Published in final edited form as:
Diabetes Educ. 2012 ; 38(2): 256–262. doi:10.1177/0145721711436135.

Effect of Perceived Control on Quality of Life in Indigent Adults with Type 2 Diabetes

Melba A. Hernandez-Tejada, MS[1], **Cheryl P. Lynch, MD, MPH**[1,2], **Joni L. Strom, MPH**[1], and **Leonard E. Egede, MD, MS**[1,2]

[1]Center for Health Disparities Research, Department of Medicine, Medical University of South Carolina, Charleston, SC

[2]Center for Disease Prevention and Health Interventions for Diverse Populations, Charleston VA REAP, Medical University of South Carolina, Charleston, SC

Abstract

Purpose—To examine the relationship between perceived control of diabetes and physical and mental health components of quality of life in indigent adults with diabetes.

Methods—The primary variables, perceived control of diabetes and quality of life, were evaluated among188 patients from a low income clinic located at an academic medical center. Over a 12-month period, consenting subjects completed the surveys to assess perceived control of diabetes and health-related quality of life. Sociodemographic factors (age, gender, race/ethnicity, income, education, employment, marital status and insurance status) were collected as well as clinical factors like comorbid conditions and use of insulin therapy. Multiple linear regression models were used to assess the independent association of perceived control on quality of life.

Results—The sample largely comprised middle-aged women with diabetes, a majority being black; nearly two-thirds had at least a high school education and almost three-quarters were unemployed. Mean quality of life scores were generally below national population means. Correlation results indicated a positive relationship between perceived control and both physical and mental quality of life. Regression results supported the positive association between perceived control and quality of life, even when controlling for sociodemographics and comorbidity in the final model.

Conclusion—Increasing perceived control, perhaps by a combination of education and skills building (i.e., self-efficacy), will result in higher perceived quality of life among disadvantaged populations with diabetes.

Keywords

perceived control; quality of life; type 2 diabetes

Corresponding Author: Leonard E. Egede, MD, MS, Center for Health Disparities Research, Center for Disease Prevention and Health Interventions for Diverse Populations, Medical University of South Carolina, 135 Rutledge Avenue, Room 280G, P.O. Box 250593, Charleston, SC 29425-0593, Phone: (843) 876-1238, Fax: (843) 876-1201, egedel@musc.edu; Melba Hernandez-Tejada, MS, Division of General Internal Medicine and Geriatrics, Center for Health Disparities Research, Medical University of South Carolina, Rutledge Towers, 135 Rutledge Avenue, Charleston, SC 29425, Phone: (843) 876-1238, Fax: (843) 876-1201, hernanma@musc.edu; Cheryl P. Lynch, MD, MPH, Division of General Internal Medicine and Geriatrics, Center for Health Disparities Research, Medical University of South Carolina, Rutledge Towers, 135 Rutledge Avenue, Charleston, SC 29425, Phone: (843) 876-1238, Fax: (843) 876-1201, lynchcp@musc.edu; Joni L. Strom, MPH, Division of General Internal Medicine and Geriatrics, Center for Health Disparities Research, Medical University of South Carolina, Rutledge Towers, 135 Rutledge Avenue, Charleston, SC 29425, Phone: (843) 876-1238, Fax: (843) 876-1201, stromjl@musc.edu.

Conflict of Interest: None of the authors have any financial disclosure or conflict of interest to report.

NIH-PA Author Manuscript
NIH-PA Author Manuscript

As the 7th leading cause of death, diabetes is one of the most prevalent chronic diseases in the United States, with nearly 24 million people (7.8% of population) affected. Diabetes is associated with other chronic illnesses such as cardiovascular disease and obesity, and severe complications such as retinopathy, neuropathy and nephropathy; all of these having an important impact in quality of life[1-2]. These patients require corrective glycemic control in order to reduce the risk of complications and significant deterioration of their health and quality of life[3].

