

A Randomized Trial of Theory-Informed Appeals for Organ Donor Registration Using Internet Advertisements



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Introduction: Many people do not register as organ donors. We developed 5 different brief appeals for organ donation that were disseminated online. The content was informed by theories of behavior change and studies of the specific cognitive barriers to organ donor registration.

Methods: One message was a persuasive narrative about a transplant recipient. Another message promoted the idea that organ donor registration is a social norm. The knowledge-based message communicated that 1 donor could improve the lives of 50 people. The message on reciprocity offered a free organ donation wristband, whether or not the participant registered as a donor. The message on control simply encouraged organ donation. Using Google AdWords, the messages were deployed randomly as banners of different sizes on diverse online sites and carried a link to an organ donor registration site. We measured clicks, page visits, and organ donor registrations.

Results: There were 5,156,048 impressions and 25,001 total clicks, a click-through rate of 0.49%. The messages on control and reciprocity both had the highest click-through rates of 0.51%. A total of 152 unique individuals requested wristbands and there were 52 total organ donor registration events. The message on reciprocity had the highest number of organ donor registrations ($n = 18$).

Conclusion: Online organ donation messages rapidly generated substantial attention through clicks, but no message led to a meaningful number of organ donor registrations. Future research may focus on effectively capturing the attention of viewers through social networks or other convenient online venues with less competition for attention than Internet banners.

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KEYWORDS: behavior change; organ donation; organ donor registration; transplantation

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For decades, innovations in solid-organ transplantation have extended the lives and reduced the suffering of patients with end-stage organ disease. Unfortunately, the transplant waiting list in the United States is comprised of approximately 110,000 people at the time of this writing.¹ Each year, approximately 7000 Americans die waiting for an organ.¹ Given the tremendous burden of kidney disease

on public health in the United States, the Advancing American Kidney Health Initiative has established the goal of doubling the number of kidneys available for transplant, but effective approaches to achieving that goal are needed.² Wide regional variation in organ donor registration rates has drawn scrutiny as an opportunity to expand organ donation and transplantation.³ The fields of behavioral economics and psychology have shown how choice architecture, defined as the way a choice is presented, can exert large effects on many decisions.^{4–6} Yet, the optimal approaches to messaging and presenting the option of organ donor registration to the general public are not yet defined. Many studies have focused on surrogate outcomes, such as intention to register or

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attitudes about organ donation, but not actual organ donor registration.^{4,7}

A large body of research into organ donor registration has suggested that individuals may not register as organ donors for a variety of reasons. Organ donor registration includes no tangible benefits to the registrant. Other important psychological barriers may include reluctance to think about one's own death, lack of trust in the health-care system, lack of knowledge about successful outcomes with transplantation, or concerns about adverse consequences for end-of-life care.^{8,9} Historically, logistical barriers to organ donor registration included the registration process itself, which in the past usually included completing paperwork and/or an in-person encounter with a representative from the Department of Motor Vehicles.¹⁰ However, online opportunities to register as an organ donor are now widely available. The ability to take Internet-based interventions to scale may also address concerns that many creative efforts to augment organ donor registration have involved in-person interventions, which can be time-consuming, typically achieve modest effects, and are often not cost-effective.^{11–13}

Features of a decision, such as framing it within a narrative,¹⁴ presenting social norms,¹⁵ opting-out,^{6,16} and gift-giving,^{17,18} can all influence the outcome. From the perspective of ethics, the manipulation of choice architecture has been proposed as a method to induce changes in how individuals make decisions without restricting the range of choices.^{4,5} A randomized experiment to test distinct appeals to register as an organ donor, informed by different theories of communication and behavior change, could generate empirical evidence about how to effectively motivate individuals to undertake this generous behavior. From an efficacy perspective, such appeals may leverage insights from psychology and economics as they relate to behavior change. On the other hand, the requirement for an active decision to register as an organ donor would preserve each viewer's autonomy because messages can be ignored and the viewer can maintain the *status quo*.

