

A Video Intervention to Increase Organ Donor Registration at the Department of Motorized Vehicles

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Background. The goal of this study was to increase organ donor registrations at the Department of Motorized Vehicles (DMV) via utilization of a sustainable, low-cost, African American-centric organ donation educational video. Results from previous studies provided a framework to generate a 10-minute video that featured registered organ donors, deceased donor families, and transplant recipients. **Methods.** The video was presented via an interrupted time series design (repeating on 2 mo, off 2 mo) on televisions placed in 6 regional DMVs. During the 12-month study, 162387 patrons visited the DMVs. **Results.** Increases in organ donor registration were consistently observed in each DMV while the video was on compared with off (mean = +2.3% [range +1.98% to +3.35%]; $P < 0.0001$). Multivariable analysis demonstrated that females (odds ratio [OR], 1.29; 95% confidence interval [CI], 1.26-1.31), younger age (OR, 0.982/y; 95% CI, 0.982-0.983), and the video intervention (OR, 1.09; 95% CI, 1.07-1.12) were significantly associated with increased registration; while compared with Caucasian race, African American race was not (OR, 0.22; 95% CI, 0.22-0.23). There was no video-dependent effect on registration between Caucasians and African Americans ($P = 0.62$). Exit interviews demonstrated only 16% of patrons could identify the key message in the video (becoming a registered organ donor). **Conclusions.** An educational video promoting organ donation resulted in increased organ donor registration at the DMV. The intervention was equally effective in African Americans and Caucasians. Future efforts should focus upon target-specific messaging and patron consumption of the educational video.

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INTRODUCTION

A critical need exists for increasing organ donation in the US; 115000 people are waiting for donor organs (September 2018^{1,2}), but under 30% receive a transplant each year. National surveys indicate that over 90% of US adults support the concept of organ donation.³ Despite this nationwide support for organ donation, rates of registering to become an organ donor have been low. Consequently, the Department of Health and Human Services mandated that all states have an organ donor registry and set a goal that at least 50% of adults become registered organ donors. This goal was achieved in 2016 (54% of adults), although 12 states continue to have <50% of adults as registered organ donors.^{4,5} In addition to significant geographic differences in organ donor registration, there is a longstanding racial disparity in registered organ donors. African Americans are 4.48 times less likely to become a registered donor compared with Caucasians and are significantly underrepresented as deceased donors.⁶⁻⁸ Multiple studies demonstrate that being a registered organ donor is the single most important predictor of a decedent becoming an actual organ donor for all races.⁹⁻¹² Registered organ donor status is also one of the few modifiable factors predictive of deceased donor consent.

Across the United States, Departments of Motor Vehicles (DMV) serve as the main portal for an individual to register as an organ donor.¹³⁻¹⁸ In 2016, the donor designation rate (organ donor registrations per driver's license issued) across

the United States ranged from a low of 9% (Mississippi) to a high of 85% (Alaska).^{19,20} There have been resource-intensive interventions based at the DMV in several states that have resulted in increased organ donor registration.^{13,14,20-23}

The primary goal of this study was to develop and implement a sustainable DMV-based intervention with low maintenance costs that increased organ donor registration of DMV patrons. A secondary goal was to increase organ donor registrations specifically in African Americans, who are significantly underrepresented on the Alabama donor registry.

Through a series of cognitive interviews, focus groups, and telephone surveys,^{8,24,25} a 10-minute African American-centric organ donation educational video was created utilizing a health behavior storytelling approach by actual registered organ donors, families of deceased donors, and transplant recipients. The video was presented on flat-screen televisions placed in the 6 Birmingham, AL DMVs via an interrupted time series design (on 2 mo, off 2 mo) for 12 consecutive months. The primary hypothesis is that organ donor registration will increase in the months when the video intervention is on compared to off. The secondary hypothesis is that organ donor registration in African Americans will increase more than in Caucasians.

MATERIALS AND METHODS

Video Development

Based upon previous formative research conducted with African American DMV patrons from Alabama, the following topics were chosen to be presented in the video: (1) medical mistrust, (2) need for organs, (3) organ donor family storytelling, (4) transplant recipient storytelling, and (5) a “rapid-fire” section promoting organ donation by a diverse group of largely recognizable local persons. A video storyboard was developed and modified several times during audience participation research.²⁵ The audience participation research was conducted with the Alabama Organ Center African American Community Advisory Group. Members were asked to respond to the video storyboard content in a “round-robin” process with a brief group discussion on each set of responses. Participants were asked for their input regarding the storyboard components, including delivery format, target audiences, and who should deliver the different education topics. Participants were asked to indicate which portions of the video storyboard may capture their attention and may motivate them to become a registered organ donor. Responses were analyzed to determine if the storyboard components were persuasive and potentially effective.

