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Predictors and influence of goal orientation on self-management and health-related quality of life after lung transplant

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Abstract

Context—Lung transplant recipients are encouraged to perform self-management behaviors to maximize health outcomes; however, performance is often less than ideal. Goal orientation is known to influence achievement of academic goals, but the influence of goal orientation on performance of self-management is unknown.

Objectives—To identify characteristics at transplant that are predictive of higher goal orientation and examine relationships between Goal Orientation Index (GOI) subscores (Acting, Planning, Reflecting), self-management behaviors (adhering, self-monitoring, and communicating critical changes), and health-related quality of life (HRQOL) at 1 year after transplant.

Design—A descriptive, secondary analysis of data from 33 lung transplant recipients who were assessed at transplant and followed for 1 year as part of a clinical trial. GOI subscores were dichotomized at the median to categorize recipients with high and low goal orientation. Logistic regression was used to identify predictors of higher GOI subscores. Correlations between higher GOI subscores, self-management, and HRQOL were examined.

Results—Lung transplant recipients reported relatively high mean GOI subscores (Acting, Planning, and Reflecting) and the 3 subscores were correlated ($r=0.31$ – 0.86). Self-care agency was the only significant predictor ($P=.04$) of higher GOI (Reflecting). Lung transplant recipients with higher Planning and Reflecting subscores were more likely to adhere ($r=0.36$ and 0.46 , respectively). Recipients with higher GOI subscores reported significantly better mental HRQOL ($r=0.42$ – 0.36). Recipients with higher GOI Planning or Acting subscores reported significantly less anxiety ($r=-0.39$ – 0.46) and fewer depressive symptoms ($r=-0.40$ – 0.43).

Conclusion—Assessing goal orientation may offer a novel approach for promoting adherence and HRQOL after lung transplant.

Despite the success of lung transplant in prolonging survival and improving quality of life, morbidity and mortality are higher among lung transplant recipients (LTRs) than among

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recipients of other solid-organ transplants.¹ In order to prevent, detect, and seek prompt treatment of complications, LTRs must adhere to a complex regimen, self-monitor, and communicate condition changes to the transplant coordinator respectively. Yet LTRs often find it difficult to perform these self-management behaviors.^{2,3}

Review of the Literature

Evidence suggests that goal setting promotes engagement of adults in health activities that foster recovery and rehabilitation.⁴ Goal orientation, defined as the behavioral and mental processes that drive individuals to achieve their goals, influences students' achievement of their educational goals^{5,6} and therefore may also be important in promoting the performance of self-management behaviors among LTRs. The impact of goal-directed action and goal orientation on LTRs' abilities to perform self-management behaviors has yet to be examined.

The purpose of this study was to explore the role of goal orientation in promoting the achievement of self-management goals after lung transplant. The specific aims were to (1) describe the types and levels of goal orientation (acting, planning, and reflecting) endorsed by LTRs, (2) identify the characteristics of LTRs that were correlated with higher levels of each type of goal orientation, and (3) describe the influence of goal orientation on self-management and health-related quality of life (HRQOL) after lung transplant.

Methods

Design, Setting, and Sample

This study was a secondary analysis of data from a clinical trial designed to evaluate the effect of an intervention on self-management and health outcomes during the first year after lung transplant.⁷ The study was conducted at the Cardiothoracic Transplant Program at the University of Pittsburgh Medical Center between 2009 and 2013 and was approved by its institutional review board.

The sample included the 33 LTRs who completed the Goal Orientation Index (GOI)⁸ at their 12-month assessment. The GOI was added to the battery of instruments near the completion of the 5-year trial; therefore, a limited number of participants (33) had the opportunity to complete the GOI, and of those, none had been lost to attrition by 12 months after transplant.

