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Measuring kidney patients' motivation to pursue living donor kidney transplant: Development of Stage of Change, Decisional Balance and Self-Efficacy measures

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Abstract

While educational interventions to increase patient motivation to pursue living donor kidney transplant have shown success in increasing living donor kidney transplant rates, there are no validated, theoretically consistent measures of Stage of Change, a measure of readiness to pursue living donor kidney transplant; Decisional Balance, a weighted assessment of living donor kidney transplant's advantages/disadvantages; and Self-Efficacy, a measure of belief that patients can pursue living donor kidney transplant in difficult circumstances. This study developed and validated measures of these three constructs. In two independent samples of kidney patients (N_1 = 279 and N_2 = 204), results showed good psychometric properties and support for their use in the assessment of living donor kidney transplant interventions.

Keywords

health education, health behavior, Self-Efficacy, stages of change, validation

Introduction

Over the past decade, the incidence and prevalence of end-stage renal disease (ESRD), a condition where a patient loses his or her kidney function, has continued to increase in almost every country in the world (United States Renal Data System, 2012). In the United States, for example, nearly 600,000 people with ESRD must decide whether to continue life on dialysis or have a deceased donor kidney transplant (DDKT) or living donor kidney transplant (LDKT) (United States Renal Data System, 2012). Compared with life on dialysis,

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transplant is widely recognized as the optimal treatment due to its association with superior patient survival and quality of life (Neipp et al., 2006; Orr et al., 2007; United States Renal Data System, 2012). Patients who are able to receive a LDKT from a family member or friend have the best treatment outcomes, living 46 percent longer than if they remained on dialysis and 8 percent longer than if they got a DDKT (United States Renal Data System, 2012). With a shortage of deceased donor kidneys available for transplant internationally (United States Renal Data System, 2012), LDKT is also the only transplant option with the potential for continued growth.

For these reasons, community nephrologists, dialysis professionals, and transplant staff are having conversations with ESRD patients and their support networks regularly about the treatment option of LDKT. The decision whether to pursue LDKT is complex. ESRD patients pursuing LDKT must complete a battery of medical and psychological evaluations, weigh the risks and benefits of LDKT for themselves and any donors, be ready and willing to have another person in their life donate to them, feel confident making efforts to find potential living donors, and be willing to have surgery and adhere to a postoperative care regimen. In addition to concerns and questions that patients have about undergoing transplant surgery themselves (Kurz et al., 2007; Waterman and Brennan, 2007; Waterman et al., 2006), accepting a kidney from a living donor, especially from a child of the patient, can be very difficult (Waterman et al., 2006). Research also has shown that many patients feel vulnerable asking others to donate a kidney to them (Rodrigue et al., 2008a) and find taking specific actions like having discussions with one's family or friends to be very challenging (Boulware et al., 2012; Waterman et al., 2006). Finally, patients also have high levels of concern about living donors losing their remaining kidney function, financial costs incurred by donors, and donors' disappointment if the transplant fails (Waterman et al., 2006).

Challenges to successful pursuit of LDKT also may be heightened for ethnic/racial minority patients. Studies have shown that non-Whites feel very uncomfortable discussing LDKT with others (Rodrigue et al., 2008a; Waterman et al., 2006). In addition, Black kidney patients are more likely to have illnesses like diabetes and hypertension that run in families, reducing the likelihood of locating potential living donors within their families (Waterman et al., 2010b). Mistrust of healthcare providers is also more common for Blacks than Whites (Boulware et al., 2003), which may affect their trust in physicians' recommendations for LDKT and cause suspicion of LDKT itself (Boulware et al., 2002, 2003). Currently, minority patients are less likely to receive LDKTs compared to White patients (Gore et al., 2009).

