Socio-cultural factors contributing to being an organ donor in a religious context

Sahar Khoshnavesh

Hamadan University of Medical Sciences School of Public Health

Akram Karimi-Shahanjarini (✉ karimi.a@umsha.ac.ir)

Hamadan University of Medical Sciences School of Public Health <https://orcid.org/0000-0002-2453-1389>

Jalal Poorolajal

Hamadan University of Medical Sciences School of Public Health

Saeed Bashirian

Hamadan University of Medical Sciences School of Public Health

Majid Barati

Hamadan University of Medical Sciences School of Public Health

Majid Hamidi

Hamadan University of Medical Sciences School of Public Health

Research article

Keywords: Donor card, organ donation, Employees, Iran

Posted Date: August 2nd, 2019

DOI: <https://doi.org/10.21203/rs.2.11100/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background Shortage of organs for transplantation is still considered to be a global concern, especially in developing countries such as Iran. Identifying factors contributing to the individual's decision to be a donor in a given society is critical to address the shortage of organ donors. The purpose of this study was to use a culturally modified Organ Donation Model (ODM) to explore the significant factors and ways in which these factors could influence signing the donor card.

Methods This study was a cross-sectional design conducted among 600 employees from 57 offices in Hamadan, in the west of Iran, in 2018. Participants were selected randomly and surveyed on being a donor and as well on their perceptions regarding signing the donor card. Structural equation modeling (SEM) was conducted to determine the inter-relationship between the studied variables.

Results: The mean age of participants was 39.5 (SD=7.0). Twenty percent of participants (n=120) had a signed donor card. Overall structural model provided a good fit with the data [$\chi^2= 1172.964$ (df=643, $p<0.001$), CFI=0.910, TLI= 0.902, RMSEA=0.037 (90% CI, 0.034 - 0.040)]. descriptive norms ($\beta= 0.53$, $p<0.001$), non-cognitive beliefs (i.e; Jinx factor, Ick factor, mistrust to medical system and body integrity ($\beta= -0.33$, $p<0.001$), anticipated regret ($\beta= 0.28$, $p<0.001$) and subjective norms ($\beta= -0.17$, $p<0.01$) had significant direct effects on signing the donor card.

Conclusions This study provides socio-culturally informed evidence on individuals' signing donor card. To combat the shortage of organs for transplantation, these factors could provide a guide to policymakers in developing the community- based interventions.

Background

Organ Transplantation is still the most effective therapy for patients with end-stage organ failure in the world [1]. Organ transplantation not only is cost-effective but also helps to preserve life and improve patients' quality of life [2].

In recent decades, although a salient advance has happened in transplantation, the shortage of organs for transplantation is still considered a global concern [3]. This issue is more acute in developing countries such as Iran and studies show a huge gap between demand and supply organ for transplanting [4]. After the law on organ donation from the brain dead was passed by Islamic Parliament of Iran in 2000 and issuing its executive regulations in 2002 [5], transplantation centers and organ harvesting units were established across the country [6]. Along with these legal measures, several initiatives have been launched in Iran to promote organ donation. For example, a campaign has been launched in some public hospitals to promote brain death donation. Holding an annual celebration of "*Jashne Nafas*" in national organ donation day, and advertisements on media such as TV and billboards, developing soap operas and documentaries on TV are some examples of invitations which have been developed to increase organ donation in Iran.

Although following these measures in Iran, much has been achieved in organ donation, the process is far from the optimal condition. Indeed, while about 15,000 cases of brain death have been estimated annually in Iran [7], it is reported that there are about 25,000 people in the waiting list of transplantation and 7 to 10 people are added daily [8]. Making the decision to donate and signing donor card is a complex and multi factorial process [1]. Indeed, although organ donation is an individual subject, it is also a legal, medical, ethical, organizational and social process [9]. Accordingly, different reasons have been identified to explain the low rate of organ donation including the lack or poor knowledge about brain death and its legality (6) knowledge of organ donation process and how to sign donor card [10], attitude toward organ donation, subjective norms, perceived behavioral control [11], descriptive norms [12], anticipated regret [13], belief in a miracle [14], Jinx factor, lck factor [15], uncertainty about the person's willingness to organ donation [16], mistrust to the medical system [15], belief in body integrity after death [15], and religious beliefs [17, 18], In Islamic countries like Iran, many religious scholars have allowed organ transplantation [19]. Also, this case in the holy Qur'an (The holy book of Muslims) has been accepted [20]

Though previous studies have investigated some important factors related to organ donation and sign donor card process, as reported by [Knox](#) et al, systematic review, the majority of studies have been conducted in a Western context and there is not a comprehensive framework to ensure that the socio-cultural factors of organ donation will be integrated into explanatory models, particularly in settings where religion beliefs have a prominent role. Several models have been developed in this regard. Organ Donation Model (ODM), drawing from Theory of Planned Behavior (TPB), is a well-known and useful framework developed by Morgan [15, 21].