Measures

Goal Orientation—The GOI⁸ was used to assess the types and level of goal orientation endorsed by LTRs. The GOI is a self-report measure originally designed for the field of education to determine the type and level of goal orientation that drive students to reach their academic goals.⁹ The total GOI includes 96 Likert-scale items divided into 12 subcategories of 8 items each. The subcategories are combined to form 3 sub-scale scores (Acting, Planning, and Reflecting) with 32 items each, for possible subscores ranging from 32 to 160.⁹ Items include both negatively and positively worded statements; reverse coding was used as appropriate so that, when summed, higher scores indicate higher levels of goal orientation. The GOI is reliable and valid for middle school and high school students.¹⁰ We report GOI scores (mean [SD], range) and for purposes of the analysis, the GOI subscale

scores were dichotomized at the median to identify recipients with higher and lower Acting, Planning, and Reflecting subscores on the GOI. The Cronbach α for total, Acting, Planning, and Reflecting GOI scores for this sample were 0.971, 0.765, 0.948, and 0.964, respectively.

Acting: LTRs who score highly on the Acting subscale are decisive about how to perform tasks even when numerous alternatives arise. They are action oriented and devote their full attention to tasks. They are aware of changes that occur, adapt, and continue with their tasks to finish the job. They avoid procrastinating and do not become overwhelmed or discouraged with details. Enjoyment comes with completing a task, and they are able to meet deadlines when needed.⁹

Planning: LTRs who score highly on the Planning subscale are aware of what is going on and can detect changes in the environment around them. They decide what to do on the basis of the present situation and make systematic plans for short- and long-term tasks. They realize the significance and influence of planning for their own personal and professional development and project the future with confidence.⁹

Reflecting: LTRs who score highly on the Reflecting subscale are able to brainstorm alternatives when plans change and visualize the completion of the end product. They assess risks and determine the value of successful completion before undertaking the tasks. Additionally, they can reward themselves when a job is finally accomplished, thus providing a solid basis for making goals in the future.⁹

Potential Predictors of Goal Orientation—Socio-demographic characteristics: age, sex, race, marital status, education level, and employment status were collected by using a self-report sociodemographic profile.

Clinical characteristics: data for type of lung transplant procedure (single or double), length of stay in the intensive care unit, total hospital stay, and discharge destination (home or extended care facility) were abstracted from the medical record.

Self-care agency: LTRs' perceived level of self-care agency, defined as the capability and willingness to engage in self-care behaviors,¹¹ was assessed by using the Perception of Self-Care Agency (PSCA), a 53-item, Likert-type, self-report instrument.¹² Items include both negatively and positively worded statements; reverse coding was used as appropriate so that, when summed, higher scores indicate higher levels of self-care agency, yielding potential scores from 53 to 265. Psychometric properties are well established.^{12,13} In a prior study of LTRs, internal consistency reliability for the PSCA was 0.93, and test-retest reliability was 0.85.² The Cronbach α for the PSCA in this sample was 0.95.

Quality of caregiver support: an adaptation of the Dyadic Adjustment Scale,¹⁴ a 15-item, Likert-response self-report measure, was used to assess the quality of the relationship with the adult whom LTRs identified as most involved in their daily care. Item responses range from 1 to 5, so that summed scores range from 15 to 75, with higher scores indicating higher quality of caregiver support. Psychometric properties are well established for cardiothoracic transplant populations with criterion and construct validity correlation coefficients of 0.86 to

0.88, respectively.¹⁵ Although spouses usually have this role, the Dyadic Adjustment Scale also is applicable for assessing the supportive nature of other types of patient-caregiver pairs.

² The Cronbach α for the Dyadic Adjustment Scale in this sample was 0.86.

Potential Outcomes of Goal Orientation: Self-Management Behaviors

Adhering to Elements of the Medical Regimen—At the time of hospital discharge, all LTRs were given instructions for adhering to medical regimen (eg, taking medications, measuring spirometry, keeping follow-up appointments). Identical versions of the Health Habits Assessment were completed by all LTRs and their family caregivers to measure the LTRs' adherence to 10 elements of the medical regimen. The Health Habits Assessment was originally developed to assess adherence among kidney transplant recipients¹⁶ but has since been revised and tested for reliability and validity with heart and lung recipients and their family caregivers.^{17,18} This self-report instrument uses ordinal response formatting to quantify level of adherence to each of 10 elements of the medical regimen. Responses were dichotomized to indicate whether the LTR adhered to the minimal level acceptable by the cardiothoracic transplant program (ie, missing immunosuppression medications less than once per month, or measuring spirometry at least 3 times per week). To arrive at a single measure of adherence to each element, we took any report of nonadherence to each element, whether from the LTR or the caregiver version, as evidence of nonadherence to that element. To estimate the performance of overall adherence, we summed the number of elements (out of the maximum number of 10) for which the LTRs met criteria for acceptable level of adherence. Because the distribution of this variable was skewed, it was dichotomized (using the sample median) to reflect adherence to the regimen as adhering to more than 8 elements.