A professional film company performed the video production with expertise in producing motivational, emotional, “call-to-action” short clip videos, primarily for a local mega-church. The final video had 4 components:

1. African American parents describing the organ donation motivations of their decedent son and the familial authorization process;
2. Caucasian nurse describing the organ donation motivations of her decedent father and the concept of brain death;
3. Middle-aged African American who described the liberation afforded from his successful kidney transplant;
4. “Rapid-fire” 90-second section of 3–7 second promotional clips by an assortment of individuals including the mayor, sheriff, US senator, US congresswoman, local officials, college students, Alabama and Auburn head football coaches,

etc. Participants were chosen because of their recognizability and to ensure there was appropriate ethnic, racial, and gender representation of the Birmingham, AL area.

DMV Sites

Through a partnership with the Alabama Law Enforcement Agency and the Jefferson and Shelby County Circuit Courts, all 6 Birmingham area DMVs and Driver’s License offices (hereafter collectively referred to as DMVs) agreed to participate in this intervention. Four of the DMVs were located in Jefferson County, and 2 were located in Shelby County, consistent with the geo-metropolis of Birmingham, AL. The flat-screen televisions were 40 inches in size and of commercial-grade construction designed for public use. The number of flat-screen televisions installed included 4 in the largest county office, 3 in 3 offices, and 2 in 2 offices. Flat-screen televisions were positioned to be visible to the sitting area (DMV patrons are given a number when they check in and directed to a sitting area) and in the line leading up to the DMV clerk. A local advertising company (Go Bell Media, Birmingham, AL) installed and maintained the flat-screen televisions. As required by the DMV offices, the video was muted during the presentations.

Exit Interview

During select times (when the video was being shown), exit interviews were conducted at the 6 DMVs. Only African Americans were targeted for exit interviews because the video was intentionally designed to address African American-centric organ donation topics. Volunteers asked African Americans willing to participate in the survey ($n = 67$) exiting the respective DMVs questions related to their visit of the DMV and questions related to the organ donation video. The exit interviews were exploratory and qualitative in nature; thus no sample size estimate was performed. Participants confirmed that they self-identified as African American and orally consented to the survey before being asked any of the questions. Participants who completed the survey were offered a king-sized candy bar in appreciation.

Statistics

The video intervention was administered using an interrupted time series design. This model was chosen because individual patron randomization within DMV offices was not possible and budgetary constraints prohibited conducting a well-powered group randomized trial. The interrupted time series approach, though having limitations, is an approach recommended for media interventions.^{26,27} Baseline organ donor registration was collected for 6 months (January 2016–June 2016), after which the interrupted time series intervention was implemented (July 2016–June 2017). The video was on for 2 months, then off for 2 months, for 12 consecutive months. The “on” and “off” cycles ran concurrently at all 6 DMV offices. Donor registration data and demographic information were obtained from the Alabama Law Enforcement Agency, including the following discrete variables: age, race, gender, DMV location, and ROD decision (yes or no). Alabama does not employ a “carry forward” policy with regard to registered organ donor status. Citizens are asked every time they renew their license. Accordingly, “new” registrations and “renewal” registrations were treated similarly. Only

DMV patrons ≥ 19 were included in the analysis because the legal age of consent in Alabama is 19. A power analysis was performed assuming a 2-tailed type I error rate of 0.05 and a dichotomous risk factor with prevalence of 0.5 (justified by observing half the total sample exposed to the intervention and half the sample not exposed to the intervention), a sample size of 2000 individuals (all of whom have never consented to organ donation), provided 80% power to detect an odds ratio (OR) of 1.333. Based upon 2015 DMV volumes, it was estimated that there will be over 60 000 patrons who were not registered organ donors who would frequent one of the 6 Birmingham area DMVs in a given 12-month period.

Demographic information was summarized using measures of central tendency and dispersion. Each of the DMV sites can be considered a cluster and may generate an intra-class correlation among individuals. Therefore, a fixed-effects logistic regression was used to analyze the data. Crude associations between intervention period and registration were tested using Cochran Mantel Haenszel tests, where DMV site is used as a stratification variable. Effects were summarized using 95% confidence intervals (CIs) for odds ratios. Multivariable logistic regression was used to estimate intervention effects after controlling for demographics.

This study was approved by both the University of Alabama at Birmingham's and the Medical University of South Carolina's Institutional Review Boards for human research (141120001, 00061998, respectively).

