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Attitudes Toward Organ, Tissue, and Vascularized Composite Allograft (VCA) Donation and Transplantation: A Survey of United States Military Veterans

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Background. There are 20 million living US armed forces veterans; however, the organ donation attitudes of veterans have not been examined. **Methods.** Over a 17-month period, a convenience sample of 1517 veterans in New England completed a survey to assess attitudes about organ, tissue, and vascularized composite allograft (VCA) donation. **Results.** Most veterans (96%) supported the donation of organs and tissue for transplantation, and 59% were registered as an organ and tissue donor. Being younger (adjusted odds ratio [aOR]: $_{0.96}0.97_{0.98}$; $P=0.01$), female (aOR: $_{1.06}1.46_{2.03}$; $P=0.02$), non-Hispanic white (aOR: $_{1.30}2.07_{3.30}$; $P=0.01$), Hispanic (aOR: $_{1.28}2.43_{4.61}$; $P=0.01$), and having more trust that the transplant process is fair and equal (aOR: $_{1.19}1.40_{1.65}$; $P=0.01$) were predictive of donor registration. Also, most veterans were willing to donate their face (57%), hands/arms (81%), legs (81%), penis (men: 61%), and uterus (women: 76%) at time of death; donation willingness was higher for upper and lower limbs than for face or genitourinary organs ($P<0.001$). Those unwilling to donate VCA organs expressed concerns about identity loss, psychological discomfort of self and others, body integrity, funeral presentation, and religious beliefs. Most (54%) felt that VCA donation should require permission of legal next-of-kin at the time of one's death, even if the decedent was a registered donor. **Conclusions.** There is a high level of support for organ, tissue, and VCA transplantation and donation among veterans, despite limited educational campaigns targeting this population. There is high potential among veterans to further increase donor registry enrollment and raise awareness about VCA benefits for severely injured service members.

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INTRODUCTION

Support for traditional organ and tissue donation is near universal in the United States. The 2012 Gallup survey found that 95% of respondents support organ and tissue donation, although only 62% were registered donors.[1] Research has focused on how to translate favorable donation attitudes into more donor registrations, particularly in populations with lower registration rates (eg, older, male, black, less educated).[2-7]

Vascularized composite allograft (VCA) transplantation restores life function and quality to those with severe disfigurement, defect, or injury involving the limbs, face, genitourinary organs, or musculoskeletal system.[8-10] However, donation of VCA organs after death is not embedded within donor registration processes and occurs only after separate

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authorization by the deceased's legal next-of-kin.[11] Thus, research remains focused on perceptions about VCA donation and increasing awareness of VCA donation and transplantation without compromising otherwise favorable attitudes toward traditional organ donation.

While not as robust as those for traditional organ donation, attitudes toward VCA donation nevertheless are favorable. We previously reported moderate to high willingness to donate VCA organs, although this varied by type (eg, higher willingness for extremities than for face).[12] Sarwer et al[13] found favorable VCA donation attitudes and, when presented with 3 different patients, respondents had stronger preference and support for face transplantation for an injured soldier (94%) than for a healthy person injured from an animal attack (87%) or a smoker burned from a house fire caused by a lit cigarette (64%). Finally, the 2012 Gallup survey found that while most adults supported both hand and face donation, people were more willing to consider hand (80%) versus face (58%) donation.[1]

There are 20 million living US armed forces veterans[14]; however, they have not been the focus of studies on organ and tissue donation. This is surprising for several reasons. First, men and older adults (>50 y old), 2 demographics with lower rates of donor registration, are overrepresented in the veteran population. Second, US veterans have made sacrifices for others and society; the degree to which such altruism extends to organ and tissue donation is unknown. Third, the Department of Defense (DoD) and the Veterans Affairs (VA) transplant program are key stakeholders in VCA transplantation due to traumatic combat injuries sustained by service members.[15] Veterans may have more favorable attitudes toward VCA transplantation and donation, considering their potential awareness of such injuries and the benefits likely to accrue to injured veterans if VCA transplantation expands.

The US Health Resources and Services Administration awarded our research group a grant to develop and evaluate strategies to increase traditional and VCA donation awareness in US veterans. Our approach began with 3 specific aims, which are the focus of the current study: (1) assess attitudes toward traditional organ donation, (2) assess attitudes toward VCA donation and transplantation, and (3) examine associations between donation attitudes and healthcare distrust. We hypothesized that most veterans would have favorable attitudes toward traditional organ donation, consistent with what is seen in the general population, and toward VCA transplantation and donation because of their likely exposure to VCA in the military and veteran settings.