An important psychosocial factor related to adequate glycemic control is the construct of perceived control. Perceived control has been studied as a multi-dimensional construct and conceptually related to a cluster of control-related items[4] such as self-efficacy (confidence in the ability to execute a behavior[5]), locus of control (extent to which individuals believe their health is controlled by internal and/or external factors[6]) and outcome expectancy (expectation that a specific outcome will occur)[4,7]. For the purpose of this study, perceived control is defined as a “patient-centered characteristic, associated with the perception that the patient's life is manageable, and being managed. It is a function of an individual's appraisal of the balance between perceived demands and available resources”[8]. The relationship between glycemic control, perceived control[8,9] and quality of life[1,3,10] has also been investigated. However, findings are often contradictory, indicating other variables are at play[11]. For example, Paschalides et al.[12] did not find an association between perceived control and adequate glycemic control, while Hampson et al.[13] found high perceived control associated with good glycemic control. Research also shows that a significant proportion of patients report that their quality of life is diminished because of the type of treatment they have to endure, particularly when these treatments are personally objectionable or overly burdensome[14].

The perception of a poorer quality of life due to significant treatment burden may lead to lack of adherence to prescribed medication regimens. Conversely, studies employing ‘patient empowerment’ techniques[15,16], in which patients experience both increased self-efficacy and increased perceived control over treatment, show that both glycemic control and treatment satisfaction improved[16]. Based on these findings and that there is still no conclusive knowledge regarding the role of perceived control over quality of life in patients with type 2 diabetes[4,12,13], the present study examined the relationship between perceived control and both the mental and physical health aspects of quality of life in patients with type 2 diabetes. The primary hypothesis was higher levels of perceived control would be associated with higher ratings of physical and mental quality of life in these patients.

Methods

Research Design

This study was conducted as part of a larger project funded by the Agency for Health Care Research and Quality. A combined records review and random participant invitation method was used to recruit participants, followed by a self-report survey which yielded data across the dependent measures of perceived diabetes control, health, and demographics specified below.

Sample Selection and Setting

Medical Center Billing records were used from the prior year to identify all patients with type 2 diabetes in a primary care/indigent clinic of an academic medical center in the Southeastern United States (n=3600). A 10% random sample was selected (n=360) and patients were contacted by telephone and invited to participate in the study. Over a 12-month period, consenting subjects completed surveys to assess perceived control of diabetes, and health-related quality of life. Questionnaires were administered by a research assistant. Response rate was 60% and did not differ by race/ethnicity. Data were only collected on race/ethnicity for responders and non-responders, and there was no significant difference. The Institutional Review Board approved this study protocol. All demographic characteristics collected and reported here were based on self-report.

Study Variables

Demographic characteristics—Age was assessed as a continuous variable but then categorized into three age categories (<50, 50–64 and 65+ years old). Race/ethnicity was based on self report. None of the participants were Hispanic, so the sample was categorized as white and black. Marital status was dichotomized as married versus not married. Years of education was assessed as a continuous variable but then categorized into three categories (less than high school graduate, high school graduate and beyond high school graduate). Insurance status was categorized as private, government (Medicare or Medicaid) and no insurance. Personal income was categorized as <$5,000, <$10,000, <$15,000 and $15,000+. Employment was dichotomized as employed versus unemployed. Comorbidity status was categorized as having 0-1, 2 or 3+ medical conditions. Current comorbid conditions were identified through chart audit and included: hypertension, heart disease, stroke, heart failure, chronic kidney disease, chronic obstructive pulmonary disease, peripheral vascular disease, chronic liver disease and cancer. The use of insulin therapy in diabetes management was assessed by answering ‘yes’ or ‘no’ and was included as a measure of disease severity.

