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Abstract

This study assessed the applicability of two important components of the transtheoretical model of behavior change (TTM) to family consent for cadaveric organ donation. Men and women (N = 169), who consented or refused to donate the organs of a family member, completed a telephone survey reflecting the stage of change and decisional balance constructs. Psychometric analyses resulted in a two-factor decisional balance scale: a seven-item scale representing negative perceptions of consent (cons), and a seven-item scale representing positive perceptions of consent (pros). The pros and cons were significantly associated with stage of readiness for donation consent and with the family consent decision. Research utilizing this measure has the potential to enhance intervention programs to increase donation consent rates.

Keywords

decisional balance, family consent, organ donation, stages of change, transtheoretical model

ORGAN transplantation is the treatment of choice for end stage organ failure, but demand for donor organs far exceeds supply. Increased family consent for donation can greatly reduce this disparity. Previous studies of the family consent process have primarily addressed demographic and situational variables. The present study is the first to assess the applicability of two important constructs from the transtheoretical model (TTM) of behavior change to understanding the process of family consent for organ donation. Measures of two key TTM constructs are developed for donation consent and initial validity data are collected. These measures could enhance both assessment and intervention with family members who are approached for donation consent.

Organ donor shortage

Enormous improvements in transplant medicine have made organ transplant the treatment of choice for end stage organ failure of the kidneys, and the only alternative for individuals with liver, heart, and lung failure (Peters, 1992; Peters & Vaughn, 1990). During the past 15 years, both survival rates and quality of life have been shown to improve after transplant surgery (Evans et al., 1985; United Network for Organ Sharing [UNOS] Database, 2000). In addition, organ transplantation reduces health care costs and often returns to the workforce thousands of individuals who would otherwise be debilitated (Gerhardt et al., 1996; Perkins, 1987; Peters & Vaughn, 1990). All of these factors have fueled the demand for transplantable organs.

While the need for solid organ transplants has continued to rise at a significant rate, the supply of available organ donors has increased at only a fraction of that rate. As of November 2000 the waiting list for organ transplantation in the USA contained over 72,000 registrants, approximately 65 percent of whom were awaiting kidney transplants. This figure represents greater than a 450 percent increase in the number of individuals awaiting organ transplant since 1988, when the UNOS organ procurement and transplantation network began compiling national data. However, during the time period of 1988 to 1999, the number of USA cadaveric and living-donor transplants rose only 74 percent from 12,618 to 21,990. This disparity between donor organ demand and supply has resulted in more than 38,000 deaths of individuals awaiting transplant during that time period (UNOS Database, 2000). Currently an estimated 17 individuals in the US die each day while waiting for an organ transplant (UNOS Database, 2000).

While several obstacles to increasing the cadaveric donation rate exist, one key barrier is that approximately half of the families of potential donors refuse consent, a finding that appears to be relatively consistent over the past decade (Gortmaker et al., 1996; Guadagnoli et al., 1999; Sales & Burrows, 1986). This obstacle has remained despite extensive efforts to inform and educate the public and professionals about the need for organ donation, increased emphasis on documenting donation intentions, and government policies that have improved the organ procurement and transplantation process (Siminoff, Arnold, Caplan, Virnig, & Seltzer, 1995). While programmatic efforts to increase the quality and quantity of family approaches have been made, few of these interventions have been theoretically based, focus on enhancing important decision-making variables, and provide an easy framework for systematic evaluation (Radecki & Jaccard, 1997; Siminoff & Arnold, 1996). As efforts to increase the family consent rate could more than double the number of available donor organs; new approaches are needed to assist the organ donation community in meeting these needs.

New methodologies are needed to assist health care practitioners and organ procurement specialists to increase family consent rates. One innovative approach to behavior change is the TTM, which matches interventions to individuals' stage of readiness to take action. Interventions based on this model have demonstrated efficacy targeting different health-related behaviors in various populations (Brug, Glantz, Van Assema, Kok, & van Breukelen, 1998; Campbell et al., 1994; CDC, 1999; Marcus, Bock et al., 1998; Marcus, Emmons et al., 1998; Prochaska, DiClemente, Velicer, & Rossi, 1993; Rakowski et al., 1998; Rossi, Weinstock, Redding, Cottrill, & Maddock, 1997; Skinner, Strecher, & Hospers, 1994; Velicer, Prochaska, Fava, Laforge, & Rossi, 1999; Weinstock, Rossi, Redding, & Maddock, 1998). This model offers a promising new approach to understanding the

family consent decision-making process and increasing consent for cadaveric organ donation. This study investigated the appropriateness of two important components from the TTM for increasing family consent for organ donation. The goal of this project was to operationalize two key TTM constructs, *stage of change* and *decisional balance*, and provide initial validity for these constructs in understanding the donation consent process.

The transtheoretical model

Stages of change

Transtheoretical model-based research over the past 20 years suggests that, in their attempts to change behavior, people pass through a well-defined series of stages of change: precontemplation, contemplation, preparation, action, and maintenance. In the first stage of change, the *precontemplation stage*, individuals are not ready to take action. They may be unaware of the issue, be misinformed about it, or hold beliefs against it, and consequently they underestimate the benefits of taking action and overestimate the costs. In the *contemplation stage*, individuals are thinking about taking action but the advantages and disadvantages of taking action are balanced. Individuals in the *preparation stage* have decided to take action and may even have begun to take small steps toward that goal. Individuals in the *action stage* actively engage in modifying their problem behaviors or acquiring new, health-promoting behaviors. In the *maintenance stage* they strive to maintain the change and prevent relapse.

