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Research Article

The Influences of Income and Education on the Illness Perception and Self-Management of Thai Adults with Type 2 Diabetes

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Abstract

Illness perception and self-management might be of importance in proactive care for patients with type 2 diabetes.

Objective: The aim of the study was to examine the influences of socioeconomic status on the illness perception and self-management of Thai people with diabetes.

Methods: A cross-sectional descriptive method was used to study 220 people with type 2 diabetes in a suburban area in Thailand. The participants were selected using a multistage sampling method. Data were collected through the structured interviews using the revised versions of the Diabetes Illness Perception scale and Diabetes Self-Management scale. Independent sample t test or Mann-Whitney U test was used for income and education subgroups comparisons as well as multiple logistic regression was analyzed the predictors of illness perception and self-management.

Results: The results indicated that socioeconomic status, defined by income and educational level, showed the effects on some aspects of illness perception and self-management strategies in a type 2 diabetes population. Educational level demonstrated more effects on many subscales of illness perception and self-management than on income and was also shown to be a predictor of self-management (OR 2.047, 95% CI 1.014-4.131, p-value 0.046).

Conclusion: The study found that socioeconomic status had an impact on the illness perception and self-management of people with type 2 diabetes. Educational level demonstrated a significant influence on the perceptions and management of Thai people with diabetes, which was also true concerning income level, although to a lesser extent. Illuminating socioeconomic status in the context of religious beliefs may increase health care professionals' understanding of patients' experiences and management of their diabetes. This is especially important when designing appropriate interventions for patients of low education.

Keywords: Illness perception; Self-management; Socioeconomic status; Thailand; Type 2 diabetes

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Introduction

Type 2 Diabetes (T2D) is a chronic disease that places a heavy burden on patients. Because of its continually increasing prevalence worldwide [1,2], T2D has become a growing concern for healthcare professionals. The global prevalence of T2D among adults was approximately 9% in 2014 [3]. In Thailand, the occurrence of T2D is increasing and it is one of the five most common chronic diseases [4], with a prevalence of approximately 6.4% in 2013 [1].

Improving health literacy, the ability to use healthcare information to follow instructions for treatment [5] is of continued and increasing concern for health professionals essential to promote healthy individuals and communities. Research in diabetes health literacy is needed to fully understand the burden of the chronic disease.

Several international studies have identified a relationship between T2D and socioeconomic status by evaluating factors such as income level, educational attainment, and occupation [6-8]. Living at low economic levels, including poverty, can affect people's lives [9]. People with low incomes or with a low level of education are more likely to be affected by a high prevalence of diabetes [6,7] and more diabetes complications than those of high socioeconomic status [8]. Education and economic levels have also been identified as predictors of diabetes mortality risk [10], and having high socioeconomic status is seen as a protective factor for the negative psychological symptoms such as anxiety and depression of people with diabetes [11].

The term "illness perception" is used both to describe a person's cognitive and emotional response pattern and coping styles when living with the disease and as the experiences and understanding of his or her situation [12]. People that perceive barriers to self-care when living with diabetes experience more consequences of the disease and show high emotional response [13]. Furthermore, western studies have demonstrated negative psychological consequences resulting from T2D, such as depression and anxiety [11,14], which have been seen to be higher among young people, females, and those with a low income [15]. Other studies have indicated that diabetes distress is linked to poorer self-care activities [16], especially adherence to medications and poorer glycemic control [15].

Self-management is often described as the way people handle their lives with the disease through self-care activities and with their own cognitive decision making and in cooperation with the support from significant social networks [17]. Lautenschlager & Smith [18] found that although people are able to verbalize information concerning self-care practices, few people can apply this knowledge in their own life. Research has also reported a relationship between employment and

economic hardship and diabetes self-management [19], suggesting that low economic status is a barrier to attaining successful self-management [20]. In addition, people living in a deprivation status have been observed to have poorer glycemic control [21]. Furthermore, diet management in comparison to Self-Monitoring of Blood Glucose level (SMBG) has been found to be the most common self-care practice in controlling diabetes among low economic groups [22].