RESULTS

Demographics

The racial distribution of patrons who visited the 6 DMVs during the study period and either obtained or renewed (in person) an Alabama driver's license was Caucasian (54.91%, 94355 records), African American (39.59%, 68032 records), unknown/undeclared (3.8%, 6526 records), and Hispanic (1.7%, 2920 records). Given the distribution, meaningful results could not be determined for unknown/undeclared and Hispanic; thus analyses were restricted to the 162387 records representing Caucasians and African Americans. There were slightly more women (53.7%) than men (46.3%) and more Caucasians (58.1%) than African Americans (41.9%), consistent with Jefferson (52.7%, women; 53.2%, Caucasians; and 43.4%, African Americans) and Shelby Counties (51.5%, women; 83.3%, Caucasians; and 12.7%, African Americans), Alabama 2017 Census statistics²⁸ (Table 1).

Video Intervention

There was a spike in donor registration rates after the 6-month prestudy data collection in both the intervention DMVs and non-intervention DMVs (Figure 1). Donor registration rates were consistently higher in the intervention DMVs while the video was being shown compared to when it was off (Figure 1 dark gray bars). In contrast, donor registration rates were relatively flat in the non-intervention DMVs (Figure 1 light gray bars). Overall, the mean increase in organ donor registration in the 6 intervention DMVs was +2.3% (48.8% off versus 51.1% on, $P < 0.0001$). The range of increased organ donor registration in the 6 intervention DMVs was from +1.98% to +3.35% (Figure 2).

TABLE 1.
Study sample demographics

Study sample demographics	(n, % of total)
Total sample size	162387
Gender	
Female (%)	87229 (53.72%)
Male (%)	75158 (46.28%)
Race	
Caucasian (%)	94355 (58.11%)
African American (%)	68032 (41.89%)
Age (y)	
Mean	46.11
Std Dev	17.12
Range	19.0–85.0
DMV Office Sites	
Site 1	29000 (17.9%)
Site 2	35301 (21.7%)
Site 3	31451 (19.4%)
Site 4	27561 (16.9%)
Site 5	30895 (19.0%)
Site 6	8179 (5.0%)

DMV, Department of Motorized Vehicles.

Multivariable analysis (Table 2) demonstrated the following factors significantly associated with organ donor registration: female gender (OR, 1.29 [95% CI, 1.26–1.31], $P < 0.001$), Caucasian race (OR, 4.48 [95% CI, 4.36–4.59], $P < 0.0001$), younger age (OR, 0.982/y [95% CI, 0.982–0.983], $P < 0.0001$), and the video intervention being on (OR, 1.09 [95% CI, 1.07–1.12], $P < 0.0001$). The 2 DMVs with the highest OR of organ donor registration (Sites 4 & 5) were the 2 DMVs located in Shelby County.

The odds of organ donor registration did not differ in size ($P = 0.62$) while the video was on compared to off between Caucasians (OR, 1.09 [95% CI, 1.06–1.13]) and African Americans (OR, 1.08 [95% CI, 1.05–1.12]). Stratified by race, organ donor registration increased while the video was on in 6/6 sites for Caucasians (range +0.88% to +3.19%) and 5/6 sites for African Americans (range –0.21% to +2.57%, Table S1, SDC, <http://links.lww.com/TP/B778>). Furthermore, the odds of organ donor registration did not differ in size, while the video was on compared to off based upon sex ($P = 0.77$) or age ($P = 0.13$).

The statistical estimates of the video effectiveness on becoming a registered organ donor were similar using a fixed-effects logistic regression (data are shown) compared with either a generalized mixed linear model or generalized estimating model (Table S2, SDC, <http://links.lww.com/TP/B778>).

Exit Interviews

Exit interviews were conducted with 67 self-identified African American DMV patrons exposed to the intervention (33 males and 34 females) randomly sampled from each of the 6 DMV sites. Only 16% indicated that they watched the video and could correctly identify that the video was about becoming a registered organ donor. The most popular segment of the video was the “rapid-fire” section, which contained multiple recognizable local individuals promoting organ donation. The top recommendations