Progress through the stages has been found to be a cyclical rather than a linear process as most people recycle back to an earlier stage of change several times before successfully making and sustaining a behavior change. The likelihood of successful behavior change in an intervention program is highly related to an individual's stage of change at enrollment. Extensive research on smoking cessation shows that stage of change is a better predictor of future behavior than demographic variables (Prochaska, DiClemente, Velicer, Ginpil, & Norcross, 1985). Smokers in preparation are twice as likely to be abstinent at one month post-treatment than contemplators, who in turn are twice as likely to be abstinent as precontemplators. This pattern continues at six months post-treatment (DiClemente et al., 1991). Furthermore, a single brief intervention that helps an individual advance only one stage of change will double his or her chances of taking effective action in the near future (Prochaska, DiClemente, & Norcross, 1992).

A great deal of empirical support for the TTM exists, especially for smoking cessation and addictive behaviors (Prochaska & DiClemente. 1983; Prochaska et al., 1985, 1991, 1992, 1993). In recent years, support for the model has been extended across a wide range of health behaviors, including sun protection, exercise adoption, dietary fat and fiber intake, mammography screening, weight management, cocaine abuse, alcohol abuse, radon exposure, diabetes management, condom use and HIV risk reduction, stress management, and psychotherapy (Prochaska et al., 1993; Prochaska, Velicer et al., 1994; Ruggiero & Prochaska, 1993; Ruggiero et al., 1997; Velicer, Prochaska, Fava, Norman, & Redding, 1998). A wide range of populations have been studied including high school and college students, adults with minimal education, and traditionally underserved and minority groups.

Decisional balance

The TTM also defines a set of outcome or intermediate variables that includes decisional balance, a subjective weighing of the *pros* and the *cons* of the behavior change. Decisional balance is based on the theoretical model of decision making developed by Janis and Mann (1977) and was first evaluated in the context of decision making for smoking cessation (Velicer, DiClemente, Prochaska, & Brandenburg, 1985). In Janis and Mann's view, sound decision making requires the consideration of the following potential gains (pros) and the potential losses (cons) associated with a behavior's consequences: (1) utilitarian gains and losses for self; (2) utilitarian gains and losses for others; (3) self-approval and self-disapproval; and (4) approval and disapproval from others. Though, Janis and Mann's theory proposed eight categories of decision making, subsequent factor analytic studies have found support for only two general factors, the pros and the cons (Marcus, Rakowski, & Rossi, 1992; O'Connell & Velicer, 1988; Rakowski et al., 1992; Redding, Rossi, Velicer, & Prochaska, 1989; Rossi, 1990; Rossi &

Blais, 1991; Velicer et al., 1985). Velicer et al. (1985) concluded that the emergence of two orthogonal pros and cons scales means that the ratings of the positive consequences of a decision are largely independent of the ratings given to the decision's negative consequences. In another integrative report of 12 studies, Prochaska, Velicer et al. (1994) found that the balance of pros and cons was systematically related to the stage of change across all 12 behaviors examined. The cons of changing to a health-promoting behavior outweighed the pros in the precontemplation stage, the pros surpassed the cons in the middle stages usually crossing in contemplation, and the pros outweighed the cons in the action stage.

It is important to note that all of the behaviors in previous TTM research were intentional, individual level health behavior changes. The organ donation decisional process differs from these health behavior changes in some important ways. The organ donation decision is made by available family members after the unanticipated, often traumatic death of a loved one, within a brief window of time following the death, and includes varying numbers of family members and/or advocates in the process. Some might hypothesize that these factors make the organ donation decision-making process different enough from other health behavior change decisions that decisional balance and stages of change constructs do not apply. Ultimately, this is an empirical question and one that this study seeks to address. In the current context, increasing the salience and enhancing the weight of the pros of consenting to donation (e.g. bring meaning to the death) and decreasing the importance of the cons of consenting to donate (e.g. concern about disfigurement of the body) should also help increase the likelihood that an individual will progress through the stages to the act of consent.

This study examined the potential for extending the transtheoretical model of behavior change to consent for cadaveric organ donation by measuring two key model constructs in a sample of individuals who consented to or refused consent for organ donation for a brain-dead family member. The purpose of this work is to develop stage and decisional balance measures and test expected relationships between these TTM constructs for organ donation consent. These measures can be useful tools for understanding and facilitating the decision to donate a loved one's organs. In addition, this study provides preliminary evidence of the applicability of the model to this new area.

Method

Participants

Recruitment Participants were legal next-of-kin, one representative per family, who had been approached to donate the organs of a family member at a hospital serviced by one of 19 organ procurement organizations (OPOs) affiliated with the South-Eastern Organ Procurement Foundation. Efforts were made to include families who ultimately decided to donate and those who refused. Representatives from each OPO contacted 270 potential study participants by telephone from OPO databases. One hundred and eighty-seven individuals (59 percent) agreed to release their name and telephone number to researchers at the University of Rhode Island (URI) and 169 of these individuals (90 percent) participated in the study.

Sample characteristics Seventy-six percent of the sample was female, the average age was 46.5 years (SD = 12.7 years) and the average years of education was 13.4 (SD = 2.8 years). Seventy-three percent of the subjects were White, 25 percent Black, and two percent Hispanic. At the time of the family member's death, 75.6 percent of the subjects were married and 46.7 percent had a household income of $30,000 or less. One hundred and thirty-six of the participants (80.5 percent) had consented to donate their family member's organs. The preponderance of participants in this sample who consented to donate reflects the lack of tracking information maintained by the OPOs on families who refuse consent for donation.