Self-Monitoring—At the time of hospital discharge, LTRs were asked to monitor health indicators (ie, vital signs, spirometry, symptoms) every day at home. We directly measured the performance of daily self-monitoring by calculating the ratio of days that each recipient recorded values for health indicators in their monitoring logs to the number of days at home during the first year (after subtracting any days readmitted to the hospital). Self-monitoring was expressed as a mean percentage of days that self-monitoring was performed in the 12-month period.¹⁷

Communicating Critical Changes to the Transplant Coordinator—At the time of hospital discharge, LTRs were instructed to immediately notify the transplant coordinator of critical values for each health indicator they were expected to monitor at home. Transplant coordinators routinely maintain an electronic record of all contacts they receive from patients. We directly measured the behavior of communicating condition changes by reviewing the LTRs monitoring logs to identify any critical values that were recorded, then reviewing the coordinators' records to identify the number of critical values reported to the coordinators. Communicating was expressed as a percentage of critical values recorded that were actually reported to the coordinator in the 12-month period for the 11 (33%) of the 33 LTRs who had any critical values to report.¹⁷

Potential Outcomes of Goal Orientation: Health-Related Quality of Life

Health-Related Quality of Life—The Medical Outcomes Short-Form Health Survey (SF-36), a 36-item self-report measure, was used to assess global HRQOL.^{19,20} Physical and mental component scales were calculated from the 8 subscales as specified by Ware et al¹⁹ such that resulting values were *T* scores normed against a mean of 50 and a standard deviation of 10 (higher scores being more positive with less limitation). Psychometric properties of the SF-36 are well established.¹⁹ In this sample, the Cronbach α for the 8 subscales ranged from 0.71 to 0.97 for Social Functioning and Role Functioning due to physical limitations, respectively, which is considered acceptable with 0.70 used as the cutoff point.²¹

Symptoms of Psychological Distress—The anxiety and depression subscales of the Symptom Checklist 90-Revised (SCL-90-R)²² were used to measure the severity of anxiety and depressive symptoms during the prior 2 weeks. Items are rated on a 5-point scale (0 =not at all, to 4=extremely distressed). Subscale scores were computed by averaging items. Higher scores reflect higher levels of psychological distress. Gender-specific norms for nonpsychiatric populations were used to determine the presence of clinically significant anxiety or depression. Psychometric properties are well established; in prior studies, internal consistency reliability for each subscale ranged from 0.77 to 0.90, and test-retest reliability was 0.85. Test-retest reliability coefficients were between 0.80 and 0.90.²² The Cronbach α values for anxiety and depression subscale scores in this sample were 0.64 and 0.77, respectively.

Statistical Analysis

Data were analyzed by using descriptive statistics (mean, standard deviation, frequencies and proportions). All analyses were conducted by using SPSS version 22 (IBM Corp). To identify potential predictors of higher GOI for each subscore, univariate logistic regression was conducted by using a significance level of *P* less than .25 as the cutoff threshold.²³ A multivariate simultaneous model was used to identify the final significant predictors for each high GOI sub-score at a significance level of *P* less than .05. Model fit was tested and considered acceptable^{24,25}; *P* values, odds ratios, and confidence intervals were reported. Spearman rank correlation coefficient was used to measure correlations between higher GOI subscores, self-management behaviors, and HRQOL outcomes. All tests were 2-tailed at a significance level of *P* less than .05.