Educational interventions to increase transplant knowledge and motivation to pursue LDKT have shown some success at increasing rates of LDKT (Boulware et al., 2012; Rodrigue et al., 2008b). However, as providers initiate conversations about the possibility of LDKT, having the ability to accurately assess individual patients' readiness to pursue LDKT, weighing of the risks and benefits of LDKT, and confidence in their own ability to find a living donor is very important. One theory of behavioral change, the transtheoretical model (TTM), has already been successfully applied to transplant decision-making, specifically organ donation decision-making (Hall et al., 2007; Robbins et al., 2001) and whether ESRD patients would pursue DDKT (Waterman et al., 2010a). The TTM explains motivation and intentional behavior change based on thoughts, experiences, and behaviors and comprises four key constructs: Stage of Change (SOC), which measures how patients' motivation to take specific behavior changes through time (Prochaska and DiClemente, 1983); Decisional Balance (DB), an assessment of how a patient weighs the Pros and Cons of behavior change (Velicer et al., 1985); Self-Efficacy (SE), which captures whether an individual believes they can

make or sustain a behavior change in difficult situations (Bandura, 1977); and Processes of Change, which capture experiential and behavioral strategies used to facilitate behavior change. The validity and reliability of these decision-making constructs have been well evidenced (Hall and Rossi, 2008). This study focuses on the SOC, DB, and SE constructs of the TTM which, to date, have never been examined for their efficacy in measuring the LDKT decision-making of ESRD patients. We conducted a three-part study to develop and assess the reliability and validity of new SOC, DB, and SE measures for LDKT decision-making in an initial sample of 279 ESRD patients, to reconfirm these measures and further refine the SOC measure in a second sample of 204 patients, and to examine how patients' SOC varies dependent on taking different living donation actions.

Methods

Sampling procedure and participants

We recruited two independent, racially diverse samples of ESRD patients from dialysis centers and Barnes-Jewish Transplant Center (BJTC) in St Louis, Missouri, to evaluate the fit of the TTM and its constructs for measuring patients' LDKT decision-making (Sample 1 and Sample 2).

Patients were invited to participate in the study by telephone if they were 18 years or older, English-speaking, could hear and cognitively understand the terms of consent, had not received a previous kidney transplant or were told they were ineligible to receive a transplant, and who had poor kidney function requiring dialysis or immediate pursuit of transplant. Each patient volunteered to participate in the study without remuneration. Recruitment and survey procedures were approved by the Internal Review Board (#09-1294) at Washington University School of Medicine in St Louis, Missouri. In addition, Medical Directors and dialysis center Clinical Research Departments approved participation by dialysis patients.

Sample 1. Telephone surveys of Sample 1 were conducted from November 2009 to August 2011. Telephone contact information for Sample 1 was obtained for 627 patients who were in all phases of transplant evaluation at BJTC (n = 393) and receiving dialysis care within participating local centers (n = 234). Overall, 30 percent (n = 187) could not be reached after multiple attempts. Among the 440 patients reached, 279 (63.4%) completed the survey, 64 (14.5%) refused, and 99 (22.5%) were ineligible based on study exclusion criteria.

The majority of participants were on dialysis (82%) and male (50.2%), with an average age of 54 years (standard deviation (SD) = 12.6 years). Patients varied by race/ethnicity: 49.6 percent White, 47.4 percent Black, 1.1 percent Hispanic/Latino, 0.4 percent Asian, 0.7 percent American Indian or Alaska native, and 0.8 percent multiracial/other. Educational level varied, with some having a college degree or postcollege training (25.4%), a high school diploma or some college or vocational school training (60.2%), or less than high school education (14.4%).

Sample 2. Telephone surveys of Sample 2 were conducted between January and April 2012. Contact information was obtained for 478 patients, 12.8 percent (n = 61) of whom could not be reached. Among the remaining 417 patients reached, 204 (48.9%) completed the survey, 124 (29.7%) refused, and 89 (21.3%) were ineligible based on study exclusion criteria.