Instruments

Quality of Life—Health-related quality of life was assessed with the Medical Outcomes Short Form 12 question scale (SF-12; version 1.0)[17]. The SF-12 is a brief self-report instrument and includes 12 questions about physical functioning, bodily pain, physical health problems, health perceptions, vitality, role limitation due to emotional problems and questions about general mental health. The SF-12 questions can be divided into a Physical Component Summary Score (PCS) and a Mental Component Summary Score (MCS) and corresponds well to these two sub-scores on the longer SF-36 (R squares of 0.911 and 0.918 for the Physical Component Summary scores and Mental Component Summary scores, respectively). The SF-12 also has good test-retest Reliability, with PCS alpha = 0.89; MCS alpha = 0.76. Finally, construct validity ratings are high when referenced to the SF-36 (PCS construct validity = 0.95 and MCS construct validity = 0.96)[17].

Perceived control of diabetes—Perceived control of diabetes was assessed with the revised 15-item Perceived Control Questionnaire (PCQ-R15)[8,18]. The PCQ-R15 measures the extent to which patients feel a sense of control over diabetes. PCQ-R15 items present statements that participants score on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale is scored as the sum of the items and means range from 5 to 75, with higher scores indicating greater perceived control. Reliability is good, with internal consistency at 0.94.

Statistical analysis

All analyses were performed using STATA v10.0 software[19]. Three main types of analyses were performed. First, demographic characteristics were assessed using *t* test for continuous variables and χ^2 statistics for categorical variables. Second, correlation analyses were conducted to determine the association of perceived control with the physical and mental health summary scores for quality of life. Finally, three separate multiple linear regression models were constructed to assess the independent association of perceived control on quality of life, while controlling for potentially related demographic and clinical factors. In the first regression model, the continuous variable for PCS-12 and MCS-12 scores were entered as dependent variables and perceived control score as the independent variable. In the second model, demographic factors were added to determine the effects of perceived control on PCS and MCS scores over and above effects of age, gender/sex, race/ethnicity, marital status, education, employment, income, and insurance status. Finally, in the third model, clinical factors were also added and controlled, and included comorbidity burden and use of insulin therapy. All variables were included in the models because they were conceptually related to the outcome of interest.

Results

A total of 188 patients with diabetes were enrolled in the study. Demographic characteristics of the total sample population are presented in Table 1. More than half the sample (54%) was in the 50-64 years age range. Females comprised over 71% and nearly 60% were black. The majority were not married (61%), approximately 62% had at least high school education and almost 72% were unemployed. There was a nearly equal distribution across income categories (between 22 and 26% in each). Over 54% reported having a governmental source of insurance but nearly 24% were uninsured. Half of the sample (50%) reported 0-1 medical comorbidities and most did not use insulin therapy (60%).

In assessing the level of perceived control for this sample population, the mean PCQ-R15 score was 55.5±8.70. Mean quality of life scores as measured by the PCS-12 and MCS-12 were 38.28±11.83 and 45.50±11.46, respectively. Table 2 presents the correlation coefficients between PCQ-R15 and PCS-12 and between PCQ-R15 and MCS-12. The size of the observed effect between PCQ-R15 and MCS2-12 was significantly large at r=0.53, representing a strong, positive relationship between perceived control and the mental health aspect of QOL. Similarly, the observed effect size between PCQ-R15 and PCS-12 was significant and medium at r=0.34, representing a moderate, positive relationship between perceived control and the physical health aspect of quality of life.

Finally, linear regression analyses were performed to examine the relationship between perceived control and each of the quality of life component scores (Table 3). The first model demonstrates a positive association between PCQ-R15 and both PCS-12 and MCS-12 such that as the perceived control score increased by 1 unit, the beta-coefficient for MCS-12 score increases by 0.72 points (95% CI 0.56 – 0.88) and for PCS-12 score increases by 0.49 points (95% CI 0.30 – 0.67). This unadjusted model accounted for 29.1% of the variance for MCS-12 and 12.4% for PCS-12. When controlling for demographic characteristics, the strength of relationship between PCQ-R15 and each component summary score mildly diminished such that the beta-coefficient for MCS-12 increases by 0.66 points and PCS-12 increases by 0.35 points for each unit change in PCQ-R15. This second model accounted for greater variance (34.4% for MCS-12 and 24.4% for PCS-12). In the final, fully adjusted model that included clinical factors the effect size and variance were only minimally changed.