T2D is a common chronic disease in Thailand [4], and only 28% of Thai people are able to control their plasma glucose level [23]. Studies in western countries have found differences in diabetes perceptions and self-management in relation to race and ethnicity [24] and have found a relationship between socioeconomic inequality and glycemic control [25,26]. Until now, the research conducted in Thailand with people with type 2 diabetes has mostly focused on the issue of self-management without comparing different socioeconomic conditions [27-29]. Thus, knowledge concerning the effects of socioeconomic status is limited. In order to increase this knowledge, it is important to investigate the influences of socioeconomic status on people's life with diabetes, particularly concerning income and education. Increased knowledge in this field may help healthcare professionals design more suitable and effective care plans for people living with T2D.

As a part of a larger study investigating a Thai population with type 2 diabetes, the aim of this study was to examine illness perception and self-management in relation to socioeconomic status defined by income and educational level. An additional aim was to determine if socioeconomic factors were important in predicting illness perception and self-management strategies.

Materials and methods

This study was carried out using a cross-sectional descriptive method. Data were collected using questionnaires and each participant was measured one time in order to determine their illness perception and self-management of the T2D.

Setting

The research area was Pathm Thani province, a suburban area in Thailand. Most of the inhabitants in this province are Buddhist (94.5%) and work in the industrial sector (71.1%) [30]. Population living in this province represent 4.7% of the overall unschooled people in Thailand [31]. The setting areas in this study were within the responsibility of the Health Promoting Hospitals (HPHs), a front line healthcare service in the public healthcare system that provides pro motive, preventive, and primary medical care to the entire population in the catchment areas. These healthcare services are available to all inhabitants with free essential treatment without any cost limit. However, people can access healthcare services from other hospitals that are not recommended in their health insurance scheme if they themselves pay for the treatment costs.

Procedures

Sampling method

This study adopted a multistage sampling method [32]**.** According to this sampling method, the entire province was split into smaller samples at each following level: district, sub-district, and HPH. One random sample was chosen at each level until getting the sampled HPH. All of the people diagnosed as having T2D by a physician in the catchment areas of the selected HPH were invited to participate in this study. If there were not enough participants available in the sampled HPH, another HPH was selected randomly. In total, 4 of 19 HPHs in the province were selected in order to obtain a sufficient sample size (220 participants), which was calculated according to the proportion of Thai people with diabetes (6.4%) and the desired level of precision at 0.05 [33]. This sample size made it possible to compare among subgroups.

Participants

All of the people with T2D that met the inclusion criteria a serve a led in the medical records were eligible as the target participants. The inclusion criteria were as follows: 1) Thai citizens that could spoke the Thai language, 2) diagnosed with T2D for at least one year, and 3) taking oral anti-diabetic agent(s), insulin injection, or both. People with T2D admitted to hospital and people whose address could not be found were excluded. A total of 478 people with diabetes were contacted, and 220 people (46%) participated in the study (Figure 1).