Procedure Subjects were contacted by a representative of the OPO that had initially solicited them for consent to donate their family member's organs at the time of the death. The OPO representative then requested permission to forward the subject's name to the URI for a survey about factors in their donation decision. Individuals who agreed to the release of their

name to the URI were then contacted and completed a 45-minute telephone survey conducted by interviewers with telephone counseling experience. Study interviews were conducted from June 1997 through June 1998. Interviews for the great majority of the subjects (n = 157) were completed no earlier than two months from the date of the family member's death and no later than 24 months from the date of the death. On average, subjects were interviewed 12 months from the date of the death (M = 360.8 days, SD = 127.8 days). Twelve subjects completed the survey a minimum of two years from the date of their loved one's death (M = 2266.3 days, SD = 2576.3 days).

Measures

Stages of change A short series of questions were designed to assign subjects into one of four mutually exclusive categories of readiness to consent to organ donation. This measure was based on previous staging algorithms developed for other behaviors (Marcus et al., 1992; Velicer et al., 1985). However, this measure was also designed to take into account the retrospective nature of this study. Subjects were asked to rate their readiness to consent to donation at the point when they first interacted with the donation specialist from the OPO. Table 1 presents the exact descriptions that the participants endorsed to be categorized into each stage of change.

Once a decision to donate has been made and procedures for organ retrieval are complete, the donation decision is irreversible and there is no potential for relapse to pre-action stages. Therefore, participants were not assigned to a maintenance stage for donation consent.

Decisional balance inventory Development of the decisional balance measure was guided by the sequential method of instrument development described by Comrey (1988) and Jackson (1970, 1971) and was based on similar decisional balance instruments previously devised for other health behaviors (Marcus et al., 1992; Velicer et al., 1985). Two focus groups conducted with organ procurement specialists and survey data on individuals who consented and refused consent for donation generated an initial pool of 47 statements reflecting the positive (pros) and negative (cons) consequences of consenting to organ donation (DeJong et al., 1998; Peters, Kittur, McGaw, Roy, & Nelson, 1996). Several trained raters experienced with the TTM assessed the items for face validity. Final item selection was determined on the basis of item clarity, simple expression of the idea, lack of redundancy with other selected items, and representativeness of the conceptual definitions of the decisional balance constructs. The final pool of items consisted of 26 statements, including 13 pros and 13 cons of consenting to donation. Subjects rated the importance of each item in their personal decision about donation on a five-point scale ranging from (1) not at all important to (5) extremely important.

Results

Overview of analyses

Two sets of analyses were conducted. In the first set, the dimensional and psychometric properties of the decisional balance scale were assessed. These analyses were designed to: (1) determine the number of components present and estimate the correlation between them; (2)

Table 1. Stages of change for organ donation consent

Stage category	*Staging item*
Precontemplation	I was opposed to organ donation for [NAME][a]
Precontemplation	I was NOT considering organ donation as an option for [NAME]
Contemplation	I was considering the option of organ donation for [NAME] but was not yet ready to make that decision
Preparation	I was ready to choose the option of organ donation for [NAME] and needed more information on the process to go ahead
Action	I had already decided to donate [NAME'S] organs and only needed to move the donation process along

[a]Telephone interviewers used the first name of the deceased family member when reading the staging measure choices to the participants

provide estimates of the component loadings, eliminate complex items and items with poor loadings; and (3) estimate internal consistency for each component. In the second set of analyses, the construct validity of the measure was assessed by examining the relationships between decisional balance, the stages of change, and the donation decision.

Development of the decisional balance scale

Exploratory factor analysis of the decisional balance inventory was conducted using principal components analysis (PCA) with varimax rotation on the 26 × 26 matrix of item intercorrelations. The number of components to retain was determined using the minimum average partial procedure (Velicer, 1976) and parallel analysis (Horn, 1965). These two methods have been found to be the most accurate for determining the number of components to retain (Zwick & Velicer, 1986). Both indicated that a two-component solution best described the data. The two orthogonal components clearly represented the pros and cons of consenting to organ donation.

Item selection was conducted to eliminate complex items (component loading ≥ .40 on both components) and items with poor loadings (< .40 on both components). Items were also eliminated after review to maintain construct breadth and limit redundancy. These procedures reduced the number of items to 14, seven representing the pros and seven representing the cons. The final two-component 14-item solution had good stability and accounted for 48.5 percent of the total item variance. Stability of component patterns is enhanced with good component saturation (loadings) and absolute sample size. This study has a good absolute sample size (n > 150), good saturation (average .6–.8 loadings) and a reasonable number of items (7) per factor (Guadagnoli & Velicer, 1988; Velicer & Fava, 1987). The items representing the pros and cons scales and factor loadings are presented in Table 2.

Scale scores were derived from the sum of the item scores. The correlation between the pros and the cons scales was –.22. Scale means, standard deviations, and internal consistency (Cronbach's alpha) coefficients for the pros and cons scales are summarized in Table 3.

Validation of the decisional balance scale

Construct validity of the instrument was assessed by examining the functional relationships between the stages of change and the pros and cons, and comparing these relationships to those that have been found for other behaviors. Examining their relationships to the donation decision also assessed the validity of the TTM measures.