For this randomized, controlled trial, we developed brief visual appeals for organ donor registration to be deployed online on a range of commercial websites that use advertising banners. The appeals were deployed randomly through the Google advertising network and included an active link to a website where viewers could complete steps toward organ donor registration.

METHODS

Overview

Our group developed a series of messages that drew on empirical research about attitudes toward and barriers

to organ donor registration for the general public.¹⁹ Instead of selecting an overarching theory of health behavior change that could address the diverse barriers believed to inhibit organ donor registration, we applied multiple behavior change theories when designing interventions.²⁰ Each theory addressed one or more specific barriers to organ donor registration and provided a rationale for the specific message; the theory and data supporting each message are described further in the methods.

Preliminary text of the messages was first pilot-tested using a convenience sample of adults reached through the Amazon Mechanical Turk online service, a crowdsourcing marketplace, who selected their favorite messages. We restricted participation to adults living in the United States and asked that participants self-report demographics and their organ donor registration status (Supplementary Table S1). Next, we developed final versions of the message content through collaboration with a digital marketing firm (<https://www.phillymarketinglabs.com>) that created and refined the images. The digital marketing firm also purchased the online advertising space and tracked utilization. The institutional review board of the University of Pennsylvania approved the research (No. 824775).

Theories and General Rationales for Message Content

Figure 1 displays the final 5 advertisements promoting organ donor registration. Because online digital advertisements commonly feature attractive images to draw attention, we deployed colorful images in all the messages including the control.

- (i) *Control*: The control message directly encouraged the viewer to register, but did not contain additional information or any persuasive content.
- (ii) *Persuasive Narrative*: In the domain of public health, persuasive narratives have been employed to promote diverse health behaviors, including cancer screening²¹ and smoking cessation,²² and reducing sexual practices associated with human immunodeficiency virus infection.²³ Kreuter *et al.* defined a narrative as “any cohesive and coherent story ... that provides information about scene, characters, and conflict.”²⁴ Narratives commonly engage an individual's experiential mode of cognition (versus the analytic mode).²⁵ The theory of transportation posits that narratives can elicit strong affective responses and provide an individual with a sense of being “transported” if the narrative effectively immerses them in the plot or characters. Through these mechanisms, an effective