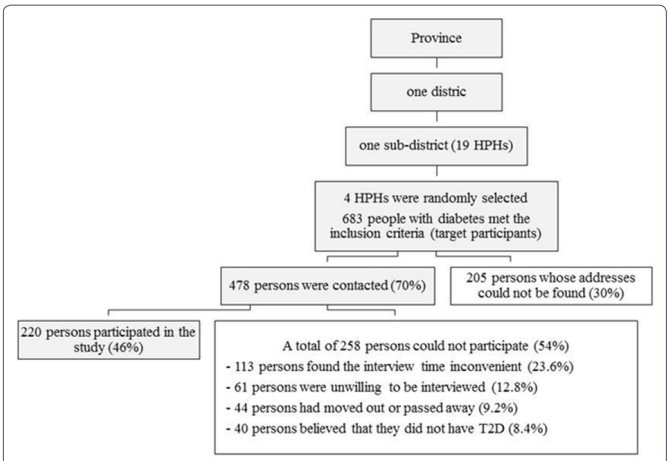

Figure 1: Flow diagram of procedures for selecting the participant

Data collection

Three interviewers supervised by the first author collected the data. All three were trained to use the specific questionnaires of this study. One interviewer interviewed each participant. The interviews were conducted from June to August 2015 at the participants' homes or another place suggested by them. Details of the study, as well as confirmation of the confidentiality of the data and how to withdraw from the study, were communicated with all participants before the interview began. An informed consent was signed when the participants agreed to participate in the study. Each interview lasted between 40 to 60 minutes. If needed the interviewer could make an additional re-visit for completing the questionnaires.

Instruments

The interview instruments included a demographic form, including socio-demographic characteristics and illness-related information, and two previously developed scales used in diabetes research that were translated into Thai. These questionaires comprised the diabetes Illness Perception Questionnaire (IPQ-R) developed by Moss-Morris et al. [12], and the new revision of the Diabetes Self-Management Questionnaire (DSMQ-R) developed by Schmitt et al. [34]. Both instruments have earlier shown good psychometric properties [12,34].

The IPQ-R diabetic version questionnaire consists of three sections: identity, diabetes perception, and causal sections. The identity

section focuses on the participants' beliefs about 14 common symptoms that are associated with diabetes with a yes/no format. The diabetes perception section consists of 38 items divided into seven subscales that present the participants' beliefs about their diabetes condition, its consequences, the ability to control the disease by themselves and with treatment, and emotional representation. The terms of the seven subscales were as follows: timeline, consequences, personal control, treatment control, illness coherence, timeline cyclical, and emotional representations. In this study, the terms "timeline" and "timeline cyclical," which refer to perceptions about the expected duration of the illness and the possibility of recurrence, were changed to "acute or chronic conditions" and "fluctuating symptoms," respectively. Lastly, the causal section focuses on the participants' views about the possible causes of their diabetes, which comprised 18 items. A five-point Likert scale—1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), or 5 (strongly agree)—was applied to both the diabetes perception section and the causal section. High scores represented strongly-held or positive beliefs.

The DSMQ-R scale was used to access the participants' self-care activities over the previous 8 weeks. This instrument comprised 27 items of self-care activities for the insulin-treated participants, while the non-insulin-treated participants only used the first 20 items. The scores were reported as a sum scale and with four subscales: glucose management, dietary control, physical activity, and healthcare use. A four-point Likert scale, scale, 0 (does not apply to me), 1 (applies to me to some degree), 2 (applies to me to a considerable degree), and 3 (applies to me very much), were used. The scores for the sum scale and each subscale were computed according to the formula in the scoring guide, which ranged between 0 and 10. High scores indicated more effective self-management.

Data Analysis

SPSS for Windows version 21.0 [35] was used for the data analysis at the significant level of 0.05. The participants were divided into one low- and one high-income group, according to their income per month, and into one low- and one high-educational group, according to their maximum educational level. The Thai national poverty line in 2014, which was 2,835 THB/person/month (approximately 81 USD/person/month) [36], was used as a cutoff point for income. The participants that were unschooled or had a maximum educational level of primary school were defined as the low-education group, and the others were classified as the high-education group.

The categorical demographic variables were presented according to frequency and percentage, and a chi-square test was used to compare the differences among the subgroups with low and high income and education. Regarding the continuous demographic variables, the median was calculated because of the skewed nature of the data, and the differences among groups were analyzed using the Mann-Whitney U test [37].

The IPQ-R diabetic version scale was analyzed according to each section. Percentages were used to show the symptoms experienced since having T2D. The identity section was computed with the sum of yes-rated symptoms and the mean and Standard Deviation (SD) were calculated. Each subscale of the diabetes perception section was analyzed using the mean and SD. The mean scores for the identity and diabetes sections among the income sub groups and education subgroups were compared using an independent samples t test or the Mann-Whitney U test depending on the nature of the data distribution [37]. The causal section was analyzed using separate items. Each item in the causal section was grouped into a dichotomous variable (disagreed or agreed with the item that might have been the cause of T2D) and was presented according to percentage.