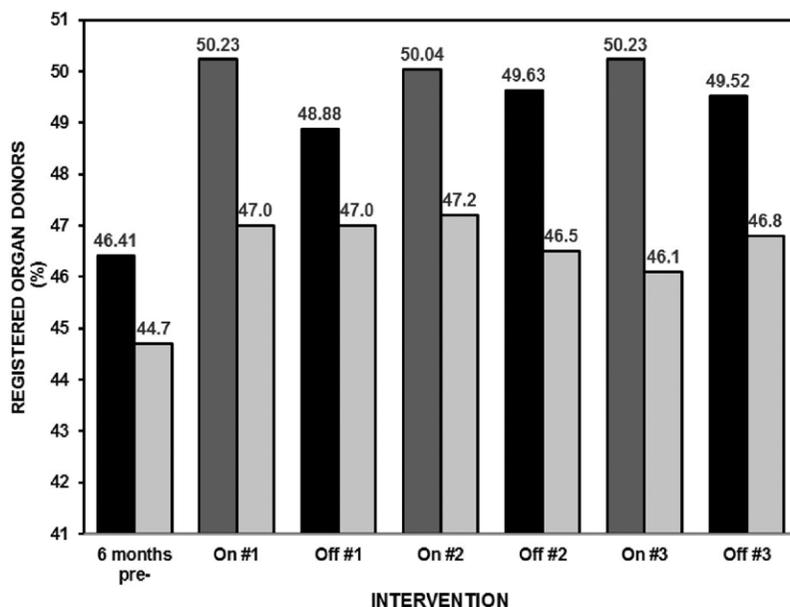


FIGURE 1. Donor registration rates. Black/dark gray bars represent the 6 intervention DMVs. Light gray bars represent non-intervention Alabama DMVs. Donor registration rates were collected in the 6 intervention DMVs and non-intervention DMV for the 6 mo before the intervention. The mean increase in organ donor registration in the 6 intervention DMVs was +2.3% (48.8% off vs 51.1% on, $P < 0.0001$). DMV, Department of Motorized Vehicles.

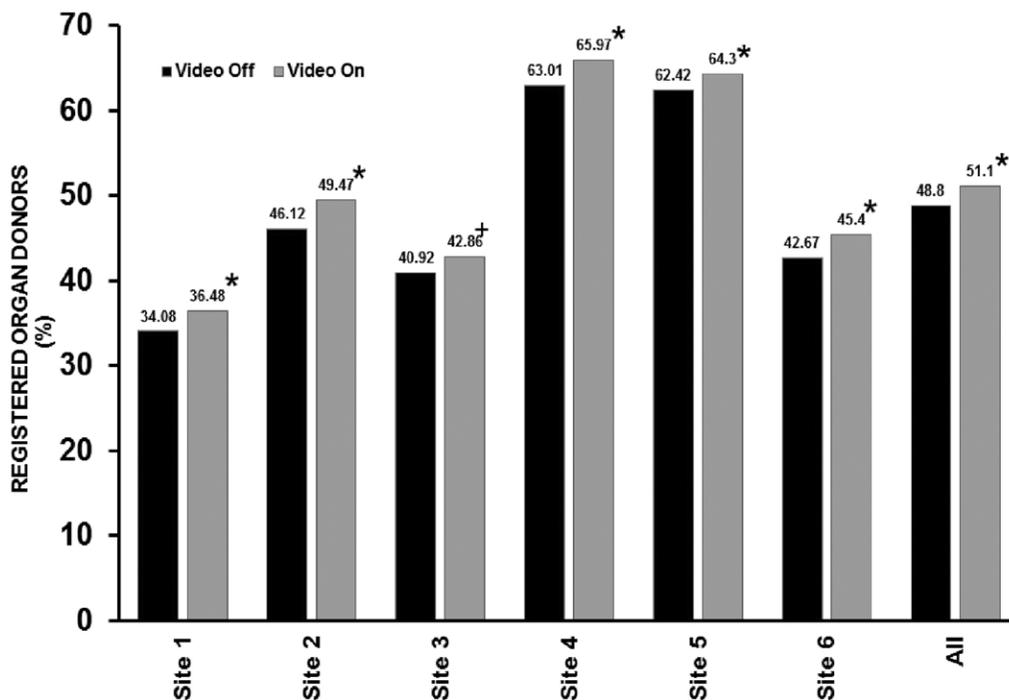


FIGURE 2. Effect of organ donation educational video on the decision to become a registered organ donor. Donor registration was significantly increased ($P < 0.0001$; $†P = 0.001$) in each DMV when the video was on compared to off. The range of increased organ donor registration in the six intervention DMVs was from +1.98% to +3.35%. DMV, Department of Motorized Vehicles.

for improvement included adding sound to the video (38%), better location of the flat-screen televisions (21%), and shorter video clips with frequent calls to action (ie, “become a registered organ donor”; 17%) (Table 3).