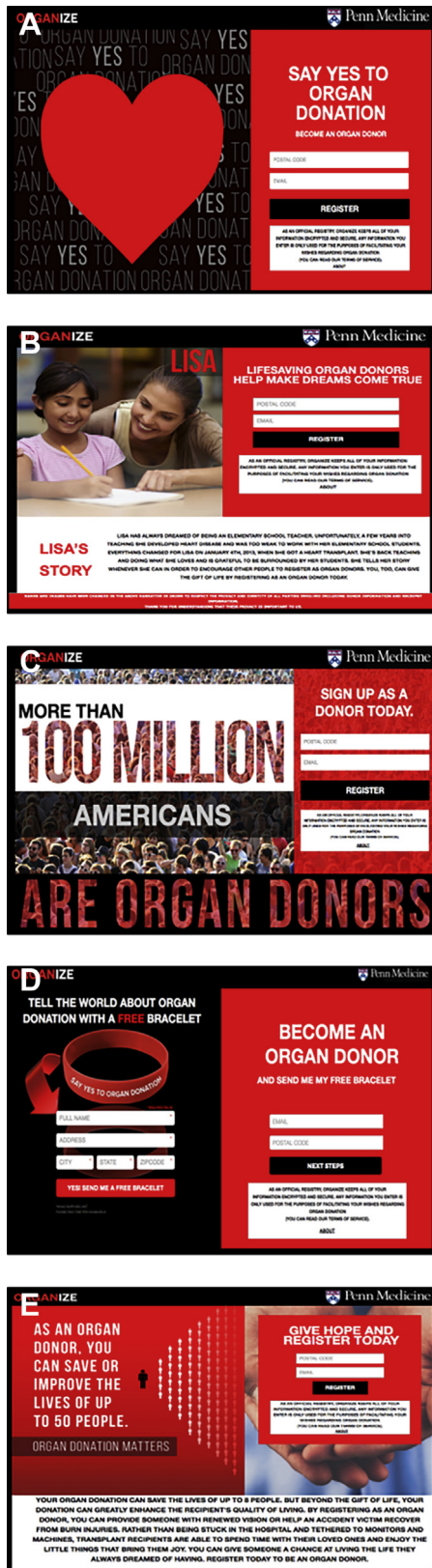


Figure 1. Five messages promoting organ donor registration. (a) *Control*: “Say YES to Organ Donation.” This message simply presents the need for organ donation and gives the viewer the option to respond and become an organ donor as well. (b) *Persuasive Narrative*: “Lifesaving organ donors help make dreams come true.” This message allows the viewer to connect with one (continued)

narrative can overcome resistance to a behavior and address emotional conflicts. Narratives can also transmit factual information.¹⁴

We selected Persuasive Narrative as a promising tool for organ donor registration because it could shift the viewer’s attention toward the narrative of a recipient and away from thoughts of the viewer’s own future death.²⁶ By focusing on one (hypothetical) transplant recipient’s healthy, productive life after transplantation, the narrative could elicit a positive affective response of sympathy, consistent with research related to how members of the public are often more motivated by the story an “identifiable victim” versus outcomes for an unidentified individual or group.²⁷

(iii) *Social Norm*: Social norms have been shown to affect a range of behaviors related to public health,²⁸ such as alcohol abuse among adolescents²⁹ and nonconsensual sex,³⁰ as well as nonhealth behaviors such as charitable giving, energy conservation, tax evasion, and job choice.^{31–34} The Theory of Planned Behavior features social norms as very important in determining intentions to change behavior.²⁰

The influence of social norms may be magnified particularly when an individual confronts a situation that poses uncertainty.³⁵ Cialdini *et al.* distinguished between descriptive norms (i.e., behaviors that most people actually do) and injunctive norms (i.e., behaviors that people believe one ought to do).¹⁵ The effectiveness of descriptive norms may depend on the extent to which an individual identifies with the reference group. For example, an individual may be more likely to register as an organ donor if the message emphasizes that registration is common among people similar to that individual.

← **Figure 1.** (continued) person’s life and causes them to think and respond emotionally. (c) *Social Norm*: “More than 100 million Americans are organ donors. This message engages a person by asking them what their neighbors are doing in response to the situation at hand—not just family and friends but those around them at the time and place the situation occurs. (d) *Reciprocity*: “Tell the world about organ donation with a free wristband.” Because a person cannot be paid or given a gift for signing up as an organ donor, this message presents a stand-alone offer for a free wristband to support organ donation AND/OR organ donation registration, suggesting an exchange of gifts. (e) *Knowledge*: “Save or improve the lives of up to 50 people.” This message emphasizes that the choice to be an organ donor does not just affect one person, but can save or improve the lives of up to 50 others (through life-saving organ and tissue donation); that is, one individual’s choice has an impact that is multiplied by its effects on every recipient.



Figure 2. Free wristband for the Gift Exchange Arm.

We developed a message that included social norms because we recognized that most individuals rarely encounter the organ donor registration decision, may never have discussed it with others, and thus may feel uncertain about the right decision. The intervention message therefore focused on a descriptive norm that registering as an organ donor is a common decision made by many others in the United States. A message emphasizing the social norm of organ donor registration could provide the viewer with the sense that registering as a donor is a sensible decision that many or most of their peers would make.