Table 2. Pros and cons scale items and principal components loadings

Scale items	*Component loading*
Pros	
1. Organ donation is an important way to help somebody else	.752
2. Organ donation allows something positive to come out of my loved one's death	.793
3. Organ donation might prevent another family from losing a loved one	.774
4. My family approves of organ donation	.598
5. Organ donation helps people cope with the loss of a loved one	.642
6. Consenting to organ donation helps bring meaning to the death of a loved one	.681
7. People who consent to organ donation can feel proud of what they have done	.791
Cons	
1. My loved one has suffered enough already and shouldn't have surgery for organ donation	.575
2. Organ donation will cause my family more emotional distress	.553
3. If I consent to organ donation, the doctors will not try to save my loved one's life	.670
4. The physicians may take my loved one's organs before he/she is really dead	.762
5. Consenting to organ donation means you can't have an open casket for your loved one	.699
6. Hospitals could bill donor families for the costs of organ donation	.650
7. Consenting to organ donation will delay my loved one's burial	.602

Table 3. Psychometric characteristics of decisional balance scales (n = 169)

Scale	*# items*	*M*	*SD*	*Alpha*
Pros	7	28.03	6.68	.85
Cons	7	11.98	6.02	.78

Scale scores range from 7 to 35

Stages of change Based on their responses to the staging algorithm questions, 41 percent of the 169 subjects were classified in the action stage for donation consent when they first interacted with the OPO representative. Fifteen percent of the subjects were classified in the preparation stage and 15 percent were classified in the contemplation stage for the donation decision. The remaining 26 percent of the subjects were classified into the precontemplation stage because they had no intention to donate their loved one's organs at the point when they first met with the donation specialist.

Construct validity of the decisional balance measure A one-way multivariate analysis of variance (MANOVA) was conducted with stage of change as the independent variable and the pros and cons scale scores as the dependent variables. Scale scores were then converted to T-scores (M = 50, SD = 10) in order to provide a standard metric. Table 4 presents the T-score means and standard deviations by stage of readiness to consent to donation.

The main effect for stage of change was significant (Wilk's Λ = .83, F[6,316] = 5.08, p < .001). Follow-up univariate analyses of variance (ANOVA) of the separate pros and cons scale scores found significant differences between stage groups for the cons (F[3,159] = 5.36, p < .01, η^2 = .09) and for the pros (F[3,159] = 6.60, p < .001, η^2 = .11). Follow-up Tukey post-hoc tests revealed that the precontemplators rated the cons of consenting to organ donation as significantly more important than did those in the action stage. Precontemplators also rated the importance of the pros significantly lower than individuals who were in action for donation consent. Figure 1 presents a graphical view of the pros and cons scales by stages of donation consent. This figure depicts a pattern of pros and cons by stage that is very similar to the relationship of these variables found in their application to numerous other behaviors (Prochaska et al., 1994).

Stage, decisional balance and the donation decision The construct validity of the stages of change and decisional balance measures was also evaluated in relation to the subjects' final decision whether or not to donate their loved one's organs. Individuals in precontemplation when first interacting with the donation specialist were significantly less likely to agree to donate their loved one's organs than family members who were in the preparation or action stages (χ^2[3,169] = 43.2, p < .001). We found a strong linear relationship between stage of change at the point when they first interacted with the donation specialist and their ultimate decision to donate: 54 percent of precontemplation, 65 percent of contemplation, 96 percent of preparation, and 99 percent of action stage individuals ultimately decided to donate their family

Table 4. Standard score (T-score) means and standard deviations of the pros and cons scales by stage of donation consent.

	Stage of change						
	PC (n = 44)	*C (n = 25)*	*PR (n = 25)*	*A (n = 69)*	*F*	*Tukey HSD*	η^2
Pros							
M	44.7	50.4	50.8	52.8	6.6*	PC < A	.111
SD	(12.9)	(10.0)	(8.3)	(7.1)			
Cons							
M	54.1	52.3	48.9	47	5.36*	PC > A	.092
SD	(12.2)	(11.3)	(8.3)	(7.4)			

PC = precontemplation, C = contemplation, PR = preparation, A = action
Wilks' Λ: F(6, 316) = 5.08, p < .01
*p < .01