MATERIALS AND METHODS

Survey

The survey, previously developed and used in a separate study assessing VCA donation and transplantation perceptions of the general public,[12] included questions on sociodemographic characteristics (age, sex, race, education, employment, marital status, military branch), traditional organ and tissue donation (Strongly Support, Support, Oppose, Strongly Oppose), donor registration status and venue for registration (driver's license, DoD military or veteran ID), and willingness to donate one's own organs and those of a deceased loved one (Very Willing, Somewhat Willing, Not Very Willing, Not At All Willing). From a list of 22 organs and tissues (eg, heart, bone, kidneys, ligaments, face), respondents were asked to identify those that a person has consented to donate when registered as a donor. Veterans also answered the following question: *It is not necessary to register as a donor with the motor vehicle office (eg, on a driver's license) if someone is already a registered donor on their military or veteran identification card (True-False)*. To assess VCA perceptions, a brief statement about each VCA organ was presented (eg, *In recent years, it has become possible to perform face transplants for those who have experienced facial disfigurement from a traumatic injury, burns, disease, or birth defect*), followed by questions about support level for transplantation (Strongly Support, Support, Oppose, Strongly Oppose), willingness to receive the VCA organ if severely injured or disables, willingness to donate one's own VCA organ and that of a deceased loved one (Very Willing, Somewhat Willing, Not Very Willing, Not At All Willing), and whether VCA transplantation changes its recipient's identity (Strongly Agree, Agree, Disagree, Strongly Disagree). Those unwilling to consider VCA donation were asked an open-ended question about why they felt that way. Any VCA media exposure in the past year was queried. We assessed perceptions about including VCA organs in the traditional organ donor registration process by asking which 2 statements they most agreed with the following:

> *Donation of body parts such the face, arms, legs, penis, and uterus should require permission of legal next-of-kin at the time of one's death, even if the deceased was a registered organ and tissue donor.*

> *Donation of body parts such the face, arms, legs, penis, and uterus should not require permission of legal next-of-kin at the time of one's death if the deceased was a registered organ and tissue donor.*

Finally, respondents indicated whether they would be less likely, more likely, or not any more or less likely to register as an organ donor if it included VCA organs. Finally, we used 2 measures of healthcare distrust: (1) Revised Healthcare System Distrust Scale,[16] a widely used and validated 9-item measure of general healthcare system distrust yielding a total score ranging between 9 and 45, with higher scores indicative of more distrust (Cronbach's alpha = 0.85 for study sample). Sample items include: *The healthcare system makes too many mistakes* and *The healthcare system experiments on patients without them knowing*; (2) a question to assess perceived fairness in the transplant system for veterans: *The process of deciding which veterans get an organ transplant is fair and equal* (Strongly Disagree, Disagree, Agree, Strongly Agree).

Participants and Recruitment

Surveys were distributed over a 17-month period (April 2018–August 2019) to US veterans throughout New England. Three convenience sampling strategies were used: (1) direct mailing (return envelopes and postage provided) by state veteran services officers to veterans chosen randomly by alternating first letter of surname; (2) distribution and collection at community events for veterans and at VA medical centers; and (3) circulation of a survey link

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(Qualtrics, Inc., Provo, Utah) by veteran service officers to constituents in their regions. Participation was voluntary and anonymous, and respondents received a $10 gift card. The Beth Israel Deaconess Medical Center Committee on Clinical Investigation determined that the study met criteria for exempt status (IRB #2017P-000656).

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Statistical Analyses

For a population of approximately 900 000 veterans in New England, a sample size of 1066 was deemed necessary with a 95% confidence interval and ±3% margin of error. However, considering known differences in organ donation attitudes based on sex, race, and age, additional surveying was completed to achieve similar or overrepresentation of women, minorities, and younger veterans, relative to their proportion in the US veteran population. Statistical analyses were not conducted to compare study veterans with the region 1 or US veteran population because we intentionally sought overrepresentation on several sociodemographic characteristics. Descriptive statistics were calculated for continuous (means, standard deviations) and categorical (percentages) variables. Associations between sociodemographic characteristics and survey responses were assessed using t-tests (continuous data) or Fisher's exact and chi square tests (categorical data). Multivariable logistic regression (odds ratio [OR] with 95% confidence interval) was conducted to identify sociodemographic, healthcare distrust, and VCA media exposure predictors of being a registered donor, willingness to receive VCA transplantation, and willingness to join a VCA donor registry if 1 existed. For this analysis, willingness was dichotomized (Very Willing/Somewhat Willing versus Not Very Willing/Not At All Willing). Cases with missing covariates were excluded from analysis because the proportion of missing data was <5%, the impact of missing data was negligible, and the data were missing at random. Open-ended responses among veterans unwilling to consider VCA donation were assigned independently by 2 research assistants into 5 categories based on prior research (identity concerns, psychological discomfort for self/others, body integrity/funeral concerns, religious/spiritual consideration, and other considerations). Disagreements in response classification were resolved by discussion, with final classification made by the senior author (J.R.) if agreement was not reached. All analyses were performed using the Statistical Package for the Social Sciences (SPSS; Chicago, IL).