(iv) *Reciprocity*: A number of social scientists^{36,37} have described the sense of social obligation that is created when an individual receives a gift.¹⁹ Providing a gift has been used to promote behaviors in fields including marketing, charitable donations, and survey administration.^{38,39} The sense of obligation to reciprocate to a gift has also been viewed as a social norm by Cialdini and others.³⁷

In this study, we elected to offer a small and inexpensive gift of a wristband (Figure 2) that was not contingent on registering as an organ donor. The gift may alleviate the sense that registering as a donor does not benefit the registrant. Further, the wristband promoted organ donor registration, which may be interpreted by others as a sign of virtuous behavior. By wearing the wristband or giving one to others, the registrant can demonstrate their intention to commit a generous act and earn respect. Therefore, the wristbands could also provide social value.

(v) *Knowledge Related to the Impact of Organ Donation*: This message provided information about the magnitude of the positive impact that organ donation could have on transplant recipients. The message educated the viewer that a single organ donor could improve the health or survival of up to 50 individuals through gifts of organs as well as tissues. By focusing on a large but anonymous set of recipients, this message contrasted in particular with the persuasive narrative message. Lack of knowledge is also proposed as a barrier to behavior

change in some theoretical frameworks such as social cognitive theory.²⁸

Trial of Organ Donation Messages Online

We purchased online advertisements with the 5 messages on the Google AdWords Display Network utilizing 15 banners of different sizes and shapes. Ads were displayed randomly throughout the Google ad network without targeting specific user searches. Users browsing on desktops, mobile devices, and tablets were included. Advertisements would only be delivered if the user did not need to scroll to view. Any viewer who clicked on the advertisement would be directed to an organ donation portal hosted by the nonprofit Organize (<https://www.organize.org>), which required the registrant to enter basic demographic identifying information and then registered that person within their state registry. The Reciprocity message also had a button (Figure 1) that a viewer could use to enter his or her address to receive an organ donation wristband.

The advertisements targeted adults ≥ 18 years of age in the United States and were displayed in English and Spanish. The advertisements excluded websites with violent, sexually suggestive, profane, or juvenile content; in-game websites; live-streaming video; photo-sharing pages; and social networks. We also implemented frequency capping at 1 impression per advertisement view. An impression is defined as an event of the advertisement appearing on a search result page or other digital site on the Internet. Each advertisement had a tracking parameter, which enabled tracking individuals by type of message and generation of data related to clicks and click-throughs. The data were analyzed using Google Analytics. The research group did not have access to registrant personal information, but instead received summary data related to clicks and organ donor registration by message type.

Statistical Analysis

We performed a chi-square test of the hypothesis that the click-through rate is independent of the message type. We next performed a chi-square and Fisher's exact test of the hypothesis that the registration rate (number of registrations per click) is independent of the message type. We also obtained 95% confidence intervals (CIs) for the rates based on the binomial distribution and plotted the rate (with 95% CI) versus message type. Analyses were performed using Stata 16.0 (StataCorp, College Station, TX).

RESULTS

The advertisements were deployed for 3 days in December 2016, at a cost of approximately \$12,550,

Table 1. Clicks, other interactions, and organ donor registration with different organ donation messages

Message type	Impressions	Clicks	Click-through rate	Registrations	Wristband orders	Organ donor registration rate
Control	1,026,411	5213	0.51%	11	NA	0.21%
Persuasive narrative	1,028,019	4907	0.48%	4	NA	0.08%
Social norms	1,045,175	4446	0.43%	9	NA	0.20%
Reciprocity/gift exchange	1,033,271	5274	0.51%	18	152	0.34%
Knowledge	1,023,172	5161	0.50%	10	N/A	0.19%
Totals	5,156,048	25,001	0.49%	52	152	0.21%

NA, not applicable.