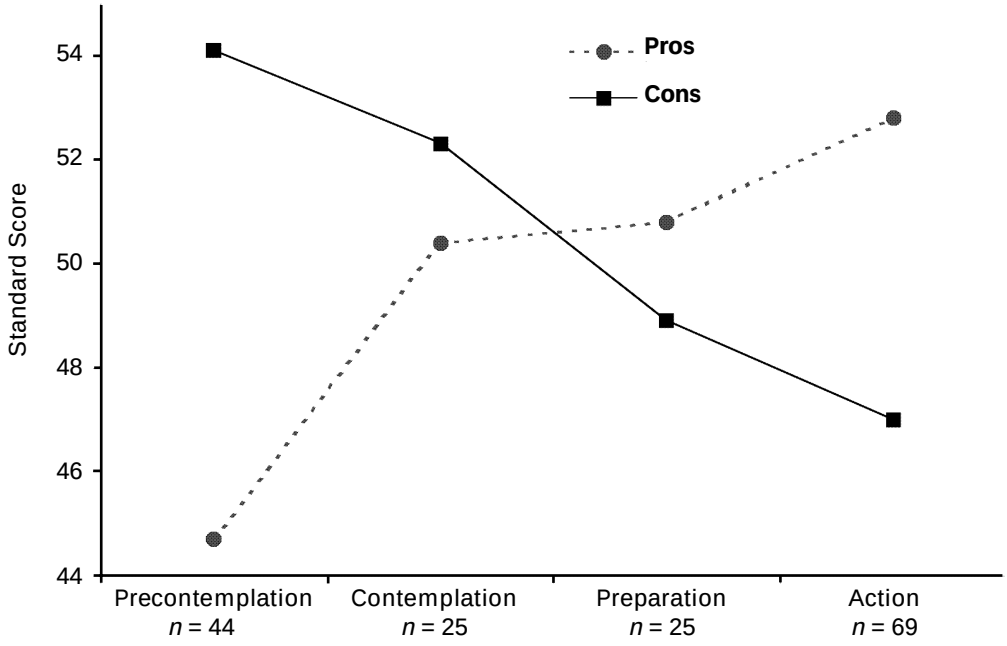

Figure 1. Pros and cons of family consent T-scores by stage of change.

members' organs. Scores on the Decisional Balance Scales were also strongly associated with the donation decision. Individuals who made the decision to donate rated the importance of pros much more highly (M = 29.75, SD = 4.83) than non-donor participants (M = 20.78, SD = 8.35; $F[1,165] = 64.91$, $p < .001$, $\eta^2 = .28$). The reverse pattern was found for the cons as family members who consented to donate rated the importance of the cons as significantly lower (M = 10.96, SD = 5.47) than family members who chose not to donate (M = 16.0, SD = 6.40; $F[1,163] = 20.88$, $p < .001$, $\eta^2 = .11$).

Discussion

These results provide good initial support for the application of the Decisional Balance and Stages of Change constructs to consenting to organ donation. Principal components analyses resulted in a two-factor model of decisional balance representing the pros and cons of donation consent. The emergence of orthogonal components, one representing the positive consequences of donating a loved one's organs and the other representing the anticipated negative consequences of consenting to donation, supports the conceptualization of decisional balance proposed by Velicer et al. (1985). The small correlation between the pros and the cons scales is comparable to that found for these scales in other health behavior applications (Grimley, Riley, Bellis, & Prochaska, 1993; Prochaska, Velicer et al., 1994). The resulting 14-item decisional balance instrument displayed excellent internal consistency for the pros scale and good internal consistency for the cons scale.

Previous results across diverse behaviors have consistently displayed a crossover pattern of decisional balance across the stages of change, with the cons outweighing the pros in the early stages and the pros outweighing the cons in the later stages (Prochaska, Velicer et al., 1994). These results were replicated in the current study, supporting the external validity of the decisional balance constructs for the organ donation decision process. In particular, the pros of consenting to donation increased substantially between the precontemplation and contemplation stages, a pattern seen consistently in other behavioral areas (Prochaska, Velicer et al., 1994).

Both stage of change and the decisional balance inventory were strongly associated with the donation decision which also supports the external validity of the TTM constructs for donation consent. Individuals who consented to donate were significantly more likely to be in the preparation or action stages for consent when first meeting with the donation specialist. Donor family members also rated the pros as much more important with the pros scale accounting for 28 percent of the variance in the donation decision. Conversely, non-donor family members rated the cons as more important with the cons scale accounting for 11 percent of the variance in the donation decision.

The results of this study are limited by the cross-sectional nature of the sample representing the different stages of change. Longitudinal research is required to more completely address this issue. Previous longitudinal studies of decisional balance and the stages of change for smoking cessation have supported cross-sectional results (Prochaska et al., 1991). Additional studies will be needed to cross-validate the structure of the decisional balance scale and its relationship to the stages of change. Future assessments of stages of change for donation consent would benefit from more representative samples of donor and non-donor participants to provide a more accurate estimate of the population distribution of readiness for the donation decision.

The retrospective nature of this study design does limit our conclusions to some extent. Given that most participants were interviewed 12 months from the death of their loved one, there could easily have been some degree of recall bias. To reduce cognitive dissonance (Festinger, 1957), in which beliefs or attitudes are sometimes brought in line with previous actions, individuals who consented to donate may be more likely to remember and emphasize the pros of their decision while individuals who refused consent may be more likely to remember and emphasize the cons. Despite this, the structure of this decisional balance measure and its relationship to the stages of change were both remarkably similar to and consistent with those of decisional balance scales developed for other health behaviors in studies that were not retrospective (Prochaska, Velicer et al., 1994). It is reasonable to hypothesize that the donation solicitation process is very memorable given the importance and emotional impact of the events that precede it. Anecdotal reports from survey participants suggested that many recalled the events and their decision-making process 'as if it happened yesterday'. If feasible, prospective and longitudinal studies would be ideal to further validate these new measures and assess the applicability of the TTM to organ donation. However, longitudinal prospective studies may not be feasible given the constraints of the organ donation decision-making context (i.e. an unexpected, emotionally charged, low base rate event). Future studies will benefit from the availability of this internally consistent and psychometrically sound measure.

As cadaveric organ donation is an infrequent event and most OPOs do not maintain information on non-donor families for follow-up surveys, the current sample over-represented individuals who consented to donate. The under-recruitment of non-donor participants likely produced a different stage distribution than would be found in a more representative sample of individuals approached for donation consent. Although the content and dimensionality of the Decisional Balance Scales are expected to be invariant across different samples of families (the assumption of factorial invariance; Thurstone, 1947), distributions of scores on the measures are likely to differ from sample to sample.