RESULTS

Sample Characteristics

A total of 1517 veterans returned completed and validated surveys. Direct mailing of surveys yielded a 46% response rate; survey response rates could not be calculated for other recruitment methods. Respondents were predominantly male, white, ≥50 years old, and married/partnered, had at least a high school education, were working or retired, and included all service branches (Table 1). Mean healthcare system distrust score was 24.4 (SD = 6.6; range = 9–45).

Data were missing for 3922 (3.6%) of the 107 707 data points possible (excluding items that were derivatives of branching logic). Respondents with any missing data did not differ significantly from those without any missing data on demographic characteristics (all $P > 0.05$).

Organ and Tissue Donation

Most veterans "strongly support" (63%) or "support" (33%) donation of traditional organs and tissues for transplantation. Most agree (61%) or strongly agree (20%) that the process of deciding which veterans get an organ transplant is fair and equal. A majority was aware that kidneys (93%), heart (93%), liver (89%), lungs (80%), corneas (64%), valves (64%), bone (53%), and pancreas (52%) are authorized for donation upon registration. Only half or fewer were aware that registration also authorizes donation of skin (50%), cartilage (46%), veins (41%), tendons (40%), intestines (40%), and ligaments (39%).

Most (59%) were registered organ donors. One-third (33%) of registered donors had informed a family member about their donation intention. Among registered donors, 84% had a donor designation on their driver's license only, 2% had a donor designation on their veteran identification card only, and 13% had a donor designation on both. More than one-third (41%) believe it is not necessary to register with other entities (eg, motor vehicle office, state registry) if already a registered donor on their military or veteran identification card. In the multivariable logistic regression model, female (adjusted odds ratio [aOR]: $_{1.06}1.46_{2.03}$; $P = 0.02$), younger (aOR: $_{0.96}0.97_{0.98}$; $P = 0.01$), and those who felt the process of deciding which veterans get an organ transplant is fair and equal (aOR: $_{1.19}1.40_{1.65}$; $P = 0.01$) had significantly higher odds of being registered donors (Table 2). Non-Hispanic white (aOR: $_{1.30}2.07_{3.30}$; $P = 0.01$) and Hispanic (aOR: $_{1.28}2.43_{4.61}$; $P = 0.01$) veterans were significantly more likely to be registered donors, relative to black veterans. Registered donors, compared with those who were not, correctly identify more organs and tissues that 1 authorizes for donation when registering as a donor (out of 14 total organs and tissues: 9.3 ± 4.1 versus 7.2 ± 4.1; $P < 0.001$).

Only 11% of veterans explicitly chose not to be an organ donor. Others were not registered because they were undecided (19%), wanted to be a donor but had not yet registered (9%), or believed their health status or age precluded donation (1%).

Most veterans were "very willing" (72%) or "somewhat willing" (20%) to donate organs and tissues of a loved one at the time of death, if they knew the decedent wanted to be a donor.

VCA Transplantation and Donation

Most veterans "strongly support"/"support" face (32%/ 46%), hand/arm (51%/42%), leg (48%/46%), penis (34%/40%), and uterus (41%/45%) transplantation (Figure 1). A majority were willing to receive an extremity transplant (hand/arm: 80%; leg: 77%) in the event of severe injury or disability. One-third (32%) personally knew a veteran with limb loss; however, knowing someone with limb loss was not significantly associated with willingness to receive an extremity transplant ($P = 0.20$). Veterans were less willing to receive a face (44%), penis (men only: 42%), or uterus (women only: 37%) transplant, if needed. Those with more trust that the process of deciding which veterans get an organ transplant is fair and equal (aOR: $_{1.26}1.61_{2.06}$; $P = 0.01$) and registered organ donors (aOR: $_{1.83}2.72_{4.03}$; $P = 0.01$) were more willing to accept VCA transplantation.

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TABLE 1.