This model assumes that following factors are important in individual's decision to become a donor: attitudes, subjective norms, descriptive norms, knowledge, information resources (media and interpersonal factors), non-cognitive beliefs (Jinx factor, lck factor, mistrust to medical system and body integrity) [15].

Evidence shows that determinants identified by ODM together provide a useful framework for understanding factors that are critical for the acceptance of organ donation [22]. Despite the success of ODM in informing and predicting organ donation decision, previous research shows that there are other important factors which contribute largely to organ donation and need to be taken into account. Although religious beliefs, especially Islamic thought and rules toward organ donation have been widely studied, regional context and corresponding regulations/policies of organ donation vary among Islamic countries. On the other hand, while religion is indented as a barrier toward organ [23, 24], there is evidence of encouraging the role of these beliefs [25], and this paradox is considerable among Muslims [26, 27]. It is evident that control beliefs could be an important predictor of intention to be a donor [28, 29]. People may feel that they can't be an organ donor because, for example, they don't know how to obtain an organ donor card. So, the inclusion of control components may improve the predictive power of the framework.

Descriptive norm refers to the individual's perception of the extent of commonness of a particular behavior within a group. Although in comparison with subjective norms, descriptive norms have been less studied in the organ donation context, existing evidence suggests that descriptive norms have an independent contribution to predict intention to become an organ donor [30]. Finally, anticipated regret is known as an important determinant in engaging individuals on the topic of organ donation. This emotional factor is defined as a perspective feeling of regret which follows from inaction. Upon the previous studies, it is a possible expectation that anticipated regret, over and above the other factors, would add significantly to the prediction of signing the donor card [31]. Among limited research having been conducted in the context of organ donation in Iran, primary attention has been devoted to ethical and legal considerations of organ donation or public's general knowledge and attitude toward organ donation. Consequently, the variety of factors that can potentially affect Iranian people' signing donor card are unknown.

The purpose of this study was to test a modified ODM to gain cultural relevance to Iranian adults by incorporating four additional factors, including: religious beliefs, descriptive norms, perceived control, and anticipated regret. This model hypothesizes a direct pathway between these four factors and signing the donor card.

Methods

Participants and procedures

We carried out this cross-sectional descriptive survey among employees of all eligible offices in Hamadan, west of Iran, in 2018. From all eligible offices, participants were selected by random sampling method. Out of 60 offices in Hamadan, 600 employees from 57 offices participated in this study (10-11 participants per office). We excluded three offices (i.e., legal Medicine Organization, Red Crescent and Blood Transition Organization because of approximation between the nature of the activity and the study issue.). We excluded employees with cognitive impairment or unwilling to participate.

Our rationale for conducting this study among the employees of offices was that employees are a reachable population with a variety of socioeconomic status. We obtained written consent from all of the employees. This study approved by Ethics committee of Haman University of Medical Sciences (No. IR.UMSHA.REC.196.909).

Measures

Data gathering was conducted by a 46 items self-administered questionnaire. The questionnaire was developed based on an expanded Morgan's Organ Donation Model. The procedure for developing the questionnaire has been described elsewhere [32]. Briefly, following a critical evaluation of existing literature and consulting with two local authorities of organ donation and transplant cases, to reflect the construct of the model, initial draft of the questionnaire was generated. Content validity of the instrument was assessed by ten experts in health education and promotion, epidemiology, nursing, and

communication. We calculated content validity ratio (CVR), content validity index (CVI), CVI for each item of a scale (I-CVI), and CVI for the overall scale (S-CVI/Ave) (23). The range of CVR values was 0.80 – values of 1. I-CVI and S-CVI/Ave were 0.79 and 0.93, respectively. To evaluate the face validity of the questionnaire, we asked a group of employees (n=20) concerning the ambiguity, difficulty, and relevancy of each item. Then, we revised some items based on their recommendations. Construct validity of the questionnaire was evaluated through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). In summary, the model fit was good [$\chi^2=1146.987$ (df=821, $p<0.001$), CFI=0.922, TLI= 0.914, RMSEA=0.032 (90% CI, 0.027 - 0.036), and WRMR= .868]

Reliability of the questionnaire was established during two rounds of pilot-testing using the intra class correlation coefficient (ICC) and Cronbach's alpha coefficient. The Cronbach's alpha coefficient ranged between 0.78 and 0.93 for its subscales and ICC for the total questionnaire was 0.76, indicating acceptable reliability. The final version of the questionnaire consisted of 46 items to measure the demographic characteristics and the constructs of the expanded ODM. Constructs were as follows:

Knowledge: Knowledge about organ donation was measured by 6 questions about organ donation (e.g., “Can men and women sign a donor card at any age?”) Correct responses were summed into a single score ranging from zero to six. Because of dichotomous responses, internal consistency reliability of knowledge was measured by Kuder-Richardson-20 coefficient (KR20) (27) and it was found to be satisfactory with a value of 0.56.