DISCUSSION

This study demonstrates that implementation of a short organ donor registration educational video displayed at DMV offices in Birmingham, AL produced an increase in

registered organ donors of both Caucasians and African American races. Organ donor registration increased 2.3% when the video intervention was on compared to off. Though significant, this increase was less than desired and anticipated. Considering that in Alabama there are approximately 3.9 million licensed drivers,⁵ a 2.3% increase translates into 89 000 more organ donor registrations in Alabama adults. Despite the video being tailored to specifically promote African American organ donor registration

TABLE 2.
Multivariable analysis for all DMV patrons

	OR (95% confidence interval)	Significance
Gender		
Male, Ref		
Female	1.287 (1.26-1.31)	<0.0001
Race		
Caucasian, Ref		
African American	0.223 (0.218-0.229)	<0.0001
Age	0.982 (0.982-0.983)	<0.0001
DMV sites		
Site 1	0.766 (0.726-0.808)	<0.0001
Site 2	1.243 (1.181-1.310)	<0.0001
Site 3	0.907 (0.860-0.956)	<0.0001
Site 4	1.416 (1.342-1.495)	<0.0001
Site 5	1.249 (1.184-1.317)	<0.0001
Site 6 (Ref)		
Intervention on (vs off)	1.094 (1.069-1.119)	<0.0001

Multivariable logistic regression. DMV, Department of Motorized Vehicles; OR, odds ratio.

(educational content addressing common African American organ donation myths and African Americans being prominently represented in the video), increases in organ donor registration were similar in African Americans and Caucasians. The lack of an incremental effect in African Americans was especially disappointing given that baseline organ donor registration in the study population was much lower in African Americans (28%) compared with Caucasians (64%); thus there is significant opportunity to increase organ donor registration in African Americans. It is unclear the reasons why the intervention was not incrementally effective in African Americans other than the exit interviews, which indicated that the tailored video was only watched by 16% of African American DMV patrons.

There have been several DMV-based interventions designed to increase organ donor registrations given that most organ donor registrations occur while obtaining or renewing a driver's license. Harrison and Morgan conducted a multifaceted organ donation education approach consisting of a mass-media intervention (ie, "media priming" achieved via radio ads and billboard advertising), point of decision-making materials (ie, posters, footprints, and pamphlets), and on-site events (ie, volunteers at the DMVs promoting donor registration) resulting in a 200%–300% increase in organ donor registrations in 2 counties in Michigan compared with historic rates.^{13,22} This multifaceted approach was modified to target African Americans and Hispanics and implemented in Illinois also resulting in significantly increased organ donor registration.²⁹ Thornton et al²³ developed a 5-minute iPad-based video, shown to participants entering a DMV in Ohio, which resulted in a 22% increase in African Americans registering to be organ donors compared with those not exposed to the video. While very successful, the increased organ donor registrations observed in two of the studies performed in Michigan, the DMV-based interventions were short-lived, and the organ donor registration rates returned to baseline soon after the intervention ceased.^{13,16} Furthermore, these DMV-based interventions were also resource-intensive and likely too expensive to disseminate on a large scale or simply to continue for a longer

TABLE 3.
Exit survey results of African Americans visiting DMVs for the purpose of obtaining or renewing their driver's license

Gender	Number (%)
Male (%)	33 (49%)
Female (%)	34 (51%)
Age, y	
16–29	22 (33%)
30–49	23 (34%)
≥50	22 (44%)
Questions	
Did you watch the video?	
Yes	11 (16%)
No	56 (83%)
What was the subject of the video?	
Healthy diet	0 (0%)
Organ donation	11 (100%)
Texting and driving	0 (0%)
Racism	0 (0%)
Which story had the greatest impact on your decision about organ donation?	
Story 1	3 (27%)
Story 2	0 (0%)
Story 3	0 (0%)
Story 4	8 (73%)
What was more effective?	
Actors talking about organ donation	6 (60%)
Celebrities/Public officials promoting donation	4 (40%)
Was closed-captioning easy to follow?	
Yes	6 (86%)
No	1 (14%)
Did you register to be an organ donor today?	
Yes	18 (29%)
No	44 (71%)
Already an organ donor?	
Yes	24 (60%)
No	16 (40%)
Patrons' Comments (n = 24)	
improve sound	9 (38%)
improve location	5 (21%)
more animated	4 (17%)

DMV, Department of Motorized Vehicles.

duration, further limiting the effectiveness for the organ donation community.

