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Relationships Among Health Locus of Control, Psychosocial Status and Glycemic Control in Type 2 Diabetes Adults

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Abstract

Background: Although a common thread among diabetic behavior is the importance of perceived glycemic control, little is known of the factors that lead to psychosocial status in this population.

Purpose: We determine whether the psychosocial factors of health locus of control, self-efficacy, self-care behavior, and depression relate to glycemic control in type 2 diabetes.

Method: We used a descriptive correlational design. In total, 285 subjects were enrolled from diabetic outpatient clinics in Southern Taiwan. We applied the health locus of control, self-efficacy, self-care behavior and depression questionnaires. Glycemic control was assessed by HbA1c.

Results: The internal health locus of control was significantly positively correlated with self-efficacy and self-care behavior, and significantly negatively correlated with depression. Combined depression and self-efficacy partly mediated the relationship between internal locus of control and self-care behavior (P.01), and completely mediated the relationship between external health locus of control and self-care behavior (P.01). Depression and initial HbA1c directly and significantly affected final HbA1c value. Higher depression had the worst HbA1c.

Conclusion: Internal health locus of control was partly mediated the relationship between depression and self efficacy. The finding could form a basis for caring people with type 2 diabetes and provide a reference for further research.

Keywords Health locus of control; Psychosocial factors; Glycemic control; Type 2 diabetes

Intoduction

Diabetes is becoming an increasingly important issue due to it rising prevalence, complications, and mortality. Previous diabetes studies have shown that tight control of a patient's glycemic levels reduces serious complications of type 2 diabetes [1]. The glycosylated hemoglobin (HbA1c) level is the indicator of glycemic control, but several problems identified in the literature relate to an understanding of how to motivate people to "control" diabetes self-care behavior. Numerous diabetes self-care studies have explored how challenging it is for diabetic patients to improve or maintain their diabetes [2]. Zulman et al. found that particular psychosocial factors appear to act as important personal barriers or facilitators to diabetes self-care and diabetes status [3]. However, little information is available regarding the relationships among these variances with glycemic control. Weng et al. indicated that health locus of control changes precedes changes in self-care behavior, which consequently lead to changes in glycemic concentrations [4].

The multidimensional health locus of control was developed based on social learning theory and represents an outcome of behavior [5]. The health locus of control construct holds that people view the attainment of a particular outcome as either within their control (internal) or outside of their control (external). Health locus of control is the potential for a behavior to occur in a given situation and the expectation that the behavior will lead to a particular outcome. This construct contends that external health locus of control perceives chance expectations such as fate or luck, and control by powerful others such as family members or physicians. In contrast, in internal health locus control, people believe that attaining a particular outcome is under their control. In perceived internal health locus of control, people take responsibility for their own actions and engage more readily in health-promoting behaviours [5,6]. The literature review presents perceived internal health locus of control to be associated with better adjustment to diabetes, better adherence to self-care regimens, and better glycemic control [4,7] however, certain reviews are pessimistic [8,9]. Exploring interactions between health locus of control and affecting factors, such as self-efficacy and depression.

Self-efficacy is a powerful predictor of diabetes self-care behaviors. Numerous studies have found self-efficacy to be positively related to improved self-care outcomes [7,10,11]. O'Hea et al. determined that psychological factors such as self-efficacy, health beliefs, and emotional distress are significantly associated with diabetes self-care behaviors. Aljasem et al. stated that self-efficacy is a powerful predictor of self-care behavior in controlling diabetes and HbA1c. Self-efficacy is behavior specific and dynamic and focuses on beliefs of personal abilities in a specific setting or to a particular behavior such as a positive effect on behavior change and positively influencing long-

term glycemic control [12]. An increase in self-efficacy showed significant improvements in health behavior and health status [13]. However, how self-efficacy and locus of control work together to predict health-related behaviors is particularly important. Previously published results have indicated that the internal health locus of control is positively associated with self-efficacy and learning how to be self-motivated [4,14,15].

Diabetes patients have a two times higher risk for depression than the general population [16]. Diabetes accounts for 13.17% of mild depression levels [17], as do common diabetic complications, which also put patients at high risk for depression. Trief et al. stated that poorer diabetic control is associated with psychological facets of depression [18]. Therefore, although emotional distress is required to motivate diabetes patients to maintain proper self-care behavior, the glycemic control of these patients can decline. According to the literature review, numerous psychological distresses, including emotional distress and depression, affect glycemic control [13,19]. Therefore, health locus of control may be an important factor in psychosocial issues influent to facilitate patients to make behavior changes to change glycemic levels [20].