Attitude: Attitude toward organ donation was measured by three items (e.g., “Sign donor card is a valuable act”) on a 5- point Likert scale (1= strongly disagree, 5= strongly agree). The Cronbach's Alpha coefficient was 0.88.

Subjective norm: Subjective norm was measured by eight items (e.g., “My husband/wife encourages me to encourage me to receive a donation card”) on a 5- point Likert scale. Cronbach's Alpha coefficient was 0.93.

Perceived control: Perceived control was measured with three items on a 5- point Likert scale (e.g., “I can sign donor card even if my family doesn't agree”). Cronbach's Alpha coefficient was 0.80.

Anticipated regret: Anticipated regret was measured by three items on a 5- point Likert scale (e.g., “If I don't sign donor card, I will regret it”). Cronbach's Alpha coefficient was 0.92.

Descriptive norm: Descriptive norm was measured with four items on a 5- point Likert scale (e.g., “As far as I know, some of my colleagues have signed donor card”). Cronbach's Alpha coefficient was 0.78.

Non-cognitive beliefs: This construct included medical mistrust, bodily integrity, ick factor, and jinx factor that measured by nine items on a 5- point Likert scale. Medical mistrust was measured by one item (i.e., “If I sign donor card, the medical team may fail to try to save my life during an emergency situation”). Bodily Integrity was measured by four items (e.g., “Removing organs from the body just isn't right”). Ick factor was measured with three items (e.g., “The idea of organ donation is somewhat disgusting because

I think my body is manipulated"). Jinx factor was measured by two items (e.g., "I think that sign donor card results in my death happening sooner"). In this construct Cronbach's Alpha coefficient was 0.90.

Religious Beliefs: Religious Beliefs were measured with four items on a 5- point Likert scale (e.g., "According to the Holy Quran, "And whose ever saves a human life it is as though he has saved all mankind", organ donation is an example of resuscitation. Alpha coefficient was 0.81.

Interpersonal sources: Employees were asked, 'Where have you seen, heard, or read about organ donation?' Options were family members, relatives, friends, colleges, religious service and others. Participants could select one or more options.

Mass Media sources: Employees were asked, "Where have you seen, heard, or read about organ donation?" Options were TV, radio, newspaper, posters, magazines, billboards and internet/ social networks. Employees could select one or more options.

Intention: Intention was measured with three items on a 5- point Likert scale (1= strongly disagree, 5 strongly disagree) and was reliable ($\alpha = 0.93$). For example, "I try to sign donor card at next month".

Behavior: Behavior was measured by one item (i.e., "Have you signed donor card?")

Statistical analysis

The Structural equation modeling (SEM) was conducted using Mplus 7.4 (30) to determine the inter-relationship between the studied constructs. The assumption of multivariate normality wasn't accepted based on multivariate skew test of fit ($p < .001$). So, alternative estimator robust to maximum likelihood was used to examine the models' paths. Model fit was determined by the following indicators: χ^2/df ratio (values > 3), the Comparative Fit Index (CFI; > 0.90), the Tucker Lewis Index (TLI; > 0.90), and the Root Mean Square Error of Approximation (RMSEA; < 0.08) (31).

Results

The mean age of participants was 39.5 (SD=7.0) most of whom were men (65.5%) (Table 1). Twenty percent of employees ($n=120$) had a signed donor card. Table 2 provides a correlation matrix and descriptive information of each variable.

The comparison of demographic characteristics donors and non-donors indicated that sex and history of blood donation had a significant effect on signing donor card ($p = 0.027$ and $p = 0.013$, respectively) (Table 2). There was a significant difference between women and men in signing the donor card (24.7% vs. 17.3%). Table 3 provides a correlation matrix and descriptive information of each variable.

At the first stage, the fitness indices were not achieved the minimum level [$\chi^2 = 2406.002$ (df=672, $p < 0.001$), CFI=0.707, TLI= 0.693, RMSEA=0.066 (90% CI, 0.063 - 0.068)] (Fig 1). In model 2, the fit indices

indicated improvement of the modified model compared to original model [$\chi^2 = 1763.468$ (df=656, $p < 0.001$), CFI=0.813 TLI= 0.799, RMSEA=0.053 (90% CI, 0.050 - 0.056)]. Given the results of the original model and the theoretical issues, original model was modified by adding and removing several relations. These modifications resulted to improve the model fit [$\chi^2 = 1172.964$ (df=643, $p < 0.001$), CFI=0.910, TLI= 0.902, RMSEA=0.037 (90% CI, 0.034 - 0.040)]. Model 3 was considered as final model (Fig. 2).