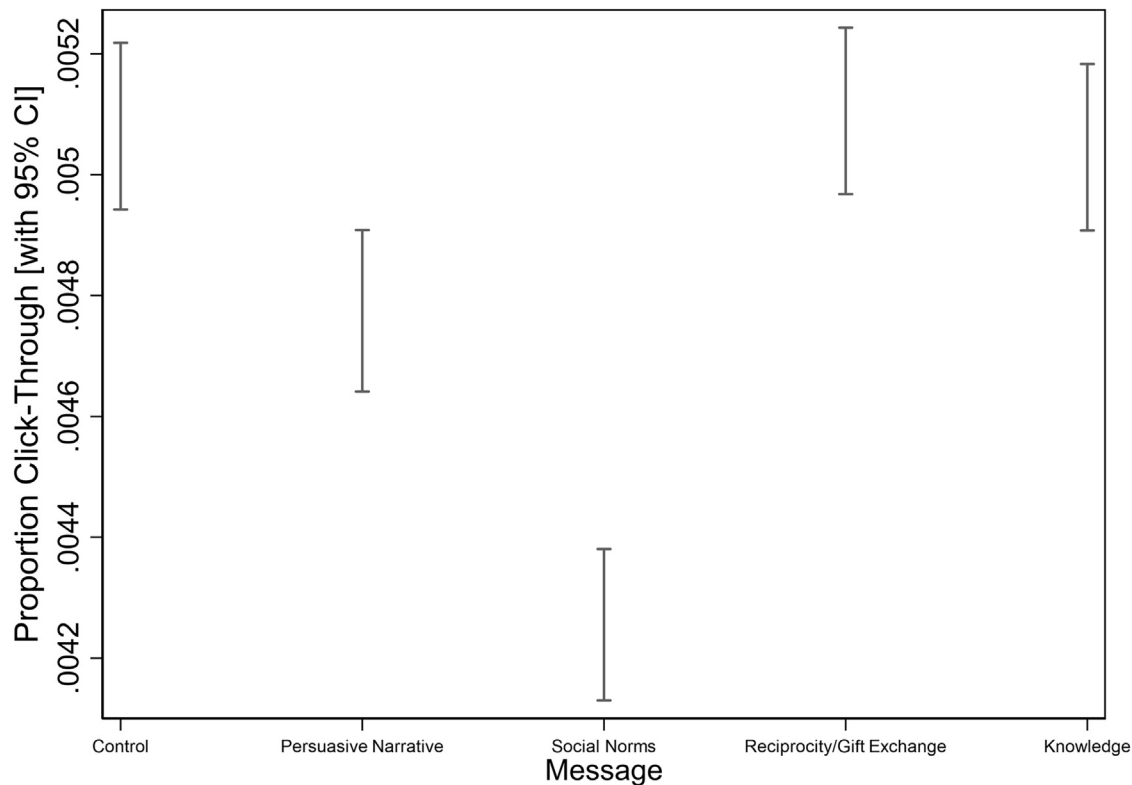


Figure 3. The click-through rate across all 5 message types. *Chi-square analysis indicated that the click-through rate does vary according to message type ($P < 0.0005$). CI, confidence interval.

leading to a total of 5,156,048 impressions. Table 1 shows the study results. Overall, there were 25,001 clicks, for a click-through rate of 0.49%. As shown in Figure 3, the Control and Reciprocity messages both generated the highest click-through rates of 0.51%, whereas the Social Norm messages generated the lowest click-through rate of 0.43%. A total of 152 individuals requested wristbands through the Reciprocity message. We performed a chi-square test of the hypothesis that the click-through rate is independent of the message type. The chi-square analysis indicated that the click-through rate does vary according to message type ($P < 0.0005$).

As shown in Figure 4, there were a total of 52 organ donor registrations, with the highest number ($n = 18$) generated through the Reciprocity message. We next performed a chi-square and Fisher's exact test of the hypothesis that the registration rate (number of

registrations per click) is independent of the message type. The chi-square and Fisher's exact tests indicated that the registration rate did not vary according to message type ($P = 0.074$ for chi-square test, $P = 0.074$ for Fisher's exact test).