Results

Sample Characteristics

Characteristics of the sample at the time of transplant and by higher goal orientation subgroup at 1 year are presented in Table 1. The mean age was 58.8 (SD, 12.9) years. The majority were white (94%), male (61%), married (79%), with at least a high school education (94%), unemployed (including retired or disabled, 85%), and had undergone double-lung transplant procedures (97%). On average LTRs spent 9.7 days in the intensive care unit and 33.9 days in the hospital. The majority (82%) was discharged directly home. In

general, scores for self-care agency (mean [SD], 223.7 [24.7]) and the quality of caregiver support (67 [8.8]) were high.

Goal Orientation Scores

Mean (SD) scores for the 12 GOI subcategories and GOI subscores for Acting, Planning, and Reflecting are presented in Table 2. Using the median to dichotomize the GOI, LTRs with GOI subscores greater than 138, 115, and 106 were considered to have higher levels of goal orientation for Acting, Planning and Reflecting, respectively.

Predictors of Higher GOI Subscores

Data for relationships between characteristics at transplant and higher GOI subscores at 1 year are presented in Table 3. Several characteristics were significant predictors of higher Acting, Planning, and Reflecting GOI subscores at the univariate level. However, only self-care agency remained a significant predictor of higher Reflecting GOI ($P = .04$) at the multivariate level.

Correlations Between GOI and Self-Management

Data for relationships between higher GOI sub-scores and self-management behaviors are presented in Table 4. LTRs with higher GOI Planning and Reflecting subscores were significantly more likely to adhere to their regimen ($r = 0.47$, $P < .01$, and $r = 0.36$, $P < .05$, respectively). None of the GOI subscores were significant correlates of self-monitoring or communicating critical changes to transplant coordinators.

Correlations Between GOI and HRQOL Outcomes

Data for relationships between GOI subscores and HRQOL outcomes are presented in Table 4. LTRs with higher GOI subscores for Acting, Planning, or Reflecting reported significantly better HRQOL on the Mental Component ($r = 0.63$, 0.62 , and 0.46 , respectively). There were no significant correlations between higher GOI subscores and HRQOL for the Physical Component. LTRs with higher Acting GOI subscores reported significantly lower levels of anxiety ($r = -0.46$, $P < .01$) and depression ($r = -0.43$, $P < .05$). LTRs with higher Planning GOI scores reported significantly lower levels of anxiety ($r = -0.39$, $P < .05$) and depression ($r = -0.40$, $P < .05$). Of the LTRs with high GOI on any subscale, only 8 of 33 (24%) reported clinically significant symptoms of anxiety and 9 of 33 (27%) reported clinically significant symptoms of depression.

Discussion

To our knowledge, this is the first study to apply goal orientation theory to the achievement of health behaviors and outcomes. We described the types and levels of goal orientation among LTRs, identified the baseline characteristics that were predictive of higher GOI subscores, and examined the relationships between higher GOI subscores, self-management behaviors, and HRQOL outcomes.

LTRs in our sample reported higher GOI Acting subscores than Planning and Reflecting subscores, which is consistent with results from other studies of GOIs conducted in the

United States.^{10,26} Furthermore, GOI subscores for Acting, Planning, and Reflecting were significantly correlated, meaning that LTRs who scored high on one GOI subscale were likely to score high on the other GOI subscales.

Our results indicated that higher levels of self-care agency at baseline may be useful in predicting which LTRs have high GOI skills. Therefore assessing self-care agency before discharge may help transplant coordinators determine which LTRs may need more support to achieve their self-management goals after transplant.

We also found that higher GOI scores were associated with better adherence outcomes. Those who scored higher on the Planning and Reflecting GOI subscales were most likely to adhere to their care regimen, which is useful information for transplant coordinators trying to determine which LTRs are at highest risk for nonadherence. Although the Acting subscale scores were higher than scores for Planning and Reflecting (as is typical among US populations), higher Acting subscores were not associated with adherence and none of the GOI subscores were significant correlates of self-monitoring or communicating critical changes to transplant coordinators.

Our findings also indicated that a higher score on any GOI subscale was associated with better mental HRQOL and that symptoms of anxiety and depression were reported at significantly lower rates by LTRs with higher GOI scores for Acting and Planning. Knowing this, transplant coordinators may be able to determine which LTRs may be at risk for symptoms of psychological distress and proactively intervene to improve the LTRs' outcomes and mental well-being.

