have ever had COVID-19	67 (19.5 %)	0.65 (0.31, 1.33)	0.35 (0.14, 0.92)
View COVID-19 as a major problem in community (N = 345)			
No	232 (67.2 %)	*Ref*	*Ref*
Yes	113 (32.8 %)	**1.85 (1.13, 3.03)***	1.25 (0.59, 2.66)
Vaccine Uptake (N = 346)			
Non-Acceptor	194 (56.1 %)	*Ref*	*Ref*
Waiting	152 (43.9 %)	**4.43 (2.65, 7.40)*****	**2.95 (1.41, 6.17)****
Scale Variables	Mean	Bivariate Regression Coefficient [95 % CI]	Final Model Association Incentives [95 % CI]
Perceived COVID-19 severity (N = 345)	16.26	**1.08 (1.04, 1.12)*****	1.01 (0.95, 1.08)
Effectiveness of behavioral strategies to protect self/others (N = 345)	18.92	**1.07 (1.03, 1.11)****	0.95 (0.88, 1.02)
General vaccine attitudes (N = 343)	18.85	**1.12 (1.06, 1.18)*****	1.00 (0.91, 1.10)
COVID vaccine attitudes (N = 338)	29.09	**1.15 (1.10, 1.20)*****	**1.13 (1.07, 1.20)*****
COVID vaccine reasons (N = 333)	18.91	**1.11 (1.08, 1.15)*****	**1.06 (1.01, 1.12)***

[1] Referent group in italics.
[2] Bolded values are significant at *p < 0.05, **p < 0.01, ***p < 0.001.
[3] The sample size for the bivariate models ranges from 342 to 346, the final model N = 319.
[4] Age not included in final model.
[5] Overall test of association was not significant; therefore, we did not interpret significance of pairwise comparisons.

vaccinated if given $600, and 104 (30.06 %) reported that they would get vaccinated if given $1200. In the bivariate analyses for the incentive of $600 (see Table 1), demographic factors significantly associated with intention to get vaccinated were: age 18–29 years versus 60+, identifying as Non-Hispanic Black versus Non-Hispanic White, and holding liberal or very liberal political views versus very conservative/conservative. Additionally, being in the 'wait-and-see' category as opposed to being a non-acceptor, viewing COVID-19 as a major problem in their community, perceiving COVID-19 as severe, believing in the effectiveness of behavioral strategies to protect oneself and others against COVID-19, holding positive attitudes about vaccines in general, having positive attitudes about COVID-19 vaccination, and believing that getting a COVID-19 vaccine is beneficial, were also positively associated

Table 2
Demographic and Health-Related Characteristics of Respondents, Bivariate & Final Model Association for Willingness to Receive the COVID-19 Vaccination with a $1200 Incentive.[1,2,3]

Categorical Variables	Frequency	Bivariate Unadjusted OR [95 % CI]	Multivariable Adjusted OR [95 % CI]
Gender (N = 346)			
Male	169 (48.8 %)	*Ref*	*Ref*
Female	177 (51.2 %)	0.91 (0.57, 1.44)	1.19 (0.62, 2.28)
Age (years) (N = 346)			
60+	80 (23.1 %)	*Ref*	–[4]
45–49	92 (26.6 %)	1.15 (0.57, 2.33)	–
30–44	115 (33.2 %)	1.84 (0.96, 3.52)	–
18–29	59 (17.1 %)	2.05 (0.97, 4.31)	–
Race/Ethnicity (N = 346)			
Non-Hispanic White	245 (70.8 %)	*Ref*	*Ref*
Non-Hispanic Black	42 (12.1 %)	1.88 (0.96, 3.67)	0.70 (0.25, 1.92)
Hispanic	40 (11.6 %)	0.83 (0.39, 1.80)	0.30 (0.09, 1.00)
2 + races or other, non-Hispanic	19 (5.5 %)	0.89 (0.31, 2.57)	0.65 (0.17, 2.52)
Annual Income (N = 346)			
More than $150,000	53 (15.3 %)	*Ref*	*Ref*
$100,000–149,999	59 (17.0 %)	1.13 (0.49, 2.59)	0.83 (0.29, 2.39)
$75,000–99,999	50 (14.5 %)	**0.31 (0.10, 0.94)***	0.25 (0.06, 1.00)
$50,000–74,999	73 (21.1 %)	1.45 (0.67, 3.16)	0.94 (0.32, 2.76)
Less than $50,000	111 (32.1 %)	1.70 (0.82, 3.49)	1.16 (0.38, 3.52)
Education (N = 346)			
Bachelor's degree or higher	62 (17.9 %)	*Ref*	*Ref*
Some college	133 (38.5 %)	1.08 (0.53, 2.17)	1.88 (0.68, 5.23)
High school degree or less	151 (43.6 %)	1.74 (0.89, 3.41)	2.26 (0.78, 6.55)
Political views (N = 342)			
Very Conservative/ Conservative	154 (45.0 %)	*Ref*	*Ref*[5]
Moderate/Middle of the Road	101 (29.6 %)	1.06 (0.60, 1.86)	0.76 (0.34, 1.70)
Very Liberal/ Liberal	35 (10.2 %)	**3.27 (1.54, 6.96)****	3.31 (1.00, 10.93)
Prefer not to answer	52 (15.2 %)	1.12 (0.56, 2.25)	1.55 (0.57, 4.24)
Region of the country (N = 346)			
Northeast	53 (15.3 %)	*Ref*	*Ref*
Midwest	83 (24.0 %)	1.02 (0.49, 2.13)	0.99 (0.36, 2.72)
South	143 (41.3 %)	0.79 (0.40, 1.57)	0.80 (0.30, 2.14)
West	67 (19.4 %)	0.90 (0.41, 1.96)	1.24 (0.42, 3.69)
Household member ≥age 65 (N = 345)			
No	255 (73.9 %)	*Ref*	*Ref*
Yes	90 (26.1 %)	0.71 (0.41, 1.23)	0.56 (0.27, 1.18)
Ever had a flu vaccine (N = 346)			
No	169 (48.8 %)	*Ref*	*Ref*