While there is significant support for the TTM, the model has been the subject of some criticism (see Joseph, Breslin, & Skinner, 1999, for a recent review). Reviews of the available empirical studies on the TTM indicate that there is a great deal of variability with respect to the behavior(s) under study, the number of—and relationship among—constructs evaluated, the quality of the measurement models and validity data reported, and there is considerable variation with respect to study populations and the adequacy of the design and study implementation (Carey, Purnine, Maisto, & Carey, 1999; Rimer, 1997; Strecher, 1999; Weinstein, Rothman, & Sutton, 1998). These reviews serve to reinforce the need for careful, programmatic, empirical research to assess the validity of the TTM. A great body of empirical work does support the utility of the TTM as a framework for understanding and intervening in decision

making and behavior change even across diverse problem behaviors (Prochaska & Velicer, 1997). Furthermore, the relationships between decisional balance and stages of change have been widely replicated. The most critical questions about this model are empirical and therefore, require further studies using psychometrically sound measures, such as the one developed here.

Despite these limitations, this study represents a promising first step towards the application of the TTM to the process of family consent for organ donation. This model has important implications for understanding and developing interventions to increase consent rates (Robbins, 1998). In addition to further research on decisional balance, more work is also needed to develop and validate other TTM constructs in the context of organ donation decision making, including the processes of change and self-efficacy. The resulting model and measures can provide a useful and powerful framework for understanding the cognitive and motivational changes displayed by individuals faced with the donation decision, and for developing interventions designed to enhance their motivation to donate.

Motivational interventions, such as those implemented by counselors to reduce alcohol use or help individuals quit smoking, focus on identifying and working with ambivalence as one of the central mechanisms of change (Colby et al., 1998; Miller & Rollnick, 1991). Donation specialists can use this decisional balance inventory in clinical situations to identify the degree of ambivalence currently experienced by family decision makers. Motivational interventions could then be applied to highlight ambivalence and tip the balance toward a decision to donate, where appropriate. If the pros are higher than the cons, it may be an indicator that the family members are ready to benefit from more action-oriented interventions, whereas if cons are higher than the pros motivational enhancement approaches may be more appropriate. When the cons exceed the pros and family members are not at all ready to consider donation, this family may ultimately choose not to donate the loved one's organs, and thus identifying this early in the process could save valuable time and resources for all involved.

When we offer action-oriented interventions to entire populations displaying all stages of readiness to change, we are likely to mis-serve those people who are in the precontemplation and contemplation stages who are not yet ready to change. Instead, a stage-matched approach would highlight the key decisional factors in the donation consent process and tailor the intervention to the level of readiness present in the family (Robbins, 1998). This approach has led to the development of successful interventions targeting a diverse range of behaviors across many different populations, and could also serve to increase the success rate of organ procurement solicitations.

Applying the TTM to increase the effectiveness of organ donation solicitations presents some new challenges for both measurement and future intervention development. These include the acute nature of the problem area, the highly emotional state of the families who are approached for donation consent, and the relatively small time window in which these solicitations must be made. Model-based interventions must then be sensitive to the emotional nature of cadaveric organ donation, minimize the assessment necessary to utilize model-based constructs, and offer optimal process-based interventions that, when appropriate, will help individuals move toward choosing to consent (Robbins, Prochaska, & Redding, 1998; Rohr & Robbins, 1998).

References

Brug J., Glantz, K.,Van Assema, P., Kok, G., & van Breukelen, G. J. P. (1998). The impact of computer-tailored feedback and iterative feedback on fat, fruit, and vegetable intake. *Health Education and Behavior, 25,* 517–531.

Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R. F., & Sandler, R. S. (1994). Improving dietary behavior: The effectiveness of tailored messages in primary care settings. *American Journal of Public Health, 84,* 783–787.

Carey, K. B., Purnine, D. M., Maisto, S. A., & Carey, M. P. (1999). Assessing readiness to change substance abuse: A critical review of instruments. *Clinical Psychology: Science and Practice, 6,* 245–265.

CDC AIDS Community Demonstration Projects Research Group. (1999). Community-level HIV intervention in 5 cities: Final outcome data from the CDC AIDS Community Demonstration Projects. *American Journal of Public Health, 89,* 336–345.

Colby, S. M., Monti, P. M., Barnett, N. P., Rosenhow, D. J., Weissman, D., Spirito, A., Woolard, R. H., & Lewander, W. J. (1998). Brief motivational interviewing in a hospital setting for adolescent smoking: A preliminary study. *Journal of Consulting and Clinical Psychology, 66,* 574–578.

Comrey, A. L. (1988). Factor-analytic methods of scale development in personality and clinical psychology. *Journal of Consulting and Clinical Psychology, 56,* 754–761.

DeJong, W., Franz, H. G., Wolfe, S. M., Nathan, H., Payne, D., Reitsma, W., & Beasley, C. (1998). Requesting organ donation: An interview study of donor and nondonor families. *American Journal of Critical Care, 7,* 13–23.

DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology, 59,* 295–304.

Evans, R. W., Manninen, D. L., Garrison, L. P., Hart, L. G., Blagg, C. R., Gutman, R. A., Hull, A. R., & Lowrie, E. G. (1985). The quality of life of patients with end-stage renal disease. *New England Journal of Medicine, 312,* 553–559.

Festinger, L. (1957). *A theory of cognitive dissonance.* Evanston, IL: Row, Peterson.