Additional DMV-based studies were conducted in West Virginia, Florida, and Massachusetts. In a study conducted in West Virginia DMVs, offices in which customer service representatives took a web-based organ donation training session saw a 7.5% increase in registered organ donors compared with control DMV offices in which no training occurred.²¹ Similarly, an intervention utilizing a 1-hour training session given to DMV staff on organ donation registry and organ donation information demonstrated a 14% increase in registered organ donors.²² In a study performed in select Florida DMV offices, Rodrigue et al²⁰ demonstrated modest increases in registered organ donors in offices in which staff received organ donor education sessions and then had personal interactions with customers which promoted organ donor registration. In contrast to

these findings, a study performed in Massachusetts DMV offices compared “usual care” (education of clerks, organ donation print materials, and volunteer ambassadors) to muted videos displayed on television monitors and demonstrated that donor registration rates were less in DMV offices showing the interventional videos compared with usual care.¹⁴ Similarly, a DMV-based intervention in New York state, using inexpensive organ donor registration materials and mailed enrollment cards, proved ineffective at significantly increasing organ donor enrollments.³⁰

As the majority of the above studies demonstrate, video-based interventions can have positive effects on increasing organ donor registrations at DMV offices, especially when the video focuses upon minority-based perceived misconceptions regarding donation. These positive effects of a video intervention were also manifest in our present study, although to a lesser extent. While this study was much less resource-intensive for sustained implementation, key elements from the aforementioned successful studies^{13,20-22,29} seemed missing, probably most notably, the lack of an onsite human advocate.

The current study was limited by practical considerations for a DMV-based intervention. The agreement with the Alabama Law Enforcement Agency (parent agency of the DMV) precluded the use of sound in the video and did not permit an analysis of the effect on minors. Eliminating audio and motivating background music undoubtedly reduced consumption and effectiveness of the video. Improving sound was the most common recommendation generated from the exit interviews. Local DMV managers impacted the positioning of the video flat screens, sometimes precluding optimal positioning. An additional limitation is the potential biases afforded by the DMV staff being aware of the study. This may have prompted patrons in a positive manner towards registering as an organ donor. Though untested, this may explain why the baseline registration rates increased even when the video was off compared to the pre-intervention baseline (Figure 1). This bias may have minimized the overall effect of the intervention. The video was designed to be African American-centric. The themes presented were specifically chosen in response to barriers and misconceptions about organ donation expressed by African Americans in previously mentioned studies.^{8,24,25} As such, this focus may have limited the video effectiveness in other racial and ethnic groups. “Consumption” of health behavior interventions such as in this study is increasingly difficult when competing with entertainment options afforded via mobile devices. Receiving information by televised video is being quickly replaced by consumption on mobile devices, especially among younger ages.³¹ An alternative option is directly marketing to patrons’ cell phones while in the DMV, an approach that currently exists via alternative marketing techniques. In addition, Alabama significantly reduced DMV waiting times before implementing this study, which reduced potential exposure to the educational intervention. In addition, online driver’s license renewal continues to gain popularity, also decreasing exposure to a “brick and mortar” DMV-based intervention.

Utilizing an interrupted time series design can be limited by time-varying confounders, which may be occurring during the intervention period. However, inclusion of 6 months of control baseline data and data acquired

from Alabama DMV offices not enrolled in the intervention help address time-matched confounders (Figure 1). There is also the advantage of this design allowing for comparing populations of similar demographics found within a single DMV office before and after the intervention.^{32,33} Another limitation was the sample size calculation that was predicted to increase the odds of becoming a ROD by 1.33 with 60 000 participants. The actual odds increase in this study was 1.094, and the intervention was exposed to >162 000 participants who made a ROD decision.

Finally, there is debate regarding the “ideal” statistical approach for estimating the effect of an intervention measured via an interrupted time series studies: Fixed Effects Logistic Model (utilized in these analyses) versus Generalized Mixed Linear Model versus Generalized Estimating Equations.³⁴⁻³⁷ Comparison of these 3 statistical approaches demonstrated similar effect estimates (Table S2, SDC, <http://links.lww.com/TP/B778>).

The exit interviews conducted in the present study allow for insight into ways to increase consumption of the video message. This will allow for modifications to the video to be made in subsequent studies in an effort to increase DMV patron consumption. These changes will include the popular “rapid-fire” section of the video, while the less effective storytelling portions of the video will be replaced with a marketing-based promotion. Marketing-based promotions may be more effective when constrained by the lack of sound. One of the main tenets of digital signage marketing is unambiguous calls to action every 15–20 seconds (ie, become a registered organ donor). Other avenues of message delivery may also need to be explored. For example, our previous study identified the topics for this video via focus group discussions related to voice-based video messaging. In view of the restrictions placed on the showing of the videos at DMVs, especially the prohibition on the use of sound, new discussion-based research should focus upon identifying influential (muted) visual-based messaging.