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Table 2 (*continued*)

Categorical Variables	Frequency	Bivariate Unadjusted OR [95 % CI]	Multivariable Adjusted OR [95 % CI]
Yes	177 (51.2 %)	0.82 (0.51, 1.29)	0.55 (0.28, 1.07)
Health condition making COVID-19 more severe (N = 346)			
No	243 (70.2 %)	*Ref*	*Ref*
Yes	72 (20.8 %)	1.58 (0.91, 2.74)	1.12 (0.48, 2.62)
Not sure	31 (9.0 %)	1.08 (0.47, 2.45)	1.20 (0.35, 4.11)
Positive for COVID-19 (N = 343)			
Believe to have had or tested positive for COVID-19	94 (27.4 %)	*Ref*	*Ref*
Do not believe to have had COVID-19	182 (53.1 %)	0.71 (0.42, 1.21)	0.58 (0.27, 1.21)
Unsure if have ever had COVID-19	67 (19.5 %)	0.60 (0.30, 1.20)	**0.27 (0.10, 0.69)***
View COVID-19 as a major problem in community (N = 345)			
No	232 (67.2 %)	*Ref*	*Ref*
Yes	113 (32.8 %)	**1.76 (1.09, 2.85)***	1.23 (0.58, 2.61)
Vaccine Uptake (N = 346)			
Non-Acceptor	194 (56.1 %)	*Ref*	*Ref*
Waiting	152 (43.9 %)	**4.44 (2.70, 7.28)*****	**2.85 (1.38, 5.90)** **
Scale Variables	Mean	Bivariate Regression Coefficient [95 % CI]	Final Model Association Incentives [95 % CI]
Perceived COVID-19 severity (N = 345)	16.25	**1.08 (1.04, 1.12)*****	1.00 (0.94, 1.07)
Effectiveness of behavioral strategies to protect self/others (N = 345)	18.92	**1.07 (1.03, 1.11)*****	0.96 (0.90, 1.03)
General vaccine attitudes (N = 343)	18.85	**1.13 (1.06, 1.19)*****	1.00 (0.91, 1.10)
COVID vaccine attitudes (N = 338)	29.09	**1.16 (1.11, 1.20)*****	**1.13 (1.07, 1.20)** ***
COVID vaccine reasons (N = 333)	18.91	**1.12 (1.09, 1.16)***	**1.07 (1.02, 1.12)** **

[1] Referent group in italics.
[2] Bolded values are significant at *p < 0.05, **p < 0.01, ***p < 0.001.
[3] The sample size for the bivariate models ranges from 342 to 346, the final model N = 319.
[4] Age not included in final model.
[5] Overall test of association was not significant; therefore, we did not interpret significance of pairwise comparisons.

with intending to get vaccinated for a $600 incentive. Factors such as gender, income, education, region of U.S. residence, having elderly household members, ever receiving an influenza vaccine, having a health condition that would increase severity of COVID-19 infection, and not believing or being unsure if they ever had COVID-19, were not significantly associated with intention to get vaccinated for a $600 incentive.

In the bivariate analyses for the $1200 incentive (see Table 2), factors significantly associated with vaccine intention were: annual income of $75,000 to $99,999 versus more than $150,000, holding liberal or very liberal political views versus very conservative/conservative, being in the 'wait and see' category as opposed to being a non-acceptor of COVID-19 vaccines, viewing COVID-19 as a major problem in the community, perceiving COVID-19 as severe, believing in the effectiveness of behavioral strategies to protect oneself and others against COVID-19, holding positive attitudes about vaccines in general, having positive attitudes about the COVID-19 vaccine, and believing that getting a COVID-19 vaccine is beneficial.