Most participants were on dialysis (74%), male (65%), and had a mean age of 54 years (SD = 12.4 years). Patients were 64.7 percent White, 33.3 percent Black, 0.5 percent Hispanic/Latino, 0.5 percent Vietnamese, and 1.0 percent multiracial/other. Educational level varied from having a college degree or postcollege training (25.0%), a high school diploma and some college or vocational school training (65.7%), to less than a high school education (9.3%).

Measures

A group of health psychologists and professionals with expertise in measure development, TTM, kidney transplantation, and organ donation reviewed previous LDKT formative research (Waterman et al., 2004a, 2004b) and developed a set of preliminary measures of LDKT SOC, DB, and SE. A detailed description of the development of identical TTM constructs for DDKT decision-making has been previously published by the authors (Waterman et al., 2010a).

Demographics and clinical characteristics. Patients' demographic and clinic characteristics were collected, including age, sex, race and ethnicity, level of education, and the length of time the patient was on dialysis.

SOC—Sample 1. SOC assesses patients' readiness to pursue LDKT. Consistent with past research (Prochaska and DiClemente, 1983), a series of questions were developed to determine patients' stage of readiness to pursue LDKT. In Sample 1, pursuing LDKT was defined as a person being willing to do three things: (1) accept a kidney from a living donor, (2) be evaluated for transplant, and (3) take actions to get the word out about their need for a living donor. After hearing this general LDKT description, patients chose one of four mutually exclusive categories that defined their own stage of readiness to get a LDKT: *Precontemplation* (not considering getting a LDKT in the next 6 months), *Contemplation* (considering taking actions to get a LDKT in the next 6 months), *Preparation* (preparing to take actions to get a LDKT in the next 30 days), and *Action* (taking actions to find living donors and get a LDKT). Following the SOC algorithm, participants were presented with a list of seven possible LDKT actions (e.g. accept someone's offer to be a living donor, share need for living donor with large community) and, for each action, indicated whether they were willing to take this action (yes/no).

SOC—Sample 2. Participant feedback suggested that the wording and order of the SOC assessment questions were somewhat confusing. To further improve the clarity of the SOC algorithm and ease of administration, for Sample 2, participants were first presented with a list of seven LDKT actions (Table 1; for example, accept someone's offer to be a living donor, share need for living donor with large community) and for each possible LDKT action asked whether they have "already done this," "are planning to do this," or "don't plan to do this." Then, patients were asked to choose one of the four following categories to define their readiness to take LDKT actions: *Precontemplation* (I am not considering taking actions in the next 6 months to pursue living donation), *Contemplation* (I am considering taking actions in the next 6 months to pursue living donation), *Preparation* (I am preparing to take actions in the next 30 days to pursue living donation), *Action* (I am taking actions to pursue living donation).

DB. Consistent with previous research, a 24-item DB measure was created to assess the Pros and Cons of pursuing LDKT (Velicer et al., 1985) and administered in Sample 1. This measure provides information about the relative importance an individual places on specific positive outcomes (e.g. living donation can happen more quickly than deceased donation) and negative outcomes (e.g. the living donor could be harmed by surgery). Patients were asked to rate, "How important is this statement to your decision about living donor transplant?" on a 5-point scale ranging from, "not important" (1) to "extremely important" (5). Sample 2 administered only a reduced measure set of 12 items determined after analysis of Sample 1 (Table 2).

SE. SE captures whether an individual believes they can make or sustain a behavior change in difficult situations (Bandura, 1977; Velicer et al., 1990). For Sample 1, an 11-item measure was created to assess an individual's degree of confidence in their ability to pursue LDKT in a

Table 1. Possible LDKT behaviors taken by Stage of Change to pursue living donation.