The DSMQ-R scale, both the sum scale and subscales, was analyzed for mean scores and SD, and the different mean scores in the income subgroups and education subgroups were compared using the independent samples t test or the Mann-Whitney U test [37].

Additionally, the associations and the predictors of illness perception and self-management strategies according to socioeconomic status were analyzed using multiple logistic regression [37].

Ethical Considerations

This project was approved by the Committee on Human Rights Related to Research Involving Human Subjects (School of Nursing, Rang sit University, Thailand), based on the declaration of Helsinki (approval number 005/2015). As poverty, income, and educational level might be experienced as a delicate matter, the respect for autonomy and human dignity [38] was seriously followed when approaching and interviewing the participants. All of the participants were volunteers and were free to participate or withdraw from the study at any time. The consent form was signed before the interview began. In addition, all of the data were kept with full confidentiality.

Results

Demo graphic characteristics

According to table 1, there was a total of 220 Buddhists participants, of which 58 (26%) belonged to the low-income group as divided by the Thai national poverty line. The median income in this group was 2,000 THB/month (approximately 57.1 USD/person/month), below the national low-income rank. One-hundred sixty-two (74%) persons belonged to our high-income group. Their median income was 6,428 THB/month (approximately 183.7 USD/person/month). One-hundred seventy-three (79%) were in the low-education group and 47 people (21%) in the high-education group. Most of the participants were elderly, female, unemployed, and married. Seventy-nine percent of all participants used benefits from the universal coverage program and 50% utilized the healthcare service at the Health Promoting Hospital. Most of them (83%) took oral anti-diabetic agents. The median fasting plasma glucose of all participants was 144 mg/dl and 76% experienced diabetes complications.

The participants in the high-income group had a higher educational level ($\chi^2 = 19.578$, $p < 0.000$), more often evaluated their family income as adequate ($\chi^2 = 6.783$, $p = 0.009$), and received oral pills in combination with other treatments more often ($\chi^2 = 7.636$, $p = 0.006$) than the people in the low-income group.

Most of the participants with a high education were men ($\chi^2 = 21.225$, $p < 0.000$), and their average income/month was higher ($Z = -4.918$, $p < 0.000$). The participants with a high education evaluated their family incomes as more adequate ($\chi^2 = 4.673$, $p = 0.031$) than the low-education group. Regarding illness-related information, most of the high-education participants utilized other preferential treatments ($\chi^2 = 19.343$, $p < 0.000$) at other public and private hospitals ($\chi^2 = 6.670$, $p = 0.036$) than the low-education group.

Illness perception

The average number of symptoms that the participants had experienced since having T2D was five (mean 5.38, SD 3.03), six for the low-income group (mean 5.86, SD 2.80), and five (mean 5.21, SD 3.09)