Limitations

This study was a secondary analysis of data collected from a clinical trial that limited the choice of variables available for analysis. Furthermore, the GOI was added to the battery of instruments after the trial was underway, which limited the number of participants who completed the primary variable of interest (GOI) and our ability to examine within-subject changes in the GOI over time. Although the small sample size may have affected the reliability of the results because of the multiple correlations conducted between the GOI scores, self-management behaviors, and HRQOL, our findings are considered preliminary and warrant further exploration in larger samples. Finally, the study was conducted at only one lung transplant center, which may affect the generalizability of the results; however, the sample characteristics were equivalent to those reported for LTRs in other centers.

Conclusions

The GOI is a useful tool for identifying the type and level of goal orientation among LTRs and may be beneficial to transplant coordinators for assessing the likelihood of LTRs' achieving their self-management goals to promote better health outcomes. Further study is needed regarding strategies to promote higher levels of goal orientation after lung transplant.

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Table 1Sample characteristics at transplant and by Goal Orientation Index (GOI) subscores at 1^a

Variable	Total sample (N = 33)	High GOI Acting ^b (n = 16)	High GOI Planning ^c (n = 16)	High GOI Reflecting ^d (n = 16)
<u>Sample characteristics (at time of transplant)</u>				
Age, years	58.8 (12.9), 27–75	60.2 (10.9), 30–71	59.8 (10.8), 30–71	61.8 (11.2), 30–75
Sex, male	20 (61)	8 (50)	8 (50)	10 (62)
Race, white	31 (94)	15 (94)	15 (94)	15 (94)
Employment, unemployed	28 (85)	13 (81)	14 (88)	13 (81)
Transplant type, double	32 (97)	16 (100)	16 (100)	16 (100)
Marital status, married	26 (79)	13 (81)	13 (81)	12 (75)
Education, > high school	31 (94)	15 (94)	16 (100)	15 (94)
Days in intensive care unit	9.7 (9.9), 1–39	6.9 (7), 1–27	8.1 (8.2), 1–27	8.6 (10.8), 1–39
Total hospital stay, days	33.9 (23.7), 10–130	28.1 (18), 10–84	28.5 (17.9), 10–84	34.9 (31.2), 10–130
Discharge destination, home	27 (82)	15 (94)	16 (100)	13 (81)
Self-care agency, PSCA	223.7 (24.7), 174–263	230.8 (21.4), 196–263	232.7 (21.2), 196–263	231.3 (24.6), 192–263
Quality of Caregiver Support, Dyadic Adjustment Scale	67 (8.8), 37–75	68 (8.8), 37–74	68.1 (8.5), 37–74	68.3 (8.7), 37–75
<u>Self-management behaviors (1 year after transplant)</u>				
Adhering, 8 elements	10 (30)	7 (44)	8 (50)	7 (44)
Self-monitoring, % days	29.1 (32.9), 0–95	28.8 (35), 0–95	27.2 (31.9), 0–95	27.8 (31.8), 0–95
Communicating, % critical values reported ^e	81.4 (26.3), 15–100	86.9 (19.7), 50–100	72.5 (33.6), 15–100	80.9 (33.1), 15–100
<u>Health-related quality of life outcomes (1 year after transplant)</u>				
SF-36, physical component	42.6 (11.2), 19.8–58.9	44.6 (8.6), 29.1–55.4	45.4 (8.2), 30.7–58.9	43.2 (10.4), 22.4–58.9
SF-36, mental component	56.1 (7), 39.5–65.5	60 (4.9), 45.6–65.5	60.7 (4.5), 45.6–65.5	58.3 (6.7), 43.9–65.5
SCL-90, anxiety	8 (24)	1 (6)	1 (6)	2 (12)
SCL-90, depression	9 (27)	2 (12)	2 (12)	3 (19)

Abbreviations: PSCA, Perception of Self-Care Agency; SCL-90, Symptom Checklist-90; SF-36, Medical Outcomes Short-Form Health Survey.