	Stage of Change[a]				Overall %
	PC	C	P	A	
	% "already done" within stage				
Generally talk to people about my interest in transplant	35	40	67	59	49.5
Share educational materials about living donation with people in your life	25	28	50	58	41.6
Allow others to tell people that I would be willing to pursue living donation	25	25	38	54	38.1
Ask a potential donor directly to be tested	16	20	33	49	32.2
Accept someone's offer to donate	23	13	21	42	28.2
Send a letter or email about my interest in living donation to important people in my life	7	5	4	16	9.7
Share my need for a living donor with a large community	2	13	21	15	11.4

LDKT: Living donor kidney transplant; PC: Precontemplation; C: Contemplation; P: Preparation; A: Action.
[a]All actions differed by Stage of Change at $p < 0.05$ with patients in action being more likely to have taken the actions except "Send a letter or email about your interest in living donation to important people in your life?"

variety of difficult situations (e.g. You asked someone to donate and they turned you down). Patients were asked to rate, "How confident are you that you could get a living donor transplant?" on a 5-point scale, ranging from "not at all confident" (1) to "completely confident" (5). Sample 2 administered only a reduced measure set of 6 items determined after analysis of Sample 1 (Table 2).

Analysis

We conducted four phases of analysis using a sequential method for scale development (Comrey, 1988; Goldberg and Velicer, 2006; Jackson, 1971; Redding et al., 2006) to assess the reliability and validity of the new SOC, DB, and SE measures for LDKT: (1) SOC measure development, (2) exploratory analyses for DB and SE, (3) confirmatory analyses for DB and SE, and (4) external validation with the SOC measure.

SOC measure development (Samples 1 and 2). After focus groups were conducted to understand patients' readiness to pursue LDKT generally and take specific actions to find living donors, two different measures were created to measure SOC and assessed with different samples of patients to ensure clarity (Waterman et al., 2006). Descriptive analyses were conducted to examine the proportion of individuals in each SOC in Samples 1 and 2. Then, each of the seven possible LDKT actions in Sample 2 was collapsed into two categories ("already done" vs "have not done" (planning to do this or not planning to do this)). A series of chi-square tests were conducted to assess whether individuals in different stages of LDKT readiness differed significantly on whether they had completed each behavior. In addition, all seven possible LDKT actions were included in a logistic regression model to determine which actions were the strongest predictors of being in the Action stage compared to one of the pre-Action stages (Precontemplation, Contemplation, or Preparation).

Exploratory phase (Sample 1). Exploratory factor analysis for the DB and SE item sets was conducted using principle components analysis (PCA) with varimax rotation on the item

Table 2. Decisional Balance and Self-Efficacy (SE) scale items, factor loadings, and coefficient alphas for Samples 1 and 2.

Scale[a]	Item	Sample 1—EFA loadings	Sample 1—CFA loadings	Sample 2—CFA loadings
Pros	With a living donor transplant, I will be able to contribute to my family and friends sooner	0.810	0.811	0.742
	I will be healthier because I spent less time on dialysis	0.780	0.710	0.778
	With a living donor transplant, I can return to my normal activities sooner	0.712	0.695	0.777
	A living donor kidney generally lasts longer than a deceased donor kidney	0.699	0.531	0.661
	A living donor transplant could happen more quickly because I don't have to wait for a kidney on the waiting list	0.658	0.664	0.596
	My living donor will feel good seeing my health improve	0.619	0.795	0.703
	Pros coefficient alpha	**0.796**	**0.780**	**0.856**
Cons	The surgery will inconvenience the living donor's work or life too much	0.764	0.612	0.770
	I will feel guilty having someone donate to me	0.708	0.719	0.590
	I don't want to involve anyone else in my health problems	0.704	0.636	0.634
	Donation could harm my relationship with a living donor	0.701	0.615	0.631
	The living donor could not donate again if someone closer to them ever need a kidney	0.633	0.475	0.589
	A living donor could have health problems due to donating	0.606	0.529	0.558
	Cons coefficient alpha	**0.787**	**0.767**	**0.796**
SE	You asked someone to donate and they turned you down	0.911	0.879	0.867
	A potential living donor changed their mind and decided not to be evaluated	0.887	0.924	0.908
	A potential living donor who was evaluated did not match you	0.860	0.792	0.859
	You don't know anyone who might be a living donor for you	0.786	0.634	0.500
	You didn't know how to discuss living donation with potential donors	0.770	0.654	0.656
	Other people were not supportive of you having a living donor transplant	0.709	0.693	0.607
	Self-Efficacy coefficient alpha	**0.904**	**0.897**	**0.876**