When all the potential predictors were put into the multivariable adjusted model for the $600 incentive (see Table 1), those in the wait and see category, those with positive attitudes about COVID-19 vaccines, and those who believe that getting a COVID-19 vaccine is beneficial, were more likely to report that they would get vaccinated if offered a $600 incentive. These same predictors were also significantly associated with willingness to get a vaccine for a $1200 incentive. In addition, those unsure if they ever had COVID-19 compared to those who believed they had COVID-19 or historically tested positive for COVID-19 were significantly less likely to be willing to get a vaccine for $1200; directionality of the results for this factor were similar for $600, but not statistically significant. (See Table 2).

4. Discussion

In this sample of U.S. adults who were classified as 'wait-and-see' and non-acceptors, approximately-one-fourth of participants reported that they would be willing to get a COVID-19 vaccine when offered a $600 incentive, and about one-third when offered $1200. While studies demonstrate that many people are willing to get vaccinated without an incentive, and even pay for the vaccine (Carpio et al., 2021; Sprengholz et al., 2021), incentives are an effective tool to increase vaccination intention or uptake. Other strategies used during the COVID-19 vaccination roll-out have aimed to foster socially desirable choices without restricting freedom (e.g., making vaccination a requirement for desirable non-essential activities) (Mertens et al., 2022). The relative effectiveness of these strategies compared to financial incentives for COVID-19 vaccination is unclear. In a German study, financial incentives appeared to work better than other strategies, such as legal incentives (e.g., mask mandates or testing requirements) (Sprengholz et al., 2021). A variety of strategies is likely necessary to maximize uptake, as different strategies will reach different individuals.

As in our study, previous research has found larger amounts of financial incentive to be more effective (Klüver et al., 2021; Serra-Garcia & Szech, 2021; Sprengholz et al., 2021). However, even small monetary payments have been shown to be effective; one Swedish study showed people were willing to get vaccinated for the equivalent of about $24 (Campos-Mercade et al., 2021). In contrast, a German study found that individuals who thought vaccination was unnecessary and were unsure about vaccine safety were willing to receive it for an incentive of 10,000 Euros (Sprengholz et al., 2021). Exploring the amount of incentive that is impactful without being coercive, along with characteristics of individuals likely to change intention, is vital to understanding the impact of financial incentives.

For both the $600 and $1200 incentive, significant predictors that remained in the multivariable model were being in the 'wait-and-see' category versus the 'non-acceptor' category and having more positive attitudes towards COVID-19 vaccines. This demonstrates that incentives may be particularly impactful for those who are considering vaccination and already have more positive views about COVID-19 vaccines. Similarly, others found that incentives seemed to work best for those who were undecided about vaccination versus those who were opposed (Klüver et al., 2021). Further, our finding that these attitudinal variables predicted the impact of the incentive in the multivariable model, while socioeconomic factors did not, may provide some reassurance to those concerned that incentives would be unduly coercive for individuals with low incomes (Jecker, 2021). As long as incentives are offered that are not excessively large, they may act as a final push towards vaccination, rather than being the main reason individuals change their intention. However, there is some risk that this could set a precedent that influences people to delay vaccination in order to wait for such incentives to be offered in the future.

A strength of the present study is that the sample was drawn from a

nationally representative panel; however, the impact of state specific contexts was not assessed. This may be important given that vaccine implementation programs typically are organized at the state level. Given the sample size, it is possible that there was insufficient power to detect all important associations. Another limitation is that the incentives were hypothetical and the outcome was intention, and there is an imperfect relationship between intention and behavior. However, understanding intention could be useful to allow policymakers to plan the strategy most likely to be successful. Despite these limitations, it appears that financial incentives have the potential to foster vaccine uptake. The expertise of behavioral economists and local level data are needed for effective planning of incentive programs.

This study focused on the use of incentives for COVID-19 vaccination; however, the results may be relevant in other contexts where rapid vaccine uptake is critical. The findings suggest that offering financial incentives may encourage 'wait-and-see' individuals to move toward vaccination. Future work could focus on determining the level at which incentives are effective, not coercive, and sustainable over time. Additionally, it will be important to understand how the impact of incentives vary across different cultural contexts.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Julen Harris, Christine Mauro and Jane Andresen have no conflicts of interest to declare. Outside of the current study, Gregory Zimet has served as an external advisory board member for Merck and Moderna, and as a consultant to Merck. He also has received investigator-initiated research funding from Merck administered through Indiana University and serves as an unpaid member of the Board of Directors for the Unity Consortium, a non-profit organization that supports adolescent health through vaccination. Susan Rosenthal has received investigator-initiated research funding from Merck Investigator Studies Program administered through Columbia University Irving Medical Center.

Data availability

Data will be made available on request.

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