Discussion

As defined in this study, perceived control refers to the perception that one's life is manageable and being managed by self-actionable behaviors[8]. Wallhagen[8] indicates perceived control may be central to how patients with type 2 diabetes deal with their illness. The present study supports the hypothesized relationship between perceived control and health-related quality of life. Specifically, perceived control was moderately correlated (r=0.53) with the mental health aspect of quality of life, and also significantly correlated (r=0.34) with the physical health aspect of quality of life. Although causality cannot be determined in correlation analyses, and it might be the case that higher quality of life estimates could lead to more perceived control (or some third factor could affect each of these factors); nonetheless, it seems logical that increasing one's perceived control, insofar as one's diabetes is concerned, will result in improved perceived quality of life. Using this information can be more clinically relevant with a thorough assessment of both the patient's knowledge of their medical regimen as well as their level of perceived control and self-efficacy. Such assessments can be followed by a tailored approach to educate patients about managing their diabetes and focusing on not only knowledge gain, but also more broadly on increased perceived control. That is, patients need to believe they have control over their diabetes through daily self-care practices, blood glucose self-monitoring, foot care, dietary and activity adjustments and medication adherence to achieve and maintain glycemic control and higher quality of life. As Gerstorf et al.[20] stated, perceived control predicts improved physical and mental health, and perhaps longer life, but the role of mediating events requires more clarification.

Prior inconsistencies in the literature relating perceived control to quality of life may result from differences in construct definition or focus on other types of control such as locus of control, which is indicative of control orientation not of feeling to be in control[8]. Thus, it is important to both specify and extend studies in which perceived control is compared to other, slightly different measures or constructs of “control,” such as self-efficacy and locus of control. Many studies have tried to establish commonalities and differences between these constructs, with the majority focused on the relationship of increased self-efficacy to improve health outcomes[4,7,21-23]. Additional research is needed in this area to clarify the importance of perceived control to quality of life[24] and ultimately, how perceived control is related to the impact and self-management of diabetes through glycemic control (including the interaction of other control-related constructs and psychological factors related to and affecting perceived control such as depression)[20]. In this way, interventions may be tailored to address perceived control according to individual patient characteristics. For example, the predictive value of perceived control on quality of life and diabetes-related outcomes likely varies with locus of control orientation and coping style. Individuals with a more external locus of control and emotion-focused (as opposed to problem-focused) coping style may not display a strong relationship between perceived control and quality of life or glycemic control. By contrast, individuals with a more internal locus of control and problem-focused coping style will demonstrate a stronger impact of their perceived control on adhering to appropriate diabetes self-management behaviors as well as a prescribed treatment regimen. In the present study, it was clear that perceived control was related to self-reported quality of life. However, future research should investigate whether perceived control is also related to outcomes such as medication adherence and glycemic control.

Limitations

This study has several strengths including being adequately powered to detect a significant effect of perceived control on quality of life and showing reliability of the perceived control scale (PCQ-15R) in a low-income sample of African American patients with type 2 diabetes. However, improvements to this study that will inform future research should also be noted. The study comprised a relatively homogeneous sample that limits generalizability of these findings to other racial/ethnic groups and those of higher socioeconomic status. Thus, these findings may not be reflective of the larger diabetes population; however, it is likely more applicable to those with poorer diabetes control and more disadvantaged population. Also, health literacy was not measured but was shown to be independently associated with poor diabetes knowledge and poor self-management practices[25]; therefore, it is important to study when examining perceived control, glycemic control and medication adherence. The sample comprised mostly women (71.3%). Some investigators[26] have posited that there might be a difference in terms of how women and men confront life-events, and samples with sufficient numbers of both genders will be necessary to answer these questions.