EFA: exploratory factor analysis; CFA: confirmatory factor analysis.
[a]Decisional Balance subscales: Pros and Cons.

intercorrelation matrices for a random half of participants from Sample 1 (n = 134). The number of components retained was determined using the minimum average partial procedure (MAP) (Velicer, 1976) and parallel analysis (Horn, 1965; Zwick and Velicer, 1986). The dimensional and psychometric properties of each measure were assessed. The aims of these exploratory analyses were to: (1) determine the number of components present and estimate the correlation between them; (2) provide estimates of the factor loadings, eliminate complex items (component loadings ≥0.40 on both components), and items with poor loadings (<0.40 on both components); and (3) estimate internal consistency for each component using Cronbach's alpha. Furthermore, final item selection was determined on the basis of item clarity, simple expression of the idea, minimization of redundancy with other selected items, and being representative of the conceptual definitions of the constructs.

Confirmatory phase (Samples 1 and 2). Confirmatory factor analysis for the DB and SE scales using structural equation modeling in EQS Structural Equation Modeling Software (Bentler and Wu, 1993) was conducted on the second random 50 percent of Sample 1 (n = 145) and also reconfirmed with all participants from Sample 2 (N = 204). Multiple models were tested and compared to determine the best fitting model using maximum likelihood (ML) as the estimator of fit. Four different fit indices were examined for each of the alternative models. These included (1) the likelihood ratio chi-square test statistic; (2) the goodness-of-fit index (GFI); (3) the comparative fit index (CFI); and (4) the average absolute standardized residual (AASR) statistic. Traditionally, values of GFI and CFI above 0.80 indicate good fit, while values above 0.90 indicate excellent fit (Tabachnick and Fidell, 2001). For AASR, values below 0.06 indicate excellent fit (Tabachnick and Fidell, 2001). All four fit indices were compared across models.

External validation. SOC was further validated using Sample 2 data by examining the relationships of SOC with DB and SE via multivariate analysis of variance (MANOVA) and analysis of variance. The magnitude and direction of these relationships were then compared to the relationships between these constructs found in other applications of the TTM (Hall and Rossi, 2008).

Results

SOC measure development

The 279 patients from Sample 1 were classified by their LDKT SOC, with patients ranging from Precontemplation (29.5%), Contemplation (20.5%), Preparation (9.4%), to Action (40.6%). After modification of the SOC wording, the 204 patients from Sample 2 ranged in stages of LDKT readiness similarly, from Precontemplation (28.2%), Contemplation (19.8%), Preparation (11.9%), to Action (40.1%).

A series of chi-square tests revealed that individuals in different stages of readiness to receive a living donor transplant differed significantly on whether they had completed each of the seven LDKT behaviors, with patients in Action being most likely to have done five of the seven behaviors ($p < 0.05$; Table 1). Only one LDKT behavior, "Send a letter or email about your interest in living donation to important people in your life?" did not vary significantly by SOC.

Using logistic regression, a test of the full model against a constant only model was statistically significant, indicating that the seven possible LDKT actions as a set reliably distinguished between being pre-Action versus Action SOC (chi-square = 34.77, $p < 0.001$ with df = 7). Nagelkerke's R^2 of 0.214 indicated a moderate relationship between prediction and grouping. The Wald criterion demonstrated that only three behaviors made a significant contribution to prediction of being in Action versus pre-Action: "Accept someone's offer to donate a kidney if they

Table 3. Decisional Balance and Self-Efficacy (SE) scales by Stage of Change (raw scores).