Little information is available regarding the relationships among the health locus of control, comorbid depression, and self-efficacy of adults with type 2 diabetes. This community-based clinical study provides an approach for determining the predictors of self-care behavior among people with diabetes. Enhanced understanding of the relationships among health locus of control, self-efficacy, and depression in diabetes and help to identify the potential effects of these factors on self-care behaviors and glycemic control. This information should help diabetes health providers plan evaluations that are more effective and possibly conduct a more productive intervention program. Thus, we determine the relationship between health locus of control, self-efficacy, depression, self-care behaviors and glycemic control in type 2 diabetes patients.

Methods

Study design

This study was a cross-sectional design with a descriptive correlation approach. Data were collected using permission regarding use of structured questionnaires and face-to-face interviews.

Sample and setting

Participants were recruited from endocrinology departments at a community-based clinical teaching hospital in Southern Taiwan. Participants were required to meet the inclusion criteria: (a) age 18 years and able to communicate in Chinese; (b) diagnosed with type 2 diabetes; (c) do not have history of critical disease or mental disease; (d) voluntary participation. The exclusion criteria were (a) having type 1 diabetes, gestational diabetes, or types of diabetes with other causes; and (b) having complications that would interfere with the ability to participate in the study (e.g., vision problems, end-stage renal disease and renal dialysis, cognitive impairments, diabetes ketoacidosis). The sample size was calculated based on the power analysis. Using a moderate effect-size for statistic power analysis for a probability level of 0.05 and 0.80 power, a sample size of 250 participants was deemed adequate. An attrition rate of 20% was anticipated based on the literature review [21]. Of the 300 participants approached, 10 people refused to participate, and 5 did not complete the questionnaires. In total, 285 participants were included in the analyses for the present study.

Ethical considerations

Human research ethics committees at a regional hospital provided ethical approval for the study. Signed informed consent was obtained from all participants prior to beginning the study. Anonymity and confidentiality were ensured, and the participants were informed that they could withdraw from the study at any time.

Instruments

The personal-information questionnaire included participant demographic data and medical condition data (age, gender, marital status, education level, income status, religion, duration, HbA1c, hypertension, lipemia, cardiomyopathy, nephropathy, and neuropathy).

The Multidimensional Health Locus of Control Scale (MHLC), developed by Wallston, Wallston and DeVellis in 1978, was applied to determine situational and perceived internal health locus of control and external health locus of control. The health locus of control scale consists of 18 items. A high score of internal health locus of control is correlated with a high level of participant-perceived internal personality. A high score of external personality trait is correlated with a high level of participant-perceived external personality. Yang tested the reliability and validity of the Chinese version and obtained a Cronbach's α value of 0.83 [22].

The Self-Efficacy Scale, developed by Chen et al. consists of four dimensions and 19-items, including general (5-items), diet (5-items), exercise and foot care (4-items), and medication (5-items). The Self-Efficacy Scale was applied to determine perception and abilities. Responses were graded on a Likert 11-point scale, ranging from 0 (can't handle the situation at all) to 10 (can handle the situation) [23]. A high score correlates with a high level of participant-perceived self-efficacy. Cronbach's α values in the Chinese version obtained 0.87.

The 21-item self-report Depression Anxiety Stress Scale (DASS-21) was developed by Lovibond and Lovibond with the aim of assessing depression, Anxiety and stress. Responses were graded on a 4-point Likert scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of tie). A high score is correlated with a high level of participant-perceived depression. The internal consistency for the DASS-21 subscales has been reported to be 0.91 (depression), 0.84 (anxiety), and 0.90 (stress). The Chinese version of the instrument been used by Taouk, Lovibond and Laube in a study with 729 Hong Kong Chinese speaking people. The internal consistency reported in this Chinese population for the DASS-21 was 0.92 (depression), 0.94 (anxiety), and 0.91 (stress) [24,25].