The results of SEM indicated that descriptive norms ($\beta = 0.53$, $p < 0.001$), non-cognitive beliefs ($\beta = -0.33$, $p < 0.001$), anticipated regret ($\beta = 0.28$, $p < 0.001$) and subjective norms ($\beta = -0.17$, $p < 0.01$) had significant direct effect on signing donor card. Descriptive norms and anticipated regret were positive predictors of signing donor card. Also, non-cognitive beliefs and subjective norms were negative predictors of signing donor card.

Some constructs such as attitude, perceived control, religious beliefs, knowledge, interpersonal sources, and mass media resources were predictors had significant indirect effect on signing donor card. Also, in the final model, there have been seen two positive significant correlations between constructs; attitude with perceived control ($r = 0.46$, $p < 0.001$), and perceived control with religious beliefs ($r = 0.49$, $p < 0.001$).

Discussion

Public perception related organ donation are influenced by multiple cognitive, non- cognitive, and socio-demographic factors. Identifying these factors in a particular society is critical to address the shortage of organ donors. To the best of our knowledge, no previous works have investigated the predictors of signing donor card widely and based on a theoretical model focusing on the salience aspects of cultural components on Iranian adults.

The results showed that only 20% of the participants had a donor card. Although there is no official statistic on the national level showing the registration rate of organ donation in Iran, it is estimated that about 10% of the Iranian population hold organ donation cards. There is a significant international variation in rates of registration for organ donation. For example, Rosenblum et al reported that of the 19 donor registries, New Zealand and Netherlands had the most registrants. On the other hand, based on their study, none of the non-donor registries had proportions registered higher than 0.5% [33]. Along with the effects of the measures such as raising awareness and creating a positive general attitude towards organ donation, at least part of the variation in rates of organ donation between countries may be explained by adopting an opt-out or opt-in policy such as the adoption of opt-out consent policies have been emphasized. In opt-out consent system, an individual is considered an organ donor unless he/ she has recorded a decision not to donate.

In this study, in line with some previous studies, sex was found to be significantly associated with signing the donor card so that women were more likely to sign the donor card than men. As stated by Thornton et al, sex differences, at least somewhat, may be due to the ideological differences between women and men, reflected in their altruism [34]. However, this issue needs further consideration in the future studies.

Also, in our study, participants who had history of blood donation more likely to sign donor card. This result has been confirmed in other studies [35, 36]. One explanation for the existence of a correlation between different types of donating behaviors is that one form of philanthropy promotes other philanthropic behaviors. [37].

Consistent with previous studies, our results revealed that being a donor was not merely influenced by the rational process. Indeed, evidence suggests that, in some cases, the decision to being a donor may be more influenced by emotional factors such as anticipated regret and religious beliefs [13, 15]. Accordingly, two predictors were emotional factors (non-cognitive variables and anticipated regret) and two other predictors were cognitive factors (subjective norms and descriptive norms). Also, other constructs predicted signing donor card indirectly.

In contrast to subjective norms, in the context of organ donation, the role of descriptive norms (perceived frequency of a behavior) is unknown in making decision regard being a donor. In this study, descriptive norms were the strongest predictor of signing the donor card. While the previous studies showed that descriptive norms predict the intention of organ donation [12, 30], we didn't consider behavioral intention in the model. Our rationale to do so, as in Morgan et al study [21], was participants who had previously signed donor card couldn't indicate their intent to sign organ donor card logically.

It seems that in the absence of external force, strong beliefs or contradictory beliefs- as were the case in our study, individuals act in accordance with the frequency of adopting the behavior (i.e., signing the donor card) by others. It is expected that this will be the case for people from collectivist cultures including Iranian culture in which people, rather form their behavior based on their own preferences including attitudes [38]. In that way the weak and indirect effect of attitude on signing the donor card is explained.

As we expected, anticipated regret was able to predict signing the donor card. However, mixed results have been obtained from interventional studies investigating the role of anticipated regret in registering as an organ donor. For example, while results of O'Carroll et al showed that a manipulating anticipated regret led to a significant increase in intention to register as an organ donor [13], in the other study, it was reported that an anticipated regret intervention led to a decrease in registration [39]. The authors of the latter study speculated that anticipated regret's effect reduces in situations in which individuals induced to think about barriers and negative perceptions of organ donation (e.g., ick and jinx factor). Accordingly, given that in our study, only about 10% of participants valued non-cognitive factors (i.e., ick and jinx factor, bodily integrity, and medical mistrust), anticipated regret exerted a significant and positive influence on signing the donor card.