Scale[a]	Stage of Change	Exploratory Sample 1, mean (SD)	Confirmatory Sample 1, mean (SD)	Confirmatory Sample 2, mean (SD)
Pros	PC	21.54 (5.16)	20.95 (6.55)	22.69 (7.38)
	C	24.97 (3.06)	24.63 (4.07)	27.58 (3.54)
	P	23.33 (2.69)	22.00 (4.96)	29.25 (1.87)
	A	23.45 (5.57)	25.73 (3.32)	27.41 (3.46)
	Total	23.28 (4.84)	23.76 (5.19)	26.42 (5.23)
Cons	PC	19.66 (5.41)	19.07 (5.92)	21.50 (5.64)
	C	19.50 (5.23)	19.22 (5.17)	17.85 (6.74)
	P	17.60 (4.42)	16.00 (4.20)	18.38 (6.93)
	A	16.53 (6.22)	17.02 (5.73)	19.60 (6.40)
	Total	18.14 (5.74)	17.99 (5.65)	19.60 (6.44)
SE	PC	13.17 (5.37)	13.93 (5.79)	18.88 (7.34)
	C	17.53 (6.84)	17.96 (6.57)	21.88 (5.85)
	P	18.93 (5.74)	19.27 (5.06)	23.75 (5.11)
	A	19.30 (6.71)	18.55 (6.45)	22.17 (6.24)
	Total	17.25 (6.74)	17.09 (6.47)	21.46 (6.50)

SD: Standard deviation; PC: Precontemplation; C: Contemplation; P: Preparation; A: Action.
[a]Decisional Balance subscales: Pros and Cons.

volunteered" (odds ratio (OR) = 2.23 (1.07, 4.65), $p < 0.05$); "Share your need for a living donor with a large community through a general announcement" (OR = 2.38 (1.11, 5.10), $p < 0.05$); and "Ask a potential donor directly to be tested" (OR = 2.47 (1.22, 4.98), $p < 0.05$). Each of these ORs indicate that participants who reported having done each of these behaviors were more than twice as likely to be in the Action stage compared to one of the pre-Action stages.

Exploratory analyses

DB. The pool of 24 items was reduced to 12 items. MAP and parallel analysis indicated that a two-component solution best described the Pros and Cons factors. Table 2 presents the items, exploratory factor loadings, and coefficient alpha for the Pros and Cons scales. The two factors had good item loadings ranging from 0.6 to 0.8 and contained a satisfactory number of items (6) (Guadagnoli and Velicer, 1988; Velicer, 1976). Scale scores were derived from the sum of the individual item scores. These scales were shown to be internally consistent and correlated ($r = 0.28$). This final two-component solution showed good stability and accounted for 51.26 percent of the total item variance. Table 3 presents the means and SDs for Pros and Cons by SOC.

SE. The pool of 11 items was reduced to 6 items. MAP and parallel analysis indicated that a one-component solution best described the data. Table 2 presents the items, exploratory factor loadings, and coefficient alpha for the SE scale. This final one-component solution showed good stability and accounted for 67.83 percent of the total item variance. Table 3 presents the means and SDs for this scale by SOC.

Confirmatory analyses

DB. In both the random half of Sample 1 and in all of Sample 2, four models were tested: (1) null model (suggesting no latent factors and used as a comparative model), (2) one factor, (3) two uncorrelated Pros and Cons factors, and (4) two correlated Pros and Cons factors. In

Sample 1, the two-factor correlated model demonstrated the best fit, $\chi^2(53) = 68.45$, $p > 0.05$, CFI = 0.97, GFI = 0.92, and AASR = 0.04. The correlation between the Pros and Cons scales was 0.25. In Sample 2, the two-factor uncorrelated model demonstrated the best fit, $\chi^2(54) = 94.06$, $p < 0.01$, CFI = 0.95, GFI = 0.93, and AASR = 0.04. The confirmatory factor loadings and coefficient alpha from both samples are presented in Table 2, and Table 3 presents the means and SDs SOC.