The Diabetes Self-Care Behavior Scale, developed by Hsu et al., consists of four dimensions and 14-items, including wound care (4-items), nutrition (3-items), medication (4-items), and SMBG (3-items). The Diabetic Self-Care Behavior Scale was applied to self-care behaviors. Responses were graded on a Likert 5-point scale, ranging from 1 (can't handle the behavior at all) to 5 (can handle the behavior). A high score is correlated with a high level of participant-perceived diabetic behavior. Cronbach's α values in the Chinese version obtained 0.87 [26].

Data collection

After the participants provided informed consent, data were collected in individual face-to-face interviews by using structured questionnaires (Personal-information, MHLC, Self-Efficacy, DASS-21, Diabetes Self-Care Behavior). Data on the patients' initial and final HbA1c levels were gathered from their medical records.

Data analysis

The SPSS software version 18.0 for Windows, and Amos software version 18.0 were used for statistical analyses. The interval data were expressed as means and standard deviations (SD), and the categorical data as frequency and percentage. A path analysis was adopted to describe relationships among variables using a structural equation model (SEM) with only measured variables. The path analysis specifies a model based on expected relationships among variables and tests if the observed variable relationships fit model expectations, thereby allowing simultaneous relationship testing among numerous variables. A path analysis was used to explore simultaneous relationships among demographic variables and health locus of control, self-efficacy, depression, self-care behavior and glycemic control. The CFI, TLI, and NFI values greater than 0.90, the normed 2 less than 5.0 [27], and the RMSEA value less than or equal to 0.08 indicated a good model fit. A P value less than 0.05 was considered statistically significant.

Results

Sample characteristics

The final study consisted of 285 participants with type 2 diabetes. The participant ages ranged from 19 to 83 years, (mean= 60.44; SD = 10.99 years), 181 (63.5%) were women, and 238 (82.1%) were married. Among these, 175 (61.4%) had primary school education or lower, 166 (58.3%) had a monthly income under NT$19,999, and 233 (81.8%) held religious beliefs. The disease duration of the participants ranged from 1 to 45 years (mean = 8.66, SD= 6.30). Complication was defined as the occurrence of syndromes related to diabetes, including hypertension 167 (58.6%), lipemia131 (46.0%), cardiomyopathy 21 (7.2%), nephropathy 116 (40.7%), and neuropathy 140 (49.1%). The HbA1c ranged from 4.6% to 14.5% (mean= 8.5%, SD = 2.14%).

Prior to analysing the means and SD of the internal health locus of control (mean= 26.99, SD = 3.05) cronbach's α values obtained 0.78, self-efficacy (mean=140.17, SD = 19.00) cronbach's α valuesobtained0.82, depression (mean= 5.49, SD = 5.56) cronbach's α valuesobtained0.83, and self-care behavior (mean= 54.19, SD = 9.60) cronbach's α values obtained 0.87, the findings indicated that most participants had a high sense of control over their behavior (Table 1).

Items	n (%)	Mean	SD	Range
Age(year)		60.44	10.99	19-83
Gender male female	104 (36.5) 181 (63.5)			
Marital status single married	47 (17.9) 238 (82.1)			
Education	64 (22.5)			
No education Literacy Primary school High school Vocational education Bachelor or more	16 (5.6) 95 (33.3) 46 (16.1) 45 (15.8) 19 (6.9)			
Income (per month) 9999 or below 10,000 - 19,999 20,000-49,999 50,000 or more	80 (28.2) 86 (30.1) 102(35.9) 17(5.8)			
Religion yes no	233 (81.8) 52 (18.2)			
HbA1c(%)		8.52	2.14	4.6-14.5
Disease duration(year)		8.66	6.30	1-45
Hypertension yes no	167 (58.6) 118 (41.4)			
Lipemia yes no	131 (46.0) 154 (54.0)			
Cardiomyopathy yes no	21 (7.2) 264 (92.8)			
Nephropathy yes no	116 (40.7) 169 (59.3)			
Neuropathy yes no	140 (49.1) 145 (50.9)			

Table 1: Demographic variables and disease status (n = 285)

Relationships among health locus of control, self-efficacy, depression and self-care behavior

Direct effects

Figure 1 shows the estimated standardized path coefficients, indicating that internal health locus of control was significantly positively correlated with self-efficacy (β=0.32, $P < 0.001$) and self-care behavior (β=0.17, $P < 0.001$), and significantly negatively correlated with depression (β=-0.18, $P < 0.01$). External health locus of control was significantly positively correlated with depression (β=0.24, $P < 0.001$) and self-efficacy (β=0.32, $P < 0.001$). No significant correlation existed between external health locus of control and self-care behavior (β=0.06, .05).