Sociodemographics of veterans in the study (N = 1517), New England (N = 892 378), and United States (N = 19.209 704)

	Study veterans	New England veterans[a]	US veterans[a]
	N (%)	N (%)	N (%)
State			
Connecticut	226 (14.9)	199 163 (22.3)	199 163 (22.3)
Maine	150 (9.9)	119 554 (13.4)	119 554 (13.4)
Massachusetts	725 (47.8)	349 687 (39.2)	349 687 (39.2)
New Hampshire	193 (12.7)	110 873 (12.4)	110 873 (12.4)
Rhode Island	159 (10.5)	67 741 (7.6)	67 741 (7.6)
Vermont	63 (4.2)	45 360 (5.1)	45 360 (5.1)
Sex			
Male	1249 (82.3)	829 897 (93.0)	17 288 739 (90.0)
Female	267 (17.6)	62 481 (7.0)	1 920 965 (10.0)
Unknown	1 (0.1)	–	–
Race / Ethnicity			
White, non-Hispanic	1123 (74.0)	809 564 (90.7)	14 503 120 (75.5)
Black	153 (10.1)	33 044 (3.7)	2 444 774 (12.7)
Hispanic	97 (6.4)	29 477 (3.3)	1 480 304 (7.7)
Other	105 (6.9)	20 293 (2.3)	781 506 (4.1)
Unknown	39 (2.6)	–	–
Age			
<50 y	448 (29.5)	186 181 (20.9)	5 116 025 (26.6)
≥50 y	1050 (69.2)	706 197 (79.1)	14 093 680 (73.4)
Unknown	19 (1.3)	–	–
Marital Status			
Single, never married	257 (16.9)	–	–
Married or domestic partnership	739 (48.7)	–	–
Widowed	84 (5.5)	–	–
Separated or divorced	412 (27.2)	–	–
Unknown	25 (1.6)	–	–
Education			
Did not complete high school	32 (2.1)	–	–
High school graduate or equivalent	1205 (79.4)	–	–
College graduate	183 (12.1)	–	–
Postgraduate degree	71 (4.7)	–	–
Unknown	26 (1.7)	–	–
Employment			
Student	36 (2.4)	–	–
Working for pay	640 (42.2)	–	–
Seeking employment	64 (4.2)	–	–
Unemployed due to disability	179 (11.8)	–	–
Retired	572 (37.7)	–	–
Unknown	26 (1.7)	–	–
Service Branch			
Army	653 (43.0)	–	8 476 566 (44.1)
Navy	300 (19.8)	–	4 072 761 (21.2)
Air Force	238 (15.7)	–	3 323 285 (17.3)
Marines	200 (13.2)	–	2 160 417 (11.2)
Non-defense	67 (4.4)	–	1 176 675 (6.1)
Unknown	59 (3.9)	–	–

– indicates variable data are unknown or unavailable.
[a]Data obtained from National Center for Veterans Analysis and Statistics (https://www.va.gov/vetdata/veteran_population.asp)

Fewer than half felt that VCA transplantation would change the identity of the person receiving it—face (47%), hand/arm (22%), leg (19%), penis (33%), and uterus (25%). Among those who felt that hand/arm (n = 348) or leg (n = 277) transplantation would change the recipient's identity, a minority felt that a hand/arm or leg transplant would change identity more than receiving a robotic limb or prosthesis (47% and 43%, respectively) (Figure 2).

Most veterans were "very willing" or "somewhat willing" to donate their own face, hands/arms, legs, penis, and uterus at time of death as well as VCA organs of a deceased loved one who wanted to be an organ donor (Figure 3). Veterans

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TABLE 2.

Multivariable predictors of being a registered organ donor, being willing to receive a VCA transplant, and being less likely to join a VCA donor registry (n = 1190)