SE. In both the second random half of Sample 1 and in all of Sample 2, two models were tested: the null model and a one-factor model. In Sample 1, the one-factor model demonstrated the best fit. Results produced strong factor loadings and excellent model fit, ($\chi^2(9) = 26.501$, $p < 0.01$, CFI = 0.96, GFI = 0.94, and AASR = 0.02). Similarly, in Sample 2, the one-factor model demonstrated the best fit with strong factor loadings and excellent model fit, (χ^2 (9) =43.45, $p < 0.01$, CFI = 0.95, GFI = 0.93, and AASR = 0.04). Table 2 presents the confirmatory factor loadings and alpha coefficient for the SE scale within both samples, and Table 3 presents the means and SDs by SOC.

External validation

Results indicated that the Pros increased 0.92 SD, Cons decreased 0.29 SD, and SE increased 0.80 SD from Precontemplation to Action, which is consistent with the typical changes found across behaviors in meta-analytic research (Hall and Rossi, 2004; Prochaska et al., 1994) (see Figure 1).

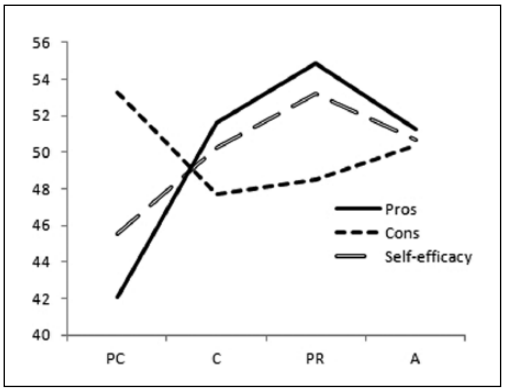

Figure 1. Pros, Cons, and Self-Efficacy to pursue living donation by Stage of Change to pursue living donation (Sample 2).
PC: Precontemplation; C: Contemplation; PR: Preparation; A: Action.
T-scores were weighted based on Stage of Change proportions to equalize the distribution and allow for more accurate comparisons across the Stages of Change.

Discussion

While educational interventions to increase ESRD patient motivation to pursue LDKT are underway in transplant and dialysis centers nationally (Boulware et al., 2012; Rodrigue et al., 2008a), there are no validated measures of LDKT decision-making. Using the TTM of Behavioral Change as a theoretical foundation, we developed three new measures of SOC, DB, and SE. This study is the first to demonstrate that the TTM theoretical foundation and key TTM constructs are well suited to assess the decision-making of kidney patients considering whether to pursue LDKT.

Successful receipt of LDKT requires the involvement of another person—a matching living donor. One important question raised by this study is whether patient decision-making related to this type of behavior could be guided by the constructs of the TTM. We found that the staging assessment for pursuit of LDKT is consistent with staging assessments for many other complex behaviors (Prochaska et al., 1994). The measure development process led to a clear and ordered assessment of LDKT SOC, where patients in Action for LDKT readiness reported taking specific actions like asking a potential living donor to be evaluated. These actions may or may not result in finding a matching living donor, thus patients can shift in their LDKT readiness over time. In both Samples 1 and 2, despite slight variation in question wording and order differences, there was remarkable similarity between the percentage of patients in each

SOC across ESRD patients, suggesting the readiness construct meaningfully applies to LDKT decision-making and is robust enough to withstand variation in measurement.

The validated SOC measure asks how ready a patient is to take LDKT actions generally, and then provides additional clarity on the specific LDKT actions an individual patient is willing to take. Some behaviors, like generally talking to people about one's interest in transplant, sharing educational materials about living donation with people in one's life, and allowing others to share their need for a living donor kidney, are generally more common for all patients to be ready to take. However, three LDKT actions, accepting someone's offer to donate a kidney, sharing their need for a living donor with a large community through a general announcement, and asking a potential donor to be tested, are significantly more likely to be taken when a patient is in Action, compared to patients in pre-Action stages. Thus, when tailoring discussion and educational feedback for patients in early stages of readiness, recommendations to take more common LDKT actions like generally talking to people about their interest in living donation and sharing educational materials about LDKT with people in their life may be more ideal. However, patients in Action will more likely benefit from additional discussion and practical assistance with doing behaviors like getting the word out about their need for a living donor to large groups of individuals, asking potential donors directly to be evaluated, and accepting someone's offer to donate. Future research must continue to learn more about the different patterns of LDKT actions and how they relate to pursuit and successful receipt of LDKT.