Demographic Variables	Total (n = 220) n (%)	Income		Statistical Tests (p-value)	Education		Statistical Tests (p-value)
Socio-demographic characteristics							
Sex							
Female	150 (68.2)	43 (74.1)	107 (66.0)	χ^2 = 1.288 (0.256)	131 (75.7)	19 (40.4)	χ^2 = 21.225*** (0.000)
Male	70 (31.8)	15 (25.9)	55 (34.0)		42 (24.3)	28 (59.6)	
Educational level							
Unschooled	27 (12.3)	15 (25.9)	12 (7.4)	χ^2 = 19.578*** (0.000)	-	-	-
Primary school	146 (66.4)	39 (67.2)	107 (66.0)				
Higher than primary school	47 (21.4)	4 (6.9)	43 (26.5)				
Marital status							
Unmarried	74 (33.6)	25 (43.1)	49 (30.2)	χ^2 = 3.162 (0.075)	60 (34.7)	14 (29.8)	χ^2 = 0.397 (0.529)
Married	146 (66.4)	33 (56.9)	113 (69.8)		113 (65.3)	33 (70.2)	
Religion							
Buddhism	220 (100.0)	58 (100.0)	162 (100.0)	-	173 (100.0)	47 (100.0)	-
Occupation							
Employed	22 (10)	5 (8.6)	17 (10.5)	χ^2 = 0.747 (0.688)	17 (9.8)	5 (10.6)	χ^2 = 1.832 (0.400)
Self-employed	72 (32.7)	17 (29.3)	55 (34.0)		53 (30.6)	19 (40.4)	
Unemployed	126 (57.3)	36 (62.1)	90 (55.6)		103 (59.5)	23 (48.9)	
Adequacy of family income							
Inadequacy	49 (22.3)	20 (34.5)	29 (17.9)	χ^2 = 6.783** (0.009)	44 (25.4)	5 (10.6)	χ^2 = 4.673* (0.031)
Adequacy	171 (77.7)	38 (65.5)	133 (82.2)		129 (74.6)	42 (89.4)	
Illness-Related information							
Usual Health Service Used							
Health Promoting hospital	109 (49.5)	31 (53.4)	78 (48.1)	χ^2 = 0.941 (0.625)	92 (53.2)	17 (36.2)	χ^2 = 6.670* (0.036)
Other public hospitals	94 (42.7)	24 (41.4)	70 (43.2)		71 (41.0)	23 (48.9)	
Private hospital	17 (7.7)	3 (5.2)	14 (8.6)		10 (5.8)	7 (14.9)	
Preferential treatment[+]							
Universal coverage	173 (78.6)	48 (82.8)	125 (77.2)	χ^2 = 0.797 (0.372)	147 (85.0)	26 (55.3)	χ^2 = 19.343*** (0.000)
Other preferential treatments	47 (21.4)	10 (17.2)	37 (22.8)		26 (15.0)	21 (44.7)	
Current treatment							
Oral anti-diabetic agent(s)	183 (83.2)	55 (94.8)	128 (79.0)	χ^2 = 7.636** (0.006)	148 (85.5)	35 (74.5)	χ^2 = 3.244 (0.072)
Oral pills in combination with other treatments	37 (16.8)	3 (5.2)	34 (21.0)		25 (14.5)	12 (25.5)	
Experience of diabetes complications							
No	53 (24.1)	15 (25.9)	38 (23.5)	χ^2 = 0.135 (0.713)	40 (23.1)	13 (27.7)	χ^2 = 0.416 (0.519)
Yes	167 (75.9)	43 (74.1)	124 (76.5)		133 (76.9)	34 (72.7)	
Median (Inter quartile)							
Age (Year)	64 (55-70)	64 (58-72.3)	63 (55-70)	Z = -1.212 (0.225)	64 (56-70)	63 (50-70)	Z = -1.193 (0.233)
Estimated average income/month/person (THB)	5,000 (2,687-8,333)	2,000 (1,075-2,500)	6,428 (4,167-10,000)	Z = -11.300*** (0.000)	4,000 (2,550-6,667)	8,333 (5,000-13,000)	Z = -4.918*** (0.000)
Duration of illness (year)	8 (4-14.5)	8.5 (4-14.5)	8 (3-15)	Z = -0.297 (0.766)	8 (4-14.5)	10 (4-15)	Z = -0.431 (0.667)
Level of fasting plasma glucose (mg/dl)	144 (121.3-184)	142.5 (123.8-194.3)	144 (120-182.3)	Z = -0.239 (0.811)	149 (121.5-187)	141 (120-180)	Z = -0.761 (0.447)

Table 1: Demographic characteristics of the participant.