	Being a registered organ donor	Being willing to receive a VCA transplant	Being less likely to join a VCA donor registry
Variables	**Adjusted OR (95% CI), *P***	**Adjusted OR (95% CI), *P***	**Adjusted OR (95% CI), *P***
State			
Connecticut (reference)			
Massachusetts	0.58 (0.29-1.17), 0.13	1.04 (0.30-3.60), 0.95	1.69 (0.71-4.06), 0.24
Maine	0.90 (0.45-1.82), 0.77	0.56 (0.17-1.87), 0.35	1.82 (0.75-4.37), 0.18
New Hampshire	0.87 (0.47-1.62), 0.66	0.79 (0.26-2.39), 0.68	1.53 (0.69-3.42), 0.30
Rhode Island	1.41 (0.70-2.86), 0.34	0.85 (0.25-2.94), 0.80	2.13 (0.90-5.04), 0.09
Vermont	0.67 (0.33-1.34), 0.26	1.12 (0.32-3.97), 0.86	1.51 (0.62-3.69), 0.37
Age, <50 y (vs ≥50 y)	**0.97 (0.96-0.98), 0.01**	0.93 (0.55-1.57), 0.78	1.07 (0.76-1.50), 0.69
Sex, male (vs female)	**1.46 (1.06-2.03), 0.02**	1.99 (1.01-3.93), 0.05	**0.85 (0.57-0.98), 0.01**
Race			
Black (reference)			
White, non-Hispanic	**2.07 (1.30-3.30), 0.01**	0.45 (0.14-1.48), 0.19	0.99 (0.69-3.56), 0.56
Hispanic	**2.43 (1.28-4.61), 0.01**	0.43 (0.15-1.23), 0.12	1.62 (0.97-4.03), 0.29
Other	0.99 (0.48-2.07), 0.99	0.36 (0.10-1.30), 0.12	2.14 (0.94-4.87), 0.07
Marital status, married (vs not married)	1.12 (0.89-1.69), 0.67	1.02 (0.67-1.54), 0.93	1.15 (0.87-1.52), 0.34
Education, college (vs high school or less)	1.04 (0.75-1.43), 0.83	0.71 (0.42-1.19), 0.20	0.85 (0.58-1.23), 0.38
Employment, working/student (vs not working)	1.22 (0.93-1.60), 0.15	1.49 (0.93-2.39), 0.09	1.20 (0.88-1.63), 0.25
Service branch			
Air Force (reference)			
Army	0.98 (0.49-1.94), 0.95	0.93 (0.25-3.54), 0.92	1.56 (0.71-3.45), 0.27
Marines	0.96 (0.51-1.82), 0.91	0.54 (0.16-1.84), 0.32	1.22 (0.58-2.58), 0.60
Navy	0.90 (0.45-1.78), 0.75	1.21 (0.31-4.71), 0.79	1.08 (0.48-2.43), 0.85
Nondefense	0.92 (0.47-1.78), 0.80	0.67 (0.19-2.40), 0.54	1.29 (0.59-2.80), 0.53
Revised healthcare system distrust scale score	1.00 (0.98-1.02), 0.94	0.98 (0.95-1.02), 0.30	1.03 (0.99-1.18), 0.10
Transplant system for veterans is fair, agree (vs disagree)	**1.40 (1.19-1.65), 0.01**	**1.61 (1.26-2.06), 0.01**	**0.54 (0.36-0.81), 0.01**
Donor registration status, donor (vs nondonor)		**2.72 (1.83-4.03), 0.01**	**0.43 (0.32-0.57), 0.01**
VCA media exposure in past y, yes (vs no)	1.38 (0.91-2.16), 0.41	1.29 (0.84-1.98), 0.24	0.79 (0.60-1.05), 0.11

Bold numerical values indicates statistical significance.
CI, confidence interval; OR, odds ratios; VCA, vascularized composite allograft.

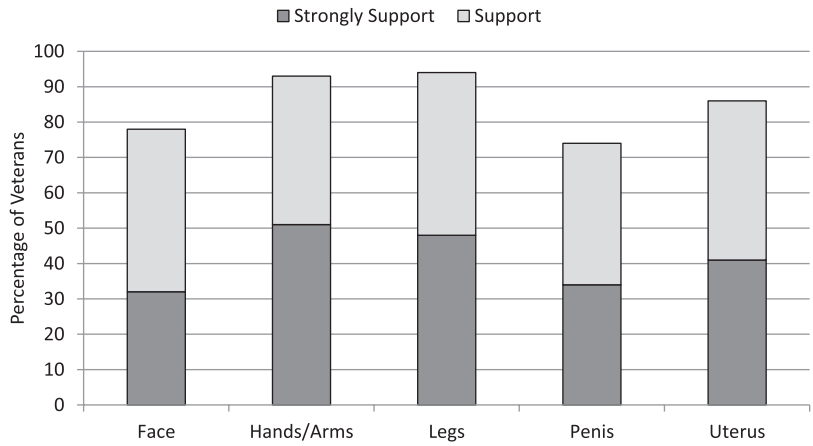

FIGURE 1. Percentage of veterans who strongly support or support face, hand/arm, leg, penis, and uterus transplantation.

were more willing to donate extremities than the face or genitourinary organs ($P < 0.001$). Across all VCA types, those not willing to donate VCA organs provided a combined 1254 comments, reflecting concerns about identity loss, psychological discomfort of self and others, body integrity, funeral presentation, and religious doctrine or beliefs (Table 3).