In summary, an educational video played in the waiting area of the DMV increased organ donor registration 2.3% compared to when the video was not shown. The intervention was equally effective for Caucasians and African Americans. Future efforts will focus upon modifying the video to increase DMV patron consumption of the educational intervention.

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REFERENCES

1. American Transplant Foundation. Facts and Myths: American Transplant Foundation; 2018. Available at <https://www.>

- americantransplantfoundation.org/about-transplant/facts-and-myths/. Accessed September 19, 2018.
2. Donate Life America 2017. Available at <http://donatelife.net/statistics/>. Accessed September 19, 2018.
 3. Health Resources and Services Administration: National Survey of Organ Donation Attitudes and Behaviors. Services DoHaH, editor. 2013. Available at <https://www.organdonor.gov/sites/default/files/about-dot/files/nationalsurveyorgandonation.pdf>. Accessed August 10, 2018.
 4. Donate Life America: celebrating 25 years of working together to save and heal lives. Donate Life America; 2017. Available at https://www.donatelife.net/wp-content/uploads/2016/06/2017_AnnualUpdate_singlepages_small.pdf. Accessed October 1, 2018.
 5. Statista. Total number of licensed drivers in the U.S. in 2016, by state. Statista, The Statistics Portal; 2016. Available at <https://www.statista.com/statistics/198029/total-number-of-us-licensed-drivers-by-state/>. Accessed September 21, 2018.
 6. Patzer RE, Gander J, Sauls L, et al; Southeastern Kidney Transplant Coalition. The radiant community study protocol: community-based participatory research for reducing disparities in access to kidney transplantation. *BMC Nephrol.* 2014;15:171. doi: 10.1186/1471-2369-15-171
 7. Patzer RE, Pastan SO. Measuring the disparity gap: quality improvement to eliminate health disparities in kidney transplantation. *Am J Transplant.* 2013;13(2):247–248. doi: 10.1111/ajt.12060
 8. DuBay DA, Ivankova N, Herby I, et al. African American organ donor registration: a mixed methods design using the theory of planned behavior. *Prog Transplant.* 2014;24(3):273–283. doi: 10.7182/pit2014936
 9. Siminoff LA, Arnold RM, Hewlett J. The process of organ donation and its effect on consent. *Clin Transplant.* 2001;15(1):39–47.
 10. Siminoff LA, Burant CJ, Ibrahim SA. Racial disparities in preferences and perceptions regarding organ donation. *J Gen Intern Med.* 2006;21(9):995–1000. doi: 10.1111/j.1525-1497.2006.00516.x
 11. Siminoff LA, Gordon N, Hewlett J, et al. Factors influencing families' consent for donation of solid organs for transplantation. *JAMA.* 2001;286(1):71–77. doi: 10.1001/jama.286.1.71
 12. Dubay DA, Redden DT, Haque A, et al. Do trained specialists solicit familial authorization at equal frequency, regardless of deceased donor characteristics? *Prog Transplant.* 2013;23(3):290–296. doi: 10.7182/pit2013406
 13. Harrison TR, Morgan SE, King AJ, et al. Promoting the Michigan organ donor registry: evaluating the impact of a multifaceted intervention utilizing media priming and communication design. *Health Commun.* 2010;25(8):700–708. doi: 10.1080/10410236.2010.521912
 14. Rodrigue JR, Fleishman A, Fitzpatrick S, et al. Organ donation video messaging in motor vehicle offices: results of a randomized trial. *Prog Transplant.* 2015;25(4):332–338. doi: 10.7182/pit2015166
 15. Rodrigue JR, Fleishman A, Vishnevsky T, et al. Organ donation video messaging: differential appeal, emotional valence, and behavioral intention. *Clin Transplant.* 2014;28(10):1184–1192. doi: 10.1111/ctr.12449
 16. Harrison TR, Morgan SE, King AJ, et al. Saving lives branch by branch: the effectiveness of driver licensing bureau campaigns to promote organ donor registry sign-ups to African Americans in Michigan. *J Health Commun.* 2011;16(8):805–819. doi: 10.1080/10810730.2011.552001
 17. Morgan SE, Harrison TR. The impact of health communication research on organ donation outcomes in the United States. *Health Commun.* 2010;25(6-7):589–592. doi: 10.1080/10410236.2010.496834