The result that subjective norm was a significant predictor of signing the donor card in a negative direction, is in contrast to previous studies, although the association was weak. This difference may have occurred because, in the previous studies, subjective norms have been assessed in relation to the intention of being a donor rather than register as a donor. It is possible that due to the intention- behavior gap, subjective norms associated with intention and behavior in different directions. Also, cultural

differences may be responsible for this contradiction. So that, in the context of Iranian culture, frequent encouragements of someone to adopt a behavior can have a reverse effect because she/he may think that others want to impose their opinion. However, it seems that there is a need to further investigate this issue.

According to available evidence, religious beliefs, especially Islamic beliefs, may have a contradictory effect on donation. Shiite's Jurisprudence supports organ donation and facilitates and provides the opportunity to create a positive public atmosphere to promote organ donation in Islamic countries. Islam places a high value on saving human life and it is stated in Holy Qur'an that "whosoever saving the life of one person is like saving the whole of mankind." However, the relationship between Islamic teachings and organ donation is complex [26]. Some Muslims are against organ donation based on the individual perspectives such as that God is the sustainer of human life and divine cure is possible [40], or because organ transplant violates respect for the dead body [41]. Our results revealed that, generally, participants found the religious beliefs to be supportive of organ donation.

Non-cognitive beliefs including ick factor (the feeling disgust towards the idea of organ donation), jinx factor (fears and superstitious belief that signing the donor card will lead to harm or death for the registrant), bodily integrity (the belief in the need to keep the body whole after death), and medical mistrust (in order to harvest their organs, doctors may hasten the death of seriously ill patients) are known as the strong barriers to organ donation [13]. In current study, non-cognitive beliefs were negative predictor of signing the donor card. Therefore, it is important to emphasize on the need of modifying these beliefs through the interventions.

One of the most interesting results of our study was that religious beliefs did not directly predict signing the donor card; instead, their effects were exerted indirectly through non-cognitive beliefs. On the other hand, religious beliefs were negatively related to non-cognitive beliefs. This result suggests that religious beliefs could partially suppress the inhibitory effects of non-cognitive beliefs.

For instance, in religious teachings, Muslims don't insist on protecting bodily integrity (a non-cognitive belief), because Muslims believe that after the death, at the resurrection, the human body will restore.

In the present study, mass media was known as an important source of participants' knowledge generation and their forming religious beliefs regarding organ donation.

Several studies across the world reported that mass media particularly TV is the most important source of information about organ donation [42]. Findings of Parsa et al study showed that TV and newspaper were the most important sources of information to make the decision regarding organ donation [27].

The life-saving role of organ donation and the Islamic virtue of being a donor have been highlighted in several soap operas, documentaries, and advertisements on TV in recent years in Iran. As the results of our study showed, in a society with a religious approach to issues- as is the case in Iran- it can be expected that the content of mass media programs on organ donation will strengthen the religious beliefs

involved. That way, analysis of religious beliefs of participants, revealed that generally they had supportive religious beliefs related to organ donation. In contrast; however, it seems that mass media initiatives were not so successful to generate public knowledge so that, for example, half of them did not know that the medical team of a person with brain death is separated from the medical team confirming brain death and about half of them did not know that it is possible to receive the donor card at any age. This result is consisted with the previous studies conducted in Iran showing limited knowledge on several aspects of organ donation [43]. The findings of the Krupic's study on Muslims living in Sweden showed that if appropriate information is provided by the mass media about religious beliefs related to organ donation, there can be an increase the rate of organ donation [44]. A major challenge of mass media programs, especially TV, is that sometimes promote false beliefs and fears about organ donation [45].

Previous findings have shown that mass media-plus-interpersonal media has a greater impact on behavior, especially about signing donor card [46]. In our study, interpersonal media had a positive significant effect on the participants' knowledge. This finding was consistent with results of Morgan et al. study [15]. Talking with family members, friends, and colleagues increase information of person about organ donation, but sometimes this relationship may negatively affect the individual decision to register as a donor [15]. Interpersonal relationships are particularly critical in context – such as Iran and Turkey- in which even if an individual has been registered as a donor before death, consent of the family member is required for donation.

While based on the theory of planned behavior, perceived control has an effect on both intent and behavior [47], in our study, this variable did not predict signing the donor card directly. Instead, we observed two correlations: a correlation between perceived control with an attitude and a correlation between perceived control and religious beliefs. These relationships suggest that positive attitude toward organ donation and supportive religious beliefs may facilitate signing the donor card. The existing evidence of the role of perceived control in being a donor shows mixed results [11, 15, 48] and further studies are needed on this issue particularly in religious context.