Approximately one-third believed that VCA organs were authorized by traditional organ donor registration (hands/arms: 38%; face: 34%; legs: 34%; spinal column: 32%; uterus: 30%; and penis: 29%). More than half (54%) felt that VCA donation should require next-of-kin consent, even if the decedent was a registered donor. Veterans

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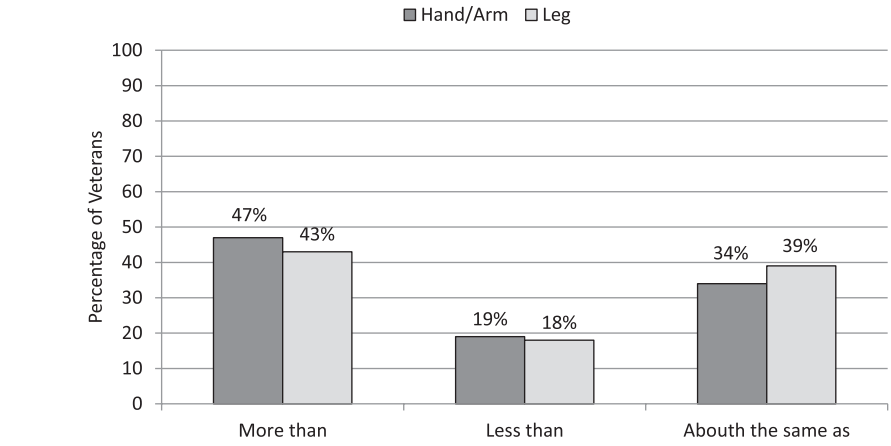

FIGURE 2. Among veterans who stated that a hand/arm (n=348) or leg (n=277) transplant changes the identity of the recipient, the proportion who felt that the identity change from transplant is more than, less than, or about the same as receiving a robotic hand/arm or leg.

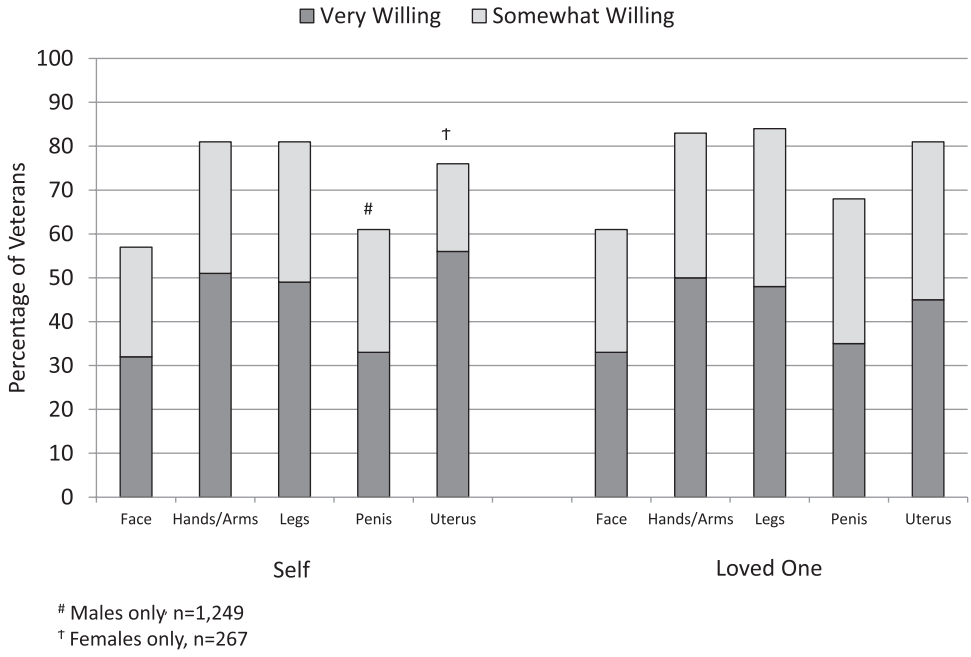

FIGURE 3. Percentage of veterans willing ("very" or "somewhat") to donate their own VCA organs at time of death (self) and on behalf of a deceased loved one who wanted to be an organ and tissue donor (Loved One). VCA, vascularized composite allograft.

not registered as donors were more likely than registered donors to feel that next-of-kin should make VCA donation decisions independent of donor registration status (63% versus 48%; $P<0.001$). Eighteen percent of registered donors and 32% of those undecided about donor registration said they would be less likely to register as an organ donor in the future if it also authorized VCA donation. In the multivariable model, men (aOR: $_{0.29}0.46_{0.71}$; $P=0.01$), those with less trust in the fairness of the transplant system (aOR: $_{0.36}0.54_{0.81}$; $P=0.01$), and those not currently registered as organ donors (aOR: $_{0.32}0.43_{.57}$; $P=0.01$) were less likely to join a donor registry if VCA organs were included.

Overall, 44% reported media exposure to VCA transplantation in the past year (33% face, 28% hand/arm, 14% limb, 9 penis, 4% uterus).