DISCUSSION

The profound need for transplantable organs has motivated research and investment in promoting organ donor registration and other steps toward actual organ donation. We used theory from behavioral economics and psychology to develop messages with immediate calls to action for organ donor registration through online banners deployed widely on the Internet. By documenting click-throughs to an online organ donation registration system, we documented 52 registrations that resulted from the advertisements. Although

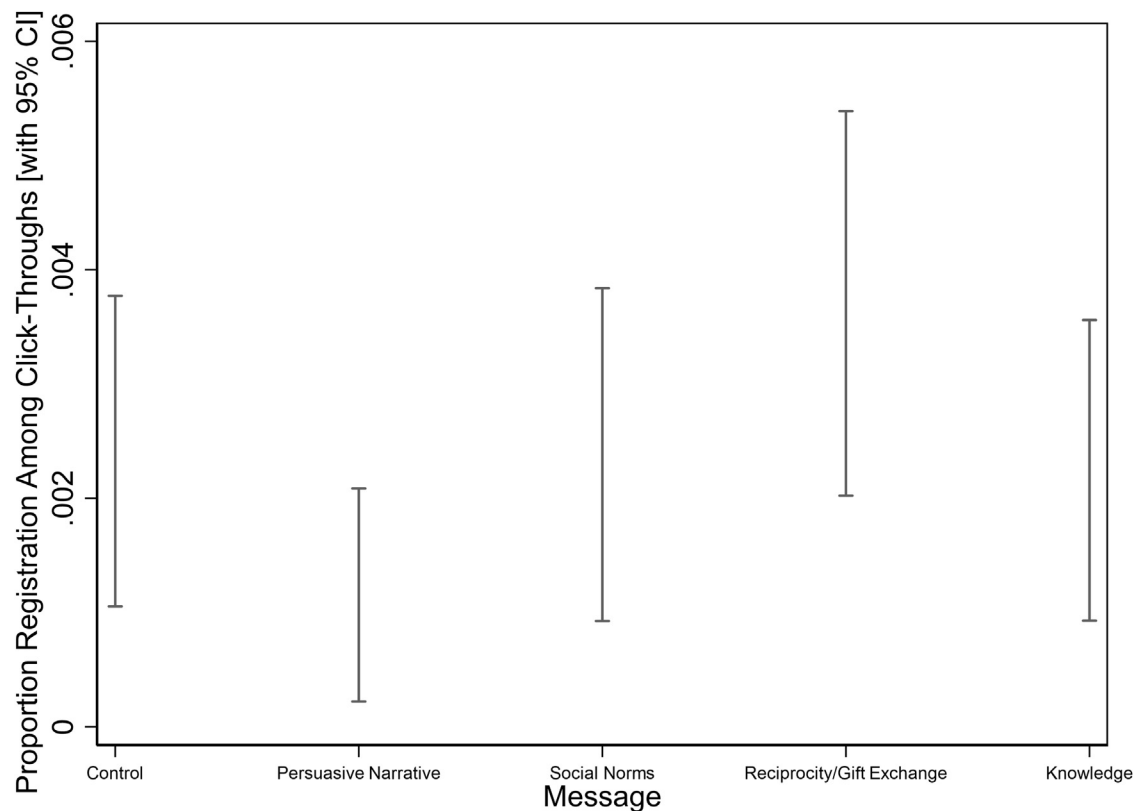


Figure 4. The registration rate (number of registrations per click) by message type. *Chi-square and Fisher's exact tests indicated that the registration rate does not vary according to message type ($P = 0.074$ for chi-square test, $P = 0.074$ for Fisher's exact test). CI, confidence interval.

we rapidly generated a large number of impressions, no particular message led to a meaningfully greater number of registrations than any other. This finding suggests that success in future efforts to promote organ donor registration may depend less on the exact content of the message and more on capturing the attention of potential registrants.