In addition, brief, internally consistent measures of DB and SE for pursuit of LDKT were developed. Using data from Sample 1, evaluations of the DB Pros, Cons, and SE scales by stage were largely consistent with previous TTM research in DDKT (Waterman et al., 2010a) and in other health behavior applications (Hall and Rossi, 2008). Study 2 results found that increases in Pros of LDKT from Precontemplation (0.92 SD found; 1 SD expected) and decreases in Cons of LDKT from Precontemplation (0.29 SD found; 0.5 SD expected) were consistent with patterns shown in other meta-analytic work with many other behaviors (Hall and Rossi, 2004; Prochaska et al., 1994). Although they build upon the DB measure developed for pursuit of DDKT (Waterman et al., 2010a), the Pros and Cons of LDKT pursuit focus more on the elements (i.e. interpersonal challenges) that are specific to the living donor process. After an assessment of DB, a discussion with ESRD patients that emphasizes the LDKT Pros and de-emphasizes the Cons may help them become more ready to pursue LDKT.

As predicted, the SE measure developed in this study emerged as a single, brief internally consistent scale assessing situational SE or confidence to pursue LDKT in a variety of difficult situations. In their 2001 meta-analysis examining SE in 25 studies across 10 health behaviors, Rossi and Redding (2001) found that SE increased significantly in a linear or curvilinear fashion across stages of change for the majority of these studies. Across both samples presented here, scores on the SE measure increased approximately 0.80 SD from Precontemplation to Action. The items in the scale most reflect the challenges that patients will likely face if they actively pursue LDKT with particular emphasis on reaching out to potential donors.

This study had several limitations. First, although our SOC measure regards patients' overall pursuit of LDKT, this behavior can be divided into three separate behaviors: acceptance of any kidney transplant (regardless of the organ source), getting evaluated for transplant, and taking actions to find a living donor. Future research should examine how well our measure adequately represents these separate behaviors. Second, our samples were both cross-sectional. Although previous longitudinal studies investigating the behavior of TTM constructs have supported the findings of other cross-sectional studies (Prochaska, 1994), future longitudinal

studies should be conducted to examine the measures developed here. Third, our primarily White and Black ESRD patient samples were recruited from a single transplant center and a few dialysis centers in the midwestern United States and may not represent the attitudes and dispositions of ESRD patients nationally. Further validation of these measures with a nationally representative sample of ESRD patients, particularly Hispanics/Latinos, is an important next step. Invariance testing of these measures across important demographic subgroups (e.g. Black versus White) groups should also occur. Finally, while our research strongly supports the application of the TTM constructs to pursuit of LDKT, future research on ESRD patients' and their support networks' views and attitudes on LDKT may yield other relevant dimensions for study as well as introduce new items that may improve the LDKT Pros, Cons, and SE measures. Further research may also lead to refinements of the assessment of LDKT action steps.

To treat the growing number of ESRD patients optimally, we must increase the rates of LDKT nationally. Valid TTM-based measures that let us accurately assess patients' initial LDKT readiness, DB, and SE and track shifts in decision-making as their kidney function worsens may help clinicians have more effective conversations with patients. Building upon the DDKT decision-making measures previously developed by this team (Waterman et al., 2010a), after this study, a complete set of theoretically consistent transplant decision-making measures have now been validated. These LDKT patient decision-making measures can be incorporated into LDKT interventions to better honor the needs of individual kidney patients and assess the effectiveness of these interventions.

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