Depression had a significant negative correlation with self-care behaviors (β=-0.07, $P < 0.05$), and self-efficacy was significantly correlated with self-care behavior (β=0.70, $P < 0.001$; Figure 1).

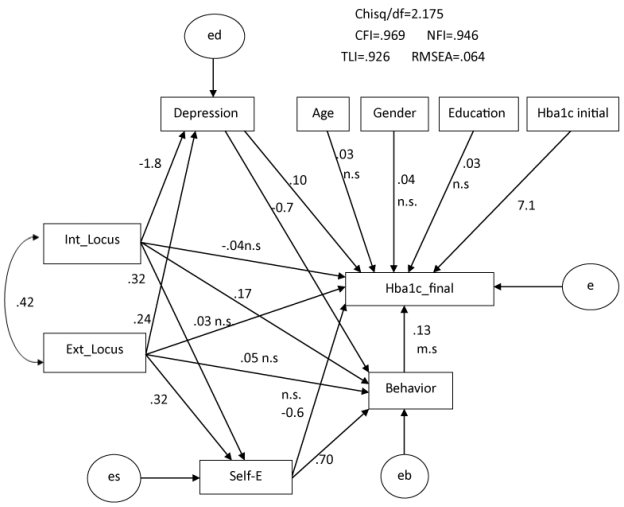

Figure 1: Path analysis model of determinants for glycemic control in type 2 diabetes.

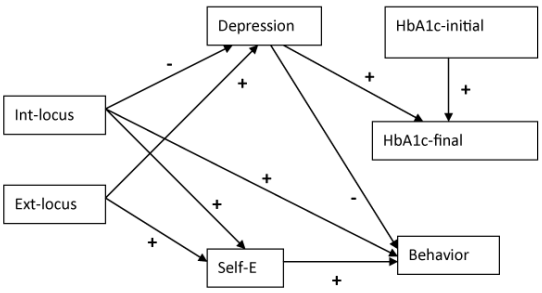

Figure 2: Final factor model related to glycemic control.

Indirect effects

Based on the path analysis results, combined depression and self-efficacy partly mediated the relationship between internal health locus of control and self-care behavior ($P < 0.01$), and completely mediated the relationship between external health locus of control and self-care behavior ($P < 0.01$).

Factors contributing to glycemic control

The normed chi-square for the overall path analysis model was 2.175, indicating that the model fit the data well. The root mean square error of approximation (RMSEA) was 0.064, suggesting exact model fit. The comparative fit index (CFI) was .969 and TLI = 0.926, NFI = 0.946, further supporting a good model fit.

In the path analysis model, both depression and the initial HbA1c value directly and significantly affected the final HbA1c value. A high level of depression was associated with the highest final HbA1c value (β=0.10, P0.05). Low initial HbA1c levels (high level of glycemic control) were associated with low final HbA1c levels. No correlations of HbA1c existed with internal health locus of control, external health locus of control, self-efficacy, gender, and age (P.05; Figure 2).

Discussion

The purpose of the current study was to examine the relationships among the health locus of control, self-efficacy, self-care behavior, depression, and glycemic control of adults with type 2 diabetes. People with strong internal locus of control beliefs are most likely to engage in positive health behaviors, where as people with external locus of control beliefs, which are controlled by influential people or by chance, are not likely to engage in positive health behaviours [3,5,13,14].

Using the SEM, we observed direct relationships among the health locus of control, self-efficacy, depression, and self-care behavior. This finding is partially supported by Zulman et al. and Shi et al., who observed a positive correlation between the internal health locus of control and self-efficacy and high scores in health-related behavior [3,13]. People with internal health beliefs attribute health outcomes to their own actions and engage readily in positive health behaviors [28]. Moreover, people with an internal health locus of control who experience emotional distresses such as depression are likely to motivate themselves to maintain proper self-care behavior [7].