Gerhardt, T. C., Goldstein, R. M., Urschel, H. C., Tripp, L. E., Levy, M. F., Husberg, B. S., Jennings, L. W., Gonwa, T. A., & Klintmalm, G. B. (1996). Alcohol use following liver transplantation for alcoholic cirrhosis. *Transplantation, 62,* 1060–1063.

Gortmaker, S. L., Beasley, C. L., Brigham, L. E., Franz, H. G., Garrison, R. N., Lucas, B. A., Patterson, R. H., Sobol, A. M., Grenvik, A. N. A., & Evanisko, M. J. (1996). Organ donor potential and performance: Size and nature of the organ donor shortfall. *Critical Care Medicine, 24,* 432–439.

Grimley, D. M., Riley, G. E., Bellis, J. M., & Prochaska, J. O. (1993). Assessing the stages of change and decision-making for contraceptive use for the prevention of pregnancy, sexually transmitted diseases, and acquired immunodeficiency syndrome. *Health Education Quarterly, 20,* 455–470.

Guadagnoli, E., McNamara, P., Evanisko, M. J., Beasley, C., Callender, C. O., & Poretsky, A. (1999). The influence of race on approaching families for organ donation and their decision to donate. *American Journal of Public Health, 89,* 244–247.

Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin, 103,* 265–275.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30,* 179–185.

Jackson, D. N. (1970). A sequential system for personality scale development. In C. D. Spielberger, (Ed.), *Current topics in clinical and community psychology (Vol. 2)* (pp. 61–96). New York: Academic Press.

Jackson, D. N. (1971). The dynamics of structural personality tests. *Psychological Review, 78,* 229–248.

Janis, I. L., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice and commitment.* New York: Free Press.

Joseph, J., Breslin, C., & Skinner, H. (1999). Critical perspectives on the transtheoretical model and stages of change. In J. A. Tucker, D. M. Donovan, & G. A. Marlatt (Eds.), *Changing addictive behavior: Bridging clinical and public health strategies* (pp. 160–190). New York: Guilford Press.

Marcus, B. H., Bock, B. C., Pinto, B. M., Forsyth, L. H., Roberts, M. B., & Traficante, R. M. (1998). Efficacy of an individualized, motivationally-tailored physical activity intervention. *Annals of Behavioral Medicine, 20,* 174–180.

Marcus, B. H., Emmons, K. M., Simkin-Silverman, L. R., Linnan, L. A., Taylor, E. R., Bock, B. C., Roberts, M. B., Rossi, J. S., & Abrams, D. B. (1998). Evaluation of motivationally tailored vs. standard self-help physical activity interventions at the workplace. *American Journal of Health Promotion, 12,* 246–253.

Marcus, B. H., Rakowksi, W., & Rossi, J. S. (1992). Assessing motivational readiness and decision making for exercise. *Health Psychology, 11,* 257–261.

Miller, W. R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change addictive behavior.* New York: Guilford Press.

O'Connell, D., & Velicer, W. F. (1988). A decisional balance measure and the stages of change model for weight loss. *International Journal of the Addictions, 23,* 729–750.

Perkins, K. A. (1987). The shortage of cadaver donor organs for transplantation: Can psychology help? *American Psychologist, 42,* 921–930.

Peters, T. G. (1992). Stringent standards shed new light on donor acceptance. *Contemporary Dialysis and Nephrology, August,* 16–21.

Peters, T. G., Kittur, D. S., McGaw, L. J., Roy, M. R., & Nelson, E. W. (1996). Organ donors and nondonors. An American dilemma. *Archives of Internal Medicine, 156,* 2419–2424.

Peters, T. G., & Vaughn, W. K. (1990). Organs for transplantation: Analysis of 27,000 cadaveric donor organs. *Southern Medical Journal, 83,* 889–892.

Prochaska, J. O., & DiClemente, C. C., (1983). Stages and processes of self-change in smoking: Towards and integrative model of change. *Journal of Consulting and Clinical Psychology, 51,* 390–395.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change:

Applications in the addictive behaviors. *American Psychologist, 47,* 1102–1114.

Prochaska, J. O., DiClemente, C. C., Velicer, W. F., & Rossi, J. S. (1993). Standardized, individualized, interactive, and personalized self-help programs for smoking cessation. *Health Psychology, 12,* 399–405.

Prochaska, J. O., DiClemente, C. C., Velicer, W. F., Ginpil, S., & Norcross, J. (1985). Predicting change in smoking status for self-changers. *Addictive Behavior, 10,* 395–406.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12,* 38–48.

Prochaska, J. O., Velicer, W. F., Guadagnoli, E., Rossi, J. S., & DiClemente, C. C. (1991). Patterns of change: Dynamic typology applied to smoking cessation. *Multivariate Behavioral Research, 26,* 83–107.

Prochaska, J. O., Velicer, W. F., Rossi, J. S., Goldstein, M. G., Marcus, B. H., Rakowski, W., Fiori, C., Harlow, L. L., Redding, C. A., Rosenbloom, D., & Rossi, S. R. (1994). Stages of change and decisional balance for twelve problem behaviors. *Health Psychology, 13,* 39–46.

Radecki, C., & Jaccard, J. (1997). Psychological aspects of organ donation: A critical review and synthesis of individual and next-of-kin donation decision. *Health Psychology, 16,* 183–195.

Rakowski, W., Dube, C. E., Marcus, B. E., Prochaska, J. O., Velicer, W. F. & Abrams, D. B. (1992). Assessing elements of women's decisions about mammography. *Health Psychology, 11,* 111–118.