[+]receive the treatment paid by the civil servants' medical benefits, social security, or universal coverage schem

*p < 0.05, **p < 0.01, ***p < 0.001

for the high-income group. The low-education group had an average of six symptoms (mean 5.69, SD 3.04), and the high-education group had an average of four symptoms (mean 4.26, SD 2.73). The most common symptoms in the low-income group were the same as in

Subscales	Range	Total (n = 220) Mean (SD)	Low-Income (n = 58) Mean (SD)	High-Income (n = 162) Mean (SD)	Mann-Whitney U test (p-value)	Low-Education (n = 173) Mean (SD)	High-Education (n = 47) Mean (SD)	Mann-Whitney U test (p-value)
Acute or chronic condition	5-30	24.53 (3.83)	24.90 (3.83)	24.40 (3.83)	Z = -1.437 (0.151)	24.42 (3.75)	24.96 (4.11)	Z = -1.268 (0.205)
Consequences	5-30	13.45 (3.88)	14.36 (3.95)	13.12 (3.82)	Z = -2.170* (0.030)	13.94 (3.94)	11.66 (3.10)	Z = -3.626*** (0.000)
Personal control	5-30	24.94 (2.71)	24.05 (2.72)	25.26 (2.65)	Z = -2.768** (0.006)	24.60 (2.58)	26.21 (2.84)	Z = -3.688*** (0.000)
Treatment control	5-25	19.16 (2.52)	18.60 (2.49)	19.36 (2.51)	Z = -1.993* (0.046)	18.92 (2.52)	20.02 (2.36)	Z = -2.594** (0.009)
Illness coherence	5-25	17.88 (3.43)	17.29 (3.45)	18.09 (3.41)	Z = -1.481 (0.139)	17.59 (3.56)	18.94 (2.67)	Z = -2.124* (0.034)
Fluctuating symptoms	5-20	9.83 (2.82)	9.88 (2.37)	9.81 (2.97)	Z = -0.476 (0.634)	10.07 (2.73)	8.96 (2.99)	Z = -2.604** (0.009)
Emotional representation	5-30	11.02 (5.16)	10.98 (5.27)	11.04 (5.13)	Z = -0.024 (0.981)	11.35 (5.23)	9.83 (4.76)	Z = -1.784 (0.074)

Table 2: Tests for the different scores of illness perception between income and education subgroup.

*p < 0.05, **p < 0.01, ***p < 0.001

the low-education group: dizziness, fatigue, sleep difficulty, pain, loss of strength, and weight loss. Both the high-income and high-education groups showed three common symptoms: fatigue, dizziness, and weight loss. Moreover, symptoms such as pain and sleep difficulties were found in the high-income group and headache was presented as a symptom in the high-education group. In total, the participants believed that on average, three symptoms were related to diabetes with no-significant difference among subgroups.

The participants in both the low-income and low-education groups perceived that T2D had greater negative effects on their lives and their finances than the participants in the high-income and in the high-education groups (consequences subscale: low-income Z = -2.170, p = 0.030; low-education Z = -3.626, p < 0.000). The participants in the high-income and high-education groups perceived more confidence in controlling diabetes by themselves (personal control subscale: high-income Z = -2.768, p = 0.006; high-education Z = -3.688, p < 0.000), and more often felt confidence in the treatment given (treatment control subscale: high-income Z = -1.993, p = 0.046; high-education Z = -2.594, p = 0.009) (Table 2). Additionally, the participants in the high-education group showed more understanding of their conditions than the low-education group (illness coherence subscale: Z = -2.124, p = 0.034), and the low-education group perceived more fluctuating symptoms than the high-income group (fluctuating symptoms subscale: Z = -2.604, p = 0.009) (Table 2).

The participants in both the income and education subgroups considered the same factors as the causes of their T2D. The risk causes they most often perceived were diet or eating habits, such as having too many sweets or carbohydrate foods (low-income: 81%, high-income: 90.1%; low-education 86.7%, high education 91.5%). Other risk causes were their own behaviors such as frequent participation in social parties and insufficient sleep (low-income: 67.2%, high-income: 70.4%; low-education 65.9%, high education 83%) and poor medical care in the past (low-income: 67.2%, high-income: 67.9%; low-education 67.6%, high education 68.1%).