Implications

The study findings mesh nicely with those of Howorka et al.[16], who found that 'empowered' patients, or those with both a sense of self-efficacy and perceived control over their medical situation (treatment choices and decision making), reported higher quality of life and had better glycemic control. Thus, treatment adherence outcomes may depend, in part, on the extent to which patients feel that the decision making process is under their control. Achieving control will probably require more than enhancing self-efficacy through education. Instead, such education should be complimented by efforts that focus on increasing a patient's perceived control over treatment choices and diabetes management.

Acknowledgments

This study was funded by grant 5K08HS11418 from the Agency for Health Care Research and Quality, Rockville, MD (PI – Leonard Egede MD).

References

1. Bradley C, Speight J. Patient perceptions of diabetes and diabetes therapy: assessing quality of life. Diabetes Metab Res Rev. Sep-Oct;2002 18(3):S64–69. [PubMed: 12324988]
2. Rubin R, Peyrot M. Quality of Life and Diabetes. Diabetes Metab Res Rev. 1999; 15:205–218. [PubMed: 10441043]
3. Rubin R. Diabetes and Quality of Life. Diabetes Spectrum. 2000; 13:21–23.
4. O'Hea EL, Moon S, Grothe KB, et al. The interaction of locus of control, self-efficacy, and outcome expectancy in relation to HbA1c in medically underserved individuals with type 2 diabetes. J Behav Med. Feb; 2009 32(1):106–117. [PubMed: 19089606]
5. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review. 1977; 84:191–215. [PubMed: 847061]
6. Wallston KA, Wallston BS, DeVellis R. Development of the Multidimensional Health Locus of Control (MHLC) Scales. Health Educ Monogr. Spring;1978 6(2):160–170. [PubMed: 689890]
7. Ajzen I. Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. J Appl Soc Psychol. 2002; 32(4):665–683.
8. Wallhagen MI, Lacson M. Perceived control and psychosocial/physiological functioning in African American elders with type 2 diabetes. Diabetes Educ. Jul-Aug;1999 25(4):568–575. [PubMed: 10614261]
9. Macrodimitris SD, Endler NS. Coping, Control, and Adjustment in Type 2 Diabetes. Health Psychology. 2001; 20(3):208–216. [PubMed: 11403218]
10. Hanestad BR, Albrektsen G. Quality of life, perceived difficulties in adherence to a diabetes regimen, and blood glucose control. Diabet Med. Oct; 1991 8(8):759–764. [PubMed: 1838068]
11. Egede LE, Ellis C. The effects of depression on diabetes knowledge, diabetes self-management, and perceived control in indigent patients with type 2 diabetes. Diabetes Technol Ther. Jun; 2008 10(3):213–219. [PubMed: 18473696]
12. Paschalides C, Wearden AJ, Dunkerley R, Bundy C, Davies R, Dickens CM. The associations of anxiety, depression and personal illness representations with glycaemic control and health-related quality of life in patients with type 2 diabetes mellitus. J Psychosom Res. Dec; 2004 57(6):557–564. [PubMed: 15596162]
13. Hampson S, Glasgow R, Strycker I. Beliefs versus feelings: a comparison of personal models and depression for predicting multiple outcomes in diabetes. Br J Health Psychol. 2000; 5:27–40.
14. Huang ES, Brown SE, Ewigman BG, Foley EC, Meltzer DO. Patient perceptions of quality of life with diabetes-related complications and treatments. Diabetes Care. Oct; 2007 30(10):2478–2483. [PubMed: 17623824]