Rakowski, W. R., Ehrich, B., Goldstein, M. G., Rimer, B. K., Pearlman, D. N., Clark, M. A., Velicer, W. F., & Woolverton, H. (1998). Increasing mammography among women aged 40–74 by use of a stage-matched, tailored intervention. *Preventive Medicine, 27,* 748–756.

Redding, C. A., Rossi, J. S., Velicer, W. F., & Prochaska, J. O. (1989). *The pros and cons of safer sex: A measurement model.* Paper presented at the 97th annual meeting of the American Psychological Association, August, New Orleans, LA.

Rimer, B. K. (1997). Perspectives on intrapersonal theories of health behavior. In K. Glantz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education: Theory, research, and practice*. San Francisco, CA: Jossey-Bass.

Robbins, M. L. (1998). Applying a readiness model to increasing organ donation and transplantation. *Medicine and Health Rhode Island, 81,* 294–296.

Robbins, M. L., Prochaska, J. O., & Redding, C. A. (1998). *Stage based intervention to increase consent for cadaveric organ donation: A training curriculum for organ procurement coordinators.* Paper presented at the Department of Health and Human Services Conference on Increasing donation and Transplantation: The Challenge of Evaluation, Arlington, VA, April.

Rohr, M. S., & Robbins, M. L. (1998). A new look at the organ donation consent process. *Contemporary Dialysis and Nephrology Care, November,* 32–33, 38.

Rossi, J. S. (1990). Radon and ultraviolet light exposure: Emerging cancer risk factors. In J. O. Prochaska (Chair), *The stages of change: Extensions to new areas of behavior change*. Symposium presented at the 98th annual conference of the American Psychological Association, Boston, MA, August.

Rossi, J. S., & Blais, L. M. (1991). *The pros and cons of using sunscreens.* Paper presented at the 12th annual meeting of the Society of Behavioral Medicine, Washington, DC, March.

Rossi, J. S., Weinstock, M. A., Redding, C. A., Cottrill, S. D., & Maddock, J. E. (1997). Effectiveness of stage-matched interventions for skin cancer prevention: A randomized clinical trial of high-risk beach bathers. *Annals of Behavioral Medicine, 19,* S194 (Abstr.).

Ruggiero, L., & Prochaska, J. O. (1993). Application of the transtheoretical model to diabetes. *Diabetes Spectrum, 6,* 22–24.

Ruggiero, L., Glasgow, R. E., Dryfoos, J. M., Rossi, J. S., Prochaska, J. O., Orleans, T., Prokhorov, A. V., Rossi, S. R., Greene, G. W., Reed, G. R., Kelly, K., Chobanian, L., & Johnson, S. (1997). Diabetes self-management. *Diabetes Care, 20,* 568–576.

Sales, C. M., & Burrows, L. (1986). Cadaveric organ procurement: An investigation of a source of kidney shortage. *Transplantation Proceedings, 18,* 416–418.

Siminoff, L. A.,& Arnold, R. M. (1996). Consent to donation: A review. *Tissue and Cell Report, 3,* 19–26.

Siminoff, L. A., Arnold, R. M., Caplan, A. L., Virnig, B. A., & Seltzer, D. L. (1995). Public policy governing organ and tissue procurement in the United States. *Annals of Internal Medicine, 123,* 10–17.

Skinner, C. S., Strecher, V. J., & Hospers, H. J. (1994). Physician recommendations for mammography: Do tailored messages make a difference? *American Journal of Public Health, 84,* 43–49.

Strecher, V. J. (1999). Computer-tailored smoking cessation materials: A review and discussion. *Patient Education and Counseling, 36,* 107–117.

Thurstone, L. L. (1947). *Multiple factor analysis.* Chicago: University of Chicago Press.

United Network for Organ Sharing Database. (2000). [Online]. Available: [www.unos.org].

Velicer, W. F. (1976). Determining the number of components from the matrix of partial correlations. *Psychometrika, 41,* 321–327.

Velicer, W. F., DiClemente, C. C., Prochaska, J. O., & Brandenburg, N. (1985). Decisional balance measure for assessing and predicting smoking status. *Journal of Personality and Social Psychology, 48,* 1279–1289.

Velicer, W. F. & Fava, J. L. (1987). An evaluation of the effects of variable sampling on component, image, and factor analysis. *Multivariate Behavioral Research, 22,* 193–209.

Velicer, W. F., Prochaska, J. O., Fava, J. L., Laforge, R. G., & Rossi, J. S. (1999). Interactive versus non-interactive interventions and dose-response relationships for stage matched smoking cessation programs in a managed care setting. *Health Psychology, 18,* 21–28.

Velicer, W. F., Prochaska, J. O., Fava, J. L., Norman, G. J., & Redding, C. A. (1998). Smoking and stress: Applications of the transtheoretical model of behavior change. *Homeostasis, 38,* 216–233.

Weinstein, N. D., Rothman, A. J. & Sutton, S. R. (1998). Stage theories of health behavior: Conceptual and methodological issues. *Health Psychology, 17,* 290–299.

Weinstock, M. A., Rossi J. S., Redding C. A., & Maddock J. E. (1998). Randomized trial of intervention for sun protection among beachgoers. *Journal of Investigative Dermatology, 110,* 589 (Abstr.).

Zwick, W. R., & Velicer, W. F. (1986). Factors influencing five rules for determining the number of components to retain. *Psychological Bulletin, 99,* 432–442.