As our results revealed, a complex variety of factors influences an individual's decision to be a donor particularly in religious contexts such as Iran. Given the organ donation gap, identifying barriers and facilitators to organ donation and designing interventions to address these factors are a critical health priority.

The results of this study should be interpreted in light of a number of limitations. One limitation is related to cross-sectional design and observed associations did not indicate the causality. Another limitation of our study was that data was obtained using a self-administered questionnaire and signing the donor card might have been underestimated or overestimated. Additionally, although we used a randomized sampling approach to recruit participants, the generalizability of results is limited as our sample mainly included men.

Conclusions

Our results showed that among the variables entered into the model, descriptive norms and anticipated regret were direct positive predictors of signing donor card, and non-cognitive beliefs and subjective norms were direct negative predictors of behavior among Iranian offices. Descriptive norms were the strongest predictor of behavior. It seems that in designing and implementing of interventions to increase sign donor card, it is necessary to pay attention to these variables based on the cultural and religious context of population under study.

Abbreviations

ODM: Organ Donation Model; SEM: Structural equation modeling; TPB: Theory of Planned Behavior; CVR: Content Validity Ratio; I-CVI: Item-Level Content Validity Index; S-CVI/Ave: Scale-Level Content Validity Index; EFA: Exploratory Factor Analysis; CFA: Confirmatory Factor Analysis; KMO: Kaiser-Meyer-Olkin; PAF: Principal Axis Factoring; CFI: Comparative Fit Index; TLI: Tucker Lewis Index; RMSEA: Root Mean Square Error of Approximation; AVE: Average Variance Extracted; MSV: Maximum Shared Variance; ASV: Average Shared Squared Variance; ICC: Interclass Correlation Coefficient

Declarations

Acknowledgments

The authors would like to thank the Dr. Susan E. Morgan for valuable and helpful comments in this project. Also, we are grateful to all of the employees of governmental and non-governmental offices that participated in this study.

Funding

This study supported by the Deputy of Research and Technology of Hamadan University of Medical Sciences financially (No. 9612228411).

Availability of data and material

Any additional information that was not presented in the manuscript is available on request from the corresponding author Akram Karimi-Shahanjarini.

Authors' contributions

Study design: KS, KSA, Data acquisition, analysis and interpretation: KS, KSA, PJ, BM, BS, HM, Writing of the first draft: KS, KSA. Revising first draft for important intellectual content: PJ, BM, BS, HM. Approval of the final version, and agreeing to be accountable for the work: KS, KSA, PJ, BM, BS, HM.

Ethics approval and consent to participate

This study approved by the Ethics Committee of Haman University of Medical Sciences (No. IR.UMSHA.REC.196.909). All participants signed an informed consent form, and they agreed to participate in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

1. Irving MJ, Tong A, Jan S, Cass A, Rose J, Chadban S, Allen RD, Craig JC, Wong G, Howard K: Factors that influence the decision to be an organ donor: a systematic review of the qualitative literature. *Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association* 2012, 27(6):2526-2533.
2. Arogundade FA: Kidney transplantation in a lowresource setting: Nigeria experience. *Kidney Int Suppl* 2013, 3:241-245.
3. Badrolhisam N I, Zakaria Z: Knowledge, Religious Beliefs and Perception towards Organ Donation from Death Row Prisoners from the Prespective of Patiens and Non-Patients in Malaysia: A Preliminary Study. *Int J Humanit Soc Sci* 2012, 2(24):197-206.
4. Shahsavarinia K, Tagizadieh A, Pouraghaei M, Soleimanpour H, Kakaie F, Sanaie S, Mahmoodpoor A: Assessment of Attitude and Knowledge of Personnel in the Intensive Care Unit of Tabriz University of Medical Sciences Hospitals Toward Organ Donation. *Transplantation proceedings* 2016, 48(8):2577-2581.
5. Afzal Aghaee M, Dehghani M, Sadeghi M, Khaleghi E: Awareness of Religious Leaders' Fatwa and Willingness to Donate Organ. *International journal of organ transplantation medicine* 2015, 6(4):158-164.
6. K BL, Malek Hosseini SA: The Situation of Liver Transplantation Programs in Iran. *Middle East journal of digestive diseases* 2018, 10(3):194-195.
7. Zohoor A, Piri Z: Attitudes of Physicians and Nurses of Intensive Care Units to Organ Transplantation with Brain Dead in the Hospitals Affiliated with Iran University of Medical Sciences (Tehran-2003). *Razi J Med Sci* 2004, 11:97-105.
8. Iran ministry of health and medical education: <http://behdasht.gov.ir/?siteid=1&pageid=127&newsview=110650>,. In.; 2014.