Self-management

Neither the sum scale nor any of the subscale for self-management showed significant differences between the low- and high-income groups (Table 3). When comparing self-management between the education subgroups, the participants in the low-education group showed less effective self-management in terms of physical activity (Z = -3.057, p = 0.002) and sum scale self-care activities (t = -2.172, p = 0.031) (Table 3).

Influences of socioeconomic status on illness perception and self-management

The socioeconomic status of people with diabetes, as defined by occupation, education, and income, was not associated with illness perception. Educational level showed a significant relationship with self-management strategies (p = 0.046). The high-educated participants with diabetes twice as often performed effective self-management strategies, compared to those with a low educational level (OR = 2.047, 95% CI = 1.014-4.131) (Table 4).

Discussion

For the Thai people living with T2D, socioeconomic status as defined by income and educational level had partly effects on their illness perception and self-management. No socioeconomic factor examined could predict illness perception, while educational level was shown to be a predictor of self-management.

That the level of education showed more visible effects on illness perception and self-management, and could predict effective self-management strategies, while income showed no such relationships, may imply that education is an important socioeconomic factor for people with type 2 diabetes in Thailand. Education has earlier been found to be a mediator between income and general health in a cohort study [39], indicating that education is a basic component of socioeconomic status. This finding also correspond with a literature review of Telfair and Shelton [40], which suggested a direct association of education with financial status and future opportunities for earning income.

The participants in the high-income and high-education groups, showing a greater confidence in controlling their diabetes, and the participants in high-education group earning significantly more income, might also emphasize the importance of education in a population of T2D. As earlier research has described, education is considered a factor in enhancing one's sense of control [41,42], which may help people control their lives and engage in healthy lifestyles [41]. The

Scale scores	Total (n = 220) Mean (SD)	Low-Income (n = 58) Mean (SD)	High-Income (n = 162) Mean (SD)	Statistical Tests (p-value)	Low-Education (n = 173) Mean (SD)	High-Education (n = 47) Mean (SD)	Statistical tests (p-value)
Sum scale	7.11 (1.24)	6.94 (1.37)	7.17 (1.19)	t = -1.200 (0.231)	7.02 (1.25)	7.46 (1.18)	t = -2.172* (0.031)
Subscale							
Glucose management	6.80 (1.29)	6.60 (1.31)	6.87 (1.28)	Z = -1.430 (0.153)	6.74 (1.27)	6.70 (1.34)	Z = -1.400 (0.162)
Diet control	7.34 (1.86)	7.13 (1.94)	7.41 (1.83)	Z = -0.981 (0.327)	7.21 (1.90)	7.79 (1.65)	Z = -1.790 (0.073)
Physical activity	7.13 (2.18)	6.99 (2.42)	7.17 (2.10)	Z = -0.254 (0.799)	6.90 (2.14)	7.94 (2.16)	Z = -3.057** (0.002)
Health care use	7.97 (1.34)	7.82 (1.42)	8.03 (1.31)	Z = -1.029 (0.303)	7.94 (1.37)	8.09 (1.22)	Z = -0.539 (0.590)

Table 3: Tests for the different scores of self-management between income and education subgroups.

*p < 0.05, **p < 0.01, t = Independent samples t test, Z = Mann-Whitney U test

	Illness Perception			Self-management		
	OR	95% CI	p-value	OR	95% CI	p-value
Educational level (High-education)	1.062	0.528-2.136	0.866	2.047	1.014-4.131	0. 046*
Occupation (Employed)	1.518	0.881-2.618	0.133	1.098	0.637-1.891	0.737
Estimated average income/month/person	1.000	1.000-1.000	0.523	1.000	1.000-1.000	0.777
Adequacy of family income (Adequate)	0.558	0.288-1.081	0.084	1.080	0.558-2.090	0.820

Table 4: Adjusted odds of illness perception and self-management by socioeconomic factors.