 18. Anatomical Gift Act of 1968: The National Conference of Commissioners on Uniform State Laws; 2018. Available at <https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=6705441e-40b7-fbd4-edd5-5748c63fbd79&forceDialog=0>. Accessed August 21, 2018.
 19. Donate Life America 2016. Available at https://www.donatelife.net/wp-content/uploads/2016/06/DLA_AnnualReport_2016-low-res.pdf. Accessed March 5, 2019.
 20. Rodrigue JR, Krouse J, Carroll C, et al. A Department of Motor Vehicles intervention yields moderate increases in donor designation rates. *Prog Transplant.* 2012;22(1):18–24.
 21. Degenholtz HB, Resnick A, Tang Y, et al. Effect of web-based training for department of motor vehicle staff on donor designation rates: results of a statewide randomized trial. *Am J Transplant.* 2015;15(5):1376–1383. doi: 10.1111/ajt.13117
 22. Harrison TR, Morgan SE, Di Corcia MJ. Effects of information, education, and communication training about organ donation for gatekeepers: clerks at the Department of Motor Vehicles and organ donor registries. *Prog Transplant.* 2008;18(4):301–309.
 23. Thornton JD, Alejandro-Rodriguez M, León JB, et al. Effect of an iPod video intervention on consent to donate organs: a randomized trial. *Ann Intern Med.* 2012;156(7):483–490. doi: 10.7326/0003-4819-156-7-201204030-00004
 24. DuBay DA, Ivankova N, Herby I, et al. Factors perceived to influence the decision for African Americans to become registered organ donors at the Department of Motorized Vehicles. *J Natl Med Assoc.* 2017;109(4):287–293. doi: 10.1016/j.jnma.2017.04.004
 25. DuBay DA, Ivankova NV, Herbey I, et al. A quantitative appraisal of African Americans' decisions to become registered organ donors at the driver's license office. *Clin Transplant.* 2018;32(10):e13402. doi: 10.1111/ctr.13402
 26. Kapolwitz M, Hadlock T, Levine R. A comparison of web and mail survey results. *Public Opin Q.* 2004;68(1):94–101.
 27. Wagstaff DA, Korda H, McCleary KJ. African Americans' organ donor intentions: who has used which registration mode to express her or his intentions? *J Public Health Manag Pract.* 2008;14(1):E7–E13. doi: 10.1097/01.PHH.0000303420.83518.65
 28. Bureau UC. Quick Facts 2015. Available at <https://www.census.gov/quickfacts/fact/dashboard/shelbycountyalabama,autaugaacountyalabama,AL,US/PST045218>. Accessed June 19, 2019.
 29. Quick B, Harrison TR, King AJ, et al. It's up to you: a multi-message, phased driver facility campaign to increase organ donation registration rates in Illinois. *Clin Transplant.* 2013;27(5):E546–E553. doi: 10.1111/ctr.12208
 30. Feeley TH, Anker AE, Evans M, et al. A department of motor vehicle-based intervention to promote organ donor registrations in New York State. *Prog Transplant.* 2017;27(3):273–280. doi: 10.1177/1526924817715471
 31. Richter F. Smartphones beat TV for young adults in the U.S. Statista; 2017. Available at <https://www.statista.com/chart/8660/smartphones-vs-tv-usage/>. Accessed October 1, 2018.
 32. Bernal JL, Cummins S, Gasparrini A. Interrupted time series regression for the evaluation of public health interventions: a tutorial. *Int J Epidemiol.* 2017;46(1):348–355. doi: 10.1093/ije/dyw098
 33. Lopez Bernal J, Cummins S, Gasparrini A. The use of controls in interrupted time series studies of public health interventions. *Int J Epidemiol.* 2018;47(6):2082–2093. doi: 10.1093/ije/dyy135
 34. McNeish D, Stapleton LM. Modeling clustered data with very few clusters. *Multivariate Behav Res.* 2016;51(4):495–518. doi: 10.1080/00273171.2016.1167008
 35. Bell BA, Morgan GB, Schoeneberger JA, et al. How low can you go? An investigation of the influence of sample size and model complexity on point and interval estimates in two-level linear models. *Methodol: Eur J Res Methods Behav Soc Sci.* 2014;10(1):1–11.
 36. Emrich LJ, Piedmonte MR. On some small sample properties of generalized estimating equation estimates for multivariate dichotomous outcomes. *J Stat Comput Simulat.* 1992;41(1-2):19–29.
 37. Gardiner JC, Luo Z, Roman LA. Fixed effects, random effects and GEE: what are the differences? *Stat Med.* 2009;28(2):221–239. doi: 10.1002/sim.3478