In addition, external health locus of control was directly and positively correlated with self-efficacy and depression. Henninger et al. observed that patient with severe medical complications tend to have an external health locus of control; thus, they perceive that they exert little personal control over their environment and circumstances [29]. Therefore, self-efficacy might be a crucial factor for people with an external health locus of control. Chen et al. offered an explanation for this observation, stating that patients with an external health locus of control depend on chance and medical professionals, such as physicians and nurses, to manage their diabetes and to enhance their self-efficacy [30]. Therefore, when planning interventions, health providers should be considered powerful people.

We observed that an external health locus of control is a direct factor of depression. This finding might be attributed to the fact that most of the data in this study were collected from elderly people (mean=60.44). Most elderly people live with their children and are financially supported [31]. Therefore, psychosocial support and recognition from the younger population are considered to be major requirements for depression among elderly Taiwanese people with diabetes [32]. However, because questions remained unanswered, additional research and discussion on this topic are required to examine other crucial factors that are associated with depression in elderly people with diabetes.

In addition, we observed the indirect effects by conducting a path analysis. Although the health locus of control was significantly correlated with self-efficacy and depression, no significant correlation existed between an external health locus of control and self-care behavior. The findings of Macaden and Clarke partially support these findings [20]. The Taiwanese diabetes patients who exhibited an external health locus of control managed their diabetic regime, believed thHat their diabetes was due to fate and bad luck, and engaged in poor glycemic control. Patients must be responsible for diabetes management, but limitations such as stress and depression affect diabetes control [32]. Moreover, fate and luck cause patients to

believe that they cannot control their health outcomes, leading to depression. The correlation between an external health locus of control and self-efficacy observed in this study indicated that most Taiwanese people with type 2 diabetes attributed the responsibility of glycemic control to influential people and depended on healthcare providers for support [2].

Similarly, Macaden and Clarke indicated that patients in a South Asian context expected physicians to provide solutions to all problems and make all decisions [20]. Patients tended to depend on healthcare providers to control their glycemic levels, transferring the responsibility of managing their disease to the doctor rather than recognizing it as their own [29]. Thus, an external health locus of control is positively correlated with self-efficacy, but not with self-care behavior. Future research must consider the cultural differences among people with type 2 diabetes.

We observed that both depression and the initial HbA1c value were directly and significantly associated with the final HbA1c value, but were only marginally significantly associated with self-care behavior. Although the reason for this interaction is unclear, we speculate that, when diabetic people perceive events as beyond their personal control, they believe that doctors should help them control glycemic levels by using medication [20]. Further research is required to clarify the reason for the aforementioned association. However, the results provided evidence that, when caring for diabetic people, nurses should conduct assessments to collect initial data on the glycemic levels of their patients [4].

No correlations between HbA1c levels and the health locus of control, self-efficacy, gender, education, and age were observed. Moreover, our investigation of the relationship between the initial HbA1c value, the final HbA1c value, the health locus of control, self-efficacy, gender, education, and age yielded inconclusive findings. Although we observed a significant relationship, this became a trend when controlling other variables; thus, the relationship was weak. A stronger relationship could be masked by limited variability in the final HbA1c value, the health locus of control, self-efficacy, gender, or age, leading to the conclusion that the relationships among these variables were weak in this sample. Further research must be conducted to determine whether the results differ in type 2 diabetes populations belonging to other culture groups [30-34].

Limitations

The current study has limitations. First, because this study used a cross-sectional design, cause-effect determinations could not be established based only on the data; thus, future longitudinal or experimental studies are required to evaluate the direction of causality. Second, the sample analyzed in this study consisted only of people attending a community-based clinic hospital for diabetes treatment. Thus, this sample was not a representative sample of all diabetic patients.

Implications

The findings of the current study provide relevant information for future programs and studies conducted to improve self-care behavior and glycemic control among type 2 diabetes populations. Intervention programs can be tailored to people's specific health locus of control beliefs. People with external locus of control beliefs tend to rely on the health opinions provided by health care providers; thus, health care providers can establish guidelines for active self-care behavior, provide strong guidance and supervision, and hold structured activities to improve these patients' perspectives toward their treatment regimens.

Conclusion

The current study indicated that depression and self-efficacy mediate the associations among health locus of control, self-care behavior, and glycemic control. However, additional studies are required to investigate the health locus of control in various cultures and the diversity among diabetes populations. These studies must involve a longitudinal follow-up to determine how the health locus of control affects self-care behavior and glycemic control.

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