DISCUSSION

In the present study, the high level of support for donation among veterans mirrors that found in recent national surveys.[1,12] Moreover, despite the high proportion of men and older adults in the study, our observed 59% donor registration rate is higher than the 50% donor registration rate among adults 18 years and older in Region 1.[17] Notwithstanding these favorable donation attitudes and higher registration rates, there are several noteworthy findings that could help guide donation education for veterans. In addition to the 59% who were registered donors, 9% wanted to be a donor but had not registered and 19% were undecided, suggesting potential for even higher donor registry enrollment among veterans. Donation education should include information about the number of veterans awaiting transplantation and their access to it.[18] While most respondents believe that veterans' access to transplantation is fair and equal, lack of trust in the system was a predictor of veterans not joining the donor registry. This could be addressed by featuring veteran transplant recipients—via health education events, video story boards, and targeted social media campaigns. Research has shown that racial disparities common to the evaluation of kidney

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TABLE 3.

Types of concerns and representative comments about why veterans would not want to donate their own VCA organs (number of comments), N = 1254

Identity concerns (n = 150, 12%)	*My face and my fingerprints are my identity more than internal organs are.* [57 y old white male]
	Because it can be used to steal someone's identity. [55 y old Asian female]
Psychological discomfort (n = 220, 18%)	*Seems very graphic- the thought makes me uneasy.* [51 y old white female]
	It would be strange for my family seeing somebody looking like me. [50 y old black male]
Body integrity and funeral concerns (n = 148, 12%)	*I would at least want to be presentable in the casket for my family. I am not in favor of changing the appearance of the outer body.* [70 y old white male]
	Because it bothers me to know that I would be harvested for parts even after death. [29 y old white female]
Religious or spiritual consideration (n = 91, 7%)	*God made each of us unique and this seems to go beyond what is ethically acceptable.* [41 y old white female]
	I'll need all my parts to come back in the next life. [54 y old white male]
Other considerations (n = 645, 51%)	*Because if there was a problem with my leg than that person would have it too.* [62 y old black male]
	It's just something that sounds a bit too extreme. Just because there are medical "breakthroughs" doesn't mean that all should be advanced. [63 y old white male]
	I'm not comfortable with the skill and technology to do this yet. [42 y old white female]

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transplant candidates at non-VA transplant programs are not found in the VA Transplant Program, findings that should assuage concerns about bias and inequity.[19]

Many veterans were not aware that donor registry enrollment authorized the procurement of certain organs and tissues (eg, pancreas, intestines, including bone, skin, and tendons) beyond the more commonly identified kidneys, liver, heart, and lungs. This may be due to more limited exposure to the benefits of these types of transplants. Highlighting the life-saving and life-enhancing benefits of transplanting all types of organs and tissues may help those who are still undecided about donation to make a more informed choice. Importantly, most veterans had not informed family members about their donation intentions. Several studies have shown that, in the absence of documented donation intentions, family members demonstrate more decisional ambivalence and are less likely to donate the organs and tissues of a decedent when presented with the opportunity.[20-24] This further highlights the importance of donor registry enrollment and communication of one's favorable donation attitudes, particularly in the absence of explicit donor authorization. Efforts to increase donor registry enrollment in veterans should emphasize the benefits of preventing decisional dilemmas for family members and thereby reducing distress at time of death by informing them of donation intentions in advance.

Some clarity may be needed about donor registry enrollment for veterans: Should veterans join the DoD donor registry, a non-DoD donor registry (eg, via driver's license transaction), or both? DoD Instruction 6465.3 establishes policy and responsibilities for organ and tissue donation, pursuant to section 1109 of Title 10, United States Code (U.S.C.).[25] Specifically, at the time of obtaining a DoD identification card, all DoD service members, civilians, *and* their beneficiaries are given the opportunity to join the DoD donor registry, with the explicit goal of making this information available to the United Network for Organ Sharing to facilitate donation at time of death. While enrollment in the DoD registry seemingly obviates the need to register elsewhere, we found confusion among many veterans about this issue, with some joining only the DoD registry and others joining multiple registries.

Support for VCA transplantation and donation of the face, hand/arm, leg, and genitourinary organs was quite high. VCA transplantation holds high potential for the recovery of life function and quality for those with catastrophic injury or deformity.[8-10,26-29] This includes thousands of military service members who have suffered traumatic improvised explosive device injuries to the face, neck, limbs, and genitourinary system that, in another era, would have resulted in death for many.[15,30] As a result, the DoD has invested more money and resources in VCA transplantation than any other public or private entity. Veterans were more willing to personally receive an extremity transplant than a face, penis, or uterus transplant if it was medically indicated, comparable to what has been reported elsewhere.[1,12,13,31-33] Nearly half of veterans surveyed reported some media exposure to VCA, which is proportionally much higher than has been previously reported for non-veterans. While some veterans have been spotlighted as the beneficiaries of VCA transplants,[34,35] we did not assess the nature, number, or duration of exposures nor whether they involved stories of other veterans. Educational campaigns featuring veterans who have benefited from VCA transplantation are likely to generate higher emotional arousal and appeal, given the strong sense of a shared community among veterans.