9. Ghods AJ: Ethical issues and living unrelated donor kidney transplantation. *Iranian journal of kidney diseases* 2009, 3(4):183-191.
10. Agrawal S, Binsaleem S, Al-Homrani M, Al-Juhayim A, Al-Harbi A: Knowledge and attitude towards organ donation among adult population in Al-Kharj, Saudi Arabia. *Saudi journal of kidney diseases and transplantation : an official publication of the Saudi Center for Organ Transplantation, Saudi Arabia* 2017, 28(1):81-89.
11. Britt RK, Britt BC, Anderson J: Theoretical implications addressing rural college students' organ donation behaviors. *Journal of health psychology* 2015.
12. Park H.S, Smith S.W: Distinctiveness and influence of subjective norms, personal descriptive and injunctive norms, and societal descriptive and injunctive norms on behavioral intent: A case of two behaviors critical to organ donation *Human Communication Research* 2007, 33(2):194-218.
13. O'Carroll RE, Foster C, McGeechan G, Sandford K, Ferguson E: The "ick" factor, anticipated regret, and willingness to become an organ donor. *Health psychology : official journal of the Division of Health Psychology, American Psychological Association* 2011, 30(2):236-245.
14. Dehghani SM, Gholami S, Bahador A, Nikeghbalian S, Eshraghian A, Salahi H, Kazemi K, Shamsaei A, Malek-Hosseini SA: Causes of organ donation refusal in southern Iran. *Transplantation proceedings* 2011, 43(2):410-411.
15. Morgan SE, Stephenson MT, Harrison TR, Afifi WA, Long SD: Facts versus 'Feelings': how rational is the decision to become an organ donor? *Journal of health psychology* 2008, 13(5):644-658.
16. Morais M, da Silva RC, Duca WJ, Rol JL, de Felicio HC, Arroyo PC, Jr., Miyazaki MC, Domingos NA, Valerio NI, Abbud-Filho M *et al*: Families who previously refused organ donation would agree to donate in a new situation: a cross-sectional study. *Transplantation proceedings* 2012, 44(8):2268-2271.
17. Hejazi SS, Nikbakht S, Jouybari L, Abadi MH, Davoodi D, Azizi TH, Yahyaei S: Knowledge and attitudes toward brain death and organ donation in Bojnurd. *Electronic physician* 2017, 9(7):4746-4752.
18. Quick BL, Reynolds-Tylus T, Fico AE, Feeley TH: An investigation into mature adults' attitudinal reluctance to register as organ donors. *Clin Transplant* 2016, 30(10):1250-1257.
19. Sharif A: Organ donation and Islam-challenges and opportunities. *Transplantation* 2012, 94(5):442-446.
20. Rady MY, Verheijde JL: Campaigning for Organ Donation at Mosques. *HEC forum : an interdisciplinary journal on hospitals' ethical and legal issues* 2016, 28(3):193-204.
21. Morgan S, Miller J, Arasaratnam L: Signing cards, saving lives: an evaluation of the worksite organ donation promotion project. *Communication Monographs* 2002, 69:253-273.