15. Funnel M, Anderson R. Empowerment and Self-Management of Diabetes. Clin Diabetes. 2004; 22(3):123–127.
16. Howorka K, Pumprla J, Wagner-Nosiska D, Grillmayr H, Schlusche C, Schabmann A. Empowering diabetes out-patients with structured education: short-term and long-term effects of functional insulin treatment on perceived control over diabetes. J Psychosom Res. Jan; 2000 48(1): 37–44. [PubMed: 10750628]
17. Ware J Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. Med Care. Mar; 1996 34(3):220–233. [PubMed: 8628042]
18. Wallhagen M. Perceived control theory: a recontextualized perspective. J Clin Geropsychol. 1998; 4:119–140.
19. Statacorp. Stata Version 10.0.2007. College Station, TX: Stata Press;
20. Gerstorf D, Rocke C, Lachman ME. Antecedent-consequent relations of perceived control to health and social support: longitudinal evidence for between-domain associations across adulthood. J Gerontol B Psychol Sci Soc Sci. Jan; 2010 66(1):61–71. [PubMed: 21041231]
21. Rodgers W, Conner M, Murray T. Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviours. Soc Psychol. 2008; 47(4):607–630.
22. Sarkar U, Fisher L, Schillinger D. Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? Diabetes Care. Apr; 2006 29(4):823–829. [PubMed: 16567822]
23. Zachariae R, Pedersen CG, Jensen AB, Ehrnrooth E, Rossen PB, von der Maase H. Association of perceived physician communication style with patient satisfaction, distress, cancer-related self-efficacy, and perceived control over the disease. Br J Cancer. Mar 10; 2003 88(5):658–665. [PubMed: 12618870]
24. Bowling A, Seetai S, Morris R, Ebrahim S. Quality of life among older people with poor functioning. The influence of perceived control over life. Age Ageing. May; 2007 36(3):310–315. [PubMed: 17387124]
25. Schillinger D, Grumbach K, Piette J, et al. Association of health literacy with diabetes outcomes. JAMA. Jul 24-31; 2002 288(4):475–482. [PubMed: 12132978]
26. Cherrington A, Wallston KA, Rothman RL. Exploring the relationship between diabetes self-efficacy, depressive symptoms, and glycemic control among men and women with type 2 diabetes. J Behav Med. Feb; 2010 33(1):81–89. [PubMed: 20128112]

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 1

Sample Demographic Characteristics

	Total Sample (n=188)
Age	
<50 years old	23.4
50-64 years old	54.3
65+ years old	22.3
Gender/Sex	
Female	71.3
Male	28.7
Race/Ethnicity	
White	41.0
Black	59.0
Marital status	
Married	38.3
Not married	61.7
Educational level	
Less than 12th grade	37.8
High school graduate	26.6
Beyond high school / post-secondary	35.6
Employment status	
Unemployed	71.8
Employed full-time or part-time	28.2
Annual household income level	
<$5,000	26.6
<$10,000	26.1
<$15,000	22.9
$15,000+	24.5
Health insurance	
Private	21.3
Governmental	54.8
Uninsured	23.9
Comorbidities	
0-1 medical conditions	50.0
2 medical conditions	27.7
3+ medical conditions	22.3
Insulin therapy	
Yes	39.4
No	60.6

All numbers represent percentages.

Table 2

Correlation between Perceived Control (PCQ-R15) and Physical Component Score (PCS-12) and Mental Component Score (MCS-12)

	MCS12	**PCS12**
PCQ-R15	r = 0.53	r = 0.34
	p < 0.0001*	p < 0.0001*

*Statistically significant at p <0.05

Table 3

Regression Models for Effect of Perceived Control (PCQ-R15) on Physical Component Score (PCS-12) and Mental Component Score (MCS-12) Controlling for Covariates

	Model 1 * **β (95%CI)**	***Model 2*** ** **β (95%CI)**	**Model 3*** β (95%CI)**
MCS-12	0.72†	0.66†	0.65†
	0.56, 0.88	0.49, 0.84	0.46, 0.83
PCS-12	0.49†	0.35†	0.34†
	0.30, 0.67	0.15, 0.55	0.14, 0.54

β= beta coefficient; 95%CI = 95% confidence interval

† Statistically significant when 95% CI does not include 0.

* Model 1 – Unadjusted. Adjusted R-squared: 0.29

** Model 2 – Adjusted for Demographics. Adjusted R-squared: 0.34

*** Model 3 – Model 2 + Comorbidity and Disease Severity. Adjusted R-squared: 0.24