^aValues in columns 2 through 5 are either mean (SD), range or number (percentage) of patients.^bDichotomized by using median GOI acting subscore of 138.^cDichotomized by using median GOI planning subscore of 115.^dDichotomized by using median GOI reflecting subscore of 106.^eBased on 11 of 33 patients who had any critical value to report.

Table 2

Goal Orientation Index (GOI) scores for each subcategory and subscores

GOI subscales	Mean (SD)	Range	GOI subcategory scores	Mean (SD)	Range
Acting	132.3 (16.9)	90–158			
			Select strategy	36.0 (3.5)	23–40
			Make it happen	31.2 (5.7)	15–40
			Push on	34.6 (4.2)	20–40
			Wrap it up	30.6 (7.2)	10–40
Planning	115.8 (22.2)	57–158			
			Recognize need	30.1 (4.6)	18–38
			Set goal	31.4 (5.8)	13–40
			Organize	27.9 (6.8)	10–40
			Purpose	26.3 (8.0)	10–40
Reflecting	109.3 (25.3)	56–159			
			Brainstorm	28.1 (5.9)	15–40
			Assessing risk	26.0 (7.4)	11–39
			Visualize	27.9 (6.8)	14–40
			Evaluate	27.3 (7.1)	12–40

Table 3
Predictors of higher Acting, Planning, and Reflecting subscores on the Goal Orientation Index (GOI)

Outcomes: high GOI subscores	Predictors	Univariate analysis ^a				Multivariate analysis ^b			
		P	OR	95% CI		P	OR	95% CI	
				Lower	Upper			Lower	Upper
Acting	Sex, male	.23	0.42	0.10	1.74	.22	0.34	0.06	1.92
	Total hospital stay, per day increase	.20	0.97	0.94	1.01	.35	1.04	0.96	1.12
	Discharge destination, home	.12	6.25	0.64	60.94	.25	4.99	0.32	78.38
	ICU stay, per day increase	.13	0.94	0.86	1.02	.19	0.90	0.77	1.05
	Self-care agency, per PSCA score increase	.12	1.03	0.99	1.06	.20	1.03	0.99	1.07
Planning	Sex, male	.23	0.42	0.10	1.74	.38	0.51	0.11	2.33
	Total hospital stay, per day increase	.23	0.98	0.94	1.02	.77	0.99	0.95	1.04
	Self-care agency, per PSCA score increase	.05	1.03	1.00	1.07	.15	1.03	0.99	1.07
Reflecting	Age, per year increase	.21	1.04	0.98	1.10	.09	1.07	0.99	1.16
	Self-care agency, per PSCA score increase	.09	1.03	1.00	1.06	.04	1.04	1.00	1.08

Abbreviations: ICU, intensive care unit; OR, odds ratio; PSCA, Perception of Self-Care Agency.

^a Only predictors that were significant ($P < .25$) are shown. Race, employment, transplant type, marital status, education, and quality of caregiver support were not significant.

^b Self-care agency was the only significant predictor ($P < .05$).

Table 4

Spearman rank correlation coefficients between sub-scores on the Goal Orientation Index (GOI), self-management behaviors, and health-related quality of life

Factor	Acting	Planning	Reflecting
Acting	1		
Planning	0.84 ^a	1	
Reflecting	0.64 ^a	0.86 ^a	1
Adhering	0.31	0.47 ^a	0.36 ^b
Self-monitoring	0.13	0.06	0.01
Communicating critical values ^c	0.46	0.25	0.30
SF-36, physical component	0.64 ^a	0.63 ^a	0.42 ^b
SF-36, mental component	0.26	0.24	0.16
SCL-90, anxiety subscale	-0.46 ^a	-0.39 ^b	-0.28
SCL-90, depression subscale	-0.43 ^b	-0.41 ^b	-0.25

Abbreviations: SCL-90, Symptom Checklist-90; SF-36, Medical Outcomes Short-Form Health Survey.

^a $P < .01$ level (2-tailed).

^b $P < .05$ level (2-tailed).

^cBased on 11 out of 33 patients who had any critical value to report.