Unwillingness to donate VCA organs may be due to concerns about compromised identity—particularly for face donation[12,36,37]—psychological discomfort with exterior body parts being donated/transplanted, perceived inability to have an open casket funeral following donation, and religious or other considerations. While some of these concerns are unique to VCA donation, others such as body integrity, funeral presentation, and religious objections are commonly associated with unwillingness to donate more traditional organs.[38] Respectful consideration of these core beliefs and concerns in educational campaigns for veterans are essential to enhancing public perception of VCA donation.

While there are many veterans who already believe that VCA organs are part of traditional donor registry enrollment, nearly one-fifth (18%) of existing donor registrants and one-third of undecided veterans would

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opt out of donation altogether if donor registry enrollment also authorized VCA organs. Additionally, most veterans—including almost half of existing registered donors—believe that the decision about VCA donation should be left up to the family after death, regardless of the decedent's donor registry enrollment. These findings suggest that VCA donation willingness and acceptability among veterans is not as strong as it is for more traditional organs and tissues. Including VCA organs as part of donor registries may not be widely accepted by veterans, at least not until they are more informed about the number of patients awaiting VCA transplantation, selection criteria, and processes, how donor-recipient matching occurs, and policies regarding allocation. Plana et al[39] showed that addressing these considerations in a brief educational video increased willingness to donate the face for transplantation. Future research with veterans should examine under what conditions first-person authorization for VCA donation can be done while maintaining transparency and preserving public trust in organ donation. For instance, should there be separate registries for traditional and VCA organs or should VCA organs be integrated into the existing traditional donor registry? What differential impact would these 2 approaches have on the public's perception of organ donation and trust in the donation system overall. Any first-person authorization strategy, however, likely requires more widespread dissemination of information about VCA transplantation and donation to the general public, given the relatively small percentage of people who have been exposed to VCA. Until such time that more expansive educational efforts can be rolled out, maintaining 2 separate processes for traditional and VCA donation seems prudent until VCA transplantation has permeated more prominently the collective conscious of the public.[11,40,41]

This study is not without limitations. While generally representative of the national veteran population, New England veterans may differ from veterans in other regions of the country on other important sociodemographic and cultural characteristics. Two medical centers in the region have performed VCA transplantation; thus, New England veterans may have had more media exposure to VCA transplantation than veterans in regions without VCA transplant programs. There is an inherent self-selection bias in survey research. Survey respondents may differ systematically from nonresponders in important ways that were not possible to capture as part of the study. For instance, those who have favorable disposition toward organ, tissue, or VCA donation may be more likely to respond to an organ donation survey, thus skewing responses toward more favorable donation attitudes and higher rates of donor registry enrollment. Such bias is further magnified by the use of a convenience sampling strategy in which we were not able to determine the overall survey response rate. Finally, the survey did not undergo independent validation and did not assess for literacy problems.

Given the strong support for donation among veterans, a collaborative partnership between HRSA's Division of Transplantation, the DoD Assistant Secretary of Defense for Health Affairs, United Network for Organ Sharing, and the VA Transplant Program is recommended to develop a more robust organ donation educational strategy for all new DoD service members, veterans, and their beneficiaries. This collaboration has potential to achieve 5 objectives, as identified in the present study: (1) increasing donor registry enrollment by leveraging strong support for organ and tissue donation among veterans, (2) encouraging communication about donation intentions—organ, tissue, and VCA—between veterans and their family members, (3) providing clarity about the necessity (or not) for enrollment in both DoD and state or national donor registries, (4) raising awareness about the need for transplantable organs and tissues, including VCA organs, among veterans, and (5) reducing levels of mistrust about the equity and fairness of the VA transplant system. There is already a mechanism available for educating veterans about donation—DoD Instruction 6465.3 authorizes implementation of an education program for DoD personnel, civilians, and beneficiaries. Exposure to organ and tissue donation, particularly testimonials from transplant recipients, has been shown to increase willingness to donate, donor registration rates, and consent for the donation of a decedent's organs and tissues.[42-45] Engaging military personnel, including veterans, who have benefited from transplantation as well as families of veteran donors may be an effective strategy.

In conclusion, veterans have very positive attitudes about organ, tissue, and VCA transplant and donation. Noteworthy is the strength of these favorable attitudes among men and older adults. There is an opportunity for more donation education within the veteran community. We found an eagerness and willingness to collaborate on organ donation initiatives among veterans and state veteran service leaders. Leveraging their support in developing and implementing targeted organ, tissue, and VCA donation campaigns for veterans is highly recommended.

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