22. Quick BL, Anker AE, Feeley TH, Morgan SE: An examination of three theoretical models to explain the organ donation attitude–registration discrepancy among mature adults. *Health communication* 2016, 31(3):265-274.
23. Berry C, Salim A, Ley EJ, Schulman D, Anderson J, Navarro S, Zheng L, Chan LS: Organ donation and Hispanic american high school students: attitudes, beliefs, perceptions, and intent to donate. *The American surgeon* 2012, 78(2):161-165.
24. Wakefield CE, Reid J, Homewood J: Religious and ethnic influences on willingness to donate organs and donor behavior: an Australian perspective. *Progress in transplantation (Aliso Viejo, Calif)* 2011, 21(2):161-168.
25. Alanazi LF, Aldossari SH, Gogandy MA, Althubaiti GA, Alanazi BF, Alfawaz AM: Attitude, beliefs and awareness towards corneal donation in Saudi Arabia. *Saudi Journal of Ophthalmology* 2019.
26. Padela AI, Zaganjor H: Relationships between Islamic religiosity and attitude toward deceased organ donation among American Muslims: a pilot study. *Transplantation* 2014, 97(12):1292-1299.
27. Parsa P, Taheri M, Rezapur-Shahkolai F, Shirahmadi S: Attitudes of Iranian students about organ donation: a qualitative study. *BMC medical ethics* 2019, 20(1):36.
28. Hyde M. K, White K. M: To be a donor or not to be? Applying an extended theory of planned behavior to predict posthumous organ donation intentions. *Journal of Applied Social Psychology* 2009, 39(4):880-900.
29. Moriuchi E, Chung C: The factors that affect donation advertising effectiveness: An experimental research for felt ethnicity and in-group and out-group perspectives for young American. In: *Association for Consumer Research Asia-Pacific Conference*. 2015.
30. Bresnahan M. J, Guan X, Wang X, Mou Y: The culture of the body: Attitudes toward organ donation in China and the US. *Chinese Journal of Communication* 2008, 1:181–195.
31. Godin G, Sheeran P, Conner M, Germain M: Asking questions changes behavior: mere measurement effects on frequency of blood donation. *Health psychology : official journal of the Division of Health Psychology, American Psychological Association* 2008, 27(2):179-184.
32. Khoshravesh S, Karimi-Shahanjarini A, Poorolajal J, Barati M, Bashirian S, Hamidi M, Khalili S: Development and psychometric assessment of the Sign Donor Card (SDC) scale in Iranian people. Unpublished manuscript. 2019.
33. Rosenblum AM, Li AH, Roels L, Stewart B, Prakash V, Beitel J, Young K, Shemie S, Nickerson P, Garg AX: Worldwide variability in deceased organ donation registries. *Transplant international : official journal of the European Society for Organ Transplantation* 2012, 25(8):801-811.

34. Thornton JD, Wong KA, Cardenas V, Curtis JR, Spigner C, Allen MD: Ethnic and gender differences in willingness among high school students to donate organs. *The Journal of adolescent health : official publication of the Society for Adolescent Medicine* 2006, 39(2):266-274.
35. Symvoulakis EK, Tsimtsiou Z, Papaharitou S, Palitzika D, Markaki A, Stavroulaki E, Morgan M, Jones R: Kidney organ donation knowledge and attitudes among health care professionals: findings from a Greek general hospital. *Applied nursing research : ANR* 2012, 25(4):283-290.
36. Thompson WW: Blood donation behavior of Hispanics in the lower Rio Grande Valley. *Transfusion* 1993, 33(4):333-335.
37. Bekkers R: Who gives what and when? A scenario study of intentions to give time and money. *Soc Sci Res* 2010, 39:369–381.
38. Yun D, Park HS: Culture and the Theory of Planned Behaviour: Organ Donation Intentions in Americans and Koreans. *Journal of Pacific Rim Psychology* 2010, 4(2):130-137.
39. O'Carroll RE, Shepherd L, Hayes PC, Ferguson E: Anticipated regret and organ donor registration: A randomized controlled trial. *Health psychology : official journal of the Division of Health Psychology, American Psychological Association* 2016, 35(11):1169-1177.
40. Alkhawari FS, Stimson GV, Warrens AN: Attitudes toward transplantation in U.K. Muslim Indo-Asians in west London. *American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons* 2005, 5(6):1326-1331.
41. Oliver M, Woywodt A, Ahmed A, Saif I: Organ donation, transplantation and religion. *Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association* 2011, 26(2):437-444.
42. Aykas A, Uslu A, Simsek C: Mass media, online social network, and organ donation: old mistakes and new perspectives. *Transplantation proceedings* 2015, 47(4):1070-1072.
43. Tagizadieh A, Shahsavari Nia K, Moharamzadeh P, Pouraghaei M, Ghavidel A, Parsian Z, Mahmoodpoor A: Attitude and Knowledge of Medical Students of Tabriz University of Medical Sciences Regarding Organ Donation. *Transplantation proceedings* 2018.
44. Krupic F, Westin O, Hagelberg M, Skoldenberg O, Samuelsson K: The Influence of Age, Gender and Religion on Willingness to be an Organ Donor: Experience of Religious Muslims Living in Sweden. *Journal of religion and health* 2018.
45. Harrison TR, Morgan SE, Chewning LV: The challenges of social marketing of organ donation: news and entertainment coverage of donation and transplantation. *Health marketing quarterly* 2008, 25(1-2):33-65.

46. Morgan SE, Stephenson MT, Afifi W, Harrison TR, Long SD, Chewing LV: The University Worksite Organ Donation Project: a comparison of two types of worksite campaigns on the willingness to donate. *Clin Transplant* 2011, 25(4):600-605.
47. Ajzen I: The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991, 50(2):179-211.
48. Godin G, Belanger-Gravel A, Gagne C, Blondeau D: Factors predictive of signed consent for posthumous organ donation. *Progress in transplantation (Aliso Viejo, Calif)* 2008, 18(2):109-117.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Tables.pdf](#)
- [Figures.pdf](#)