Organ donor registration is a generous behavior that comes at no cost to the registrant. Unfortunately, logistical barriers, including paperwork or an in-person encounter at a Department of Motor Vehicles, have inhibited high rates of registration in many areas. This barrier may be overcome by more convenient online interfaces that facilitate organ donor registration, but convenience alone is not sufficient. For specific individuals, additional barriers to opt-in registration may include anxiety about considering one's own death, concern that physicians will withhold life-saving therapies in the setting of critical illness to procure organs, low trust in the health-care system, religious concerns, or other sources of ambivalence. Other studies have tested a wide variety of more resource-intensive approaches to changing attitudes and beliefs about organ donor registration, including one-on-one counseling, group education led by transplant professionals or peer counselors, in-person promotion at

sporting events, counseling by hairstylists, and video education and discussion by primary care doctors.^{40,41} Although a number of these interventions have improved attitudes or increased actual registrations, valid concerns have been raised about cost per registrant with some organ donor registration interventions.¹¹ This concern is important because most individuals in the general population will never become an organ donor as the circumstances of their death (e.g., involvement of disseminated infection or cancer) are incompatible with donation.^{11,42,43} A large number of additional registrations may be necessary to drive meaningful increases in actual transplantation.

Behavioral economics offers a range of insights, including the power of social norms that may nudge individuals to make decisions in the setting of uncertainty or ambivalence. One important feature of the organ donor registration decision is that individuals may never or only occasionally be presented with an opportunity to register. We designed the interventions in this study to present an opportunity for organ donor registration that was convenient, efficient, and scalable. The messages could be ignored without any social cost or other threats to autonomy and anonymity. The overall click-through rate for our messages of 0.49% is typical of advertisements on the Google Display

Network, which do not target viewers based on their intent in Internet browsing (in contrast, Search Network advertisements appear in response to specific terms entered into a search engine).⁴⁴ Because our organ donation messages were not targeted to users with organ donation in mind, our messages had to compete with other compelling sources of attention by viewers from the primary webpage content (e.g., an article or consumer product) or other advertisements on the page, which may explain the modest number of registrations.

Future interventions may need to run for longer periods to generate a substantial number of registrations. Future efforts should aim to take advantage of settings where there is less information competing for recipients' attention, where registration is convenient, and where an organ donation message can more easily focus an individual's attention, such as an automated teller transaction or online tax preparation or social media. Alternatively, the message content could be repurposed with face-to-face encounters, at higher cost but with perhaps greater effectiveness.

Our study has limitations. We have no data on reasons for not completing organ donor registration, which may include concerns about information security or fraud. Another limitation is that some individuals who registered as organ donors may have already been registered in their states. A third limitation is that the Reciprocity intervention required mailing wristbands, which demanded extra time and expense. An additional limitation is that the intervention was neither customized to the needs of demographic groups, such as minorities or the elderly, nor focused on individuals more likely to die in a way that makes organs available for transplant, such as motorcycle drivers.⁴⁵ On the other hand, an organ donation message with broad appeal for diverse groups may remain as an important goal for organ donation interventions. Last, future organ donor registration campaigns will benefit from delivering the message in a way that is widely accessible; online approaches may not succeed in reaching important groups, such as elderly individuals (who may donate organs at lower rates)⁴⁶ and those without digital literacy or consistent access to the Internet. Future research may also aim to capture the attention of policymakers if investigators can make efforts to assess cost-effectiveness.

In conclusion, a trial of theory-informed organ donation messages delivered through online advertisements was shown to generate substantial attention, with 25,001 clicks over 3 days, but no one message led to meaningful numbers of organ donor registrations.

Future research into organ donor registration may focus less on the exact content of the message and more on better capturing the attention of viewers through social networks or other convenient online venues with less competition for viewer attention.

DISCLOSURE

All the authors declared no competing interests.

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SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Supplementary Table S1. Characteristics of participants in Amazon Turk survey.

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