OR = Adjusted odds ratios, 95% CI = 95% Confidence intervals, *p < 0.05

more educated people with diabetes may have higher skills to search for healthcare resources and gain adequate health information, which may assist them in feeling confident in controlling their disease and in achieving effective self-management, as the results in this study revealed. As education improves a person's ability to achieve and gain comprehension of health knowledge [43], it may also have enhanced the participants' ability to understand their conditions. Furthermore, an increased ability to seek health care resources may offer those persons opportunities to access high levels of healthcare services apart from the HPH, which usually provide diabetes educational sessions. Moreover, gaining diabetes-specific knowledge has in a previous study been found to improve dietary and glycemic control [44,45]. On the other hand, unawareness regarding diabetes prevention has earlier been shown to lead to complications, resulting in economic hardship and inadequate ability to manage diabetes [25]. As mentioned, we might assume that the participants with a low education had some barriers in performing activities that could have been helpful for their diabetes and which made them experience more negative consequences, including finances and fluctuating symptoms, than the participants with a higher education.

In contrast to western studies [9,19,46], this study showed the limited effects of socioeconomic factors, especially in terms of income, on the perceptions and self-management of people living with diabetes. These findings may be related to Thai social values and beliefs, influenced by the philosophy of sufficiency economy developed by the king of Thailand and Buddhist beliefs. The sufficiency economy blends the Eastern value of having a holistic view of life and the notion of the middle path in Buddhist teaching in order to achieve a balanced and sustainable life with contentment [47]. Abiding by this concept may be able to lead the participants to understand their lives as a whole (including body, mind, and sociocultural aspects) and seek a proper way to adjust their life consistent with their limited resources. They may also utilize optimal facilities from their social networks and perform moderate and reasonable actions based on knowledge used with consideration, moral values, and social norms. Findings in accordance with research [48] demonstrating that adherence to health behavior is influenced not only by information but also by multiple socioeconomic, emotional, and cultural factors, i.e., motivation, support, and level of education. As found in earlier research on T2D populations, Thai family members were an important part of the social network providing various support, especially financial support, an aspect which is typical and relies on Thai social norms [27,49]. Moreover, the notion of the middle path, meaning being moderate in one's actions in order to attain optimal and realistic goals [50], may encourage the participants to be aware of harmful food and eat in moderation in order to keep their lives in balance and with satisfaction when living with the disease.

Additionally, the way that Buddhist beliefs influence people's thinking and behavior and are involved in their perceptions and self-management has earlier been shown among Thai people with diabetes [28,29] Understanding the fact that life goes on as the law of nature may lead the participants to view their life with diabetes and a low socioeconomic status as the way it is, and to realize that they cannot go against the law of nature. Furthermore, the Buddhist law of karma, which explains the occurrences in this life resulting from intended action in the past or in one's current life [50], may influence the participants to accept their diabetes in this current life as an unavoidable situation. Realizing these Buddhist notions will enable the

participants to accept their destiny and seek how to live happily with their situation, as corresponded to an earlier study of Thai people with diabetes [29]. Hence, the participants could leave their vulnerable conditions—diabetes and socioeconomic status-in the background and decide to do their best by taking responsibility to perform self-care activities suggested by the healthcare providers.

Strengths and Limitations

This cross-sectional study was conducted among people with T2D in a suburban province near Bangkok, Thailand. As this study possesses the rigor of quantitative research [51], although it used a limited sample, the number of participants was assumed to yield sufficient data to answer the research questions. Hence, the results may be generalized to people with diabetes living in other suburban areas around Bangkok. However, the results of this study were interpreted with both strengths and limitations as follows.

Strengths

Even if earlier research has shown associations between knowledge about diabetes and socioeconomic status [6-8], this study tried to increase the research knowledge concerning the associations of patients' experiences and perceptions with socioeconomic status.

The participants in this study could be both literate and illiterate, hence gathering data using a structured interview provided an equal chance for all of them to partake in this study. An additional strength was the skilled interviewers, who had experienced more than 10 years in interviewing people in a community, and were additionally trained and supervised during the data-gathering process. Furthermore, the Thai version of the questionnaires used in this study was investigated for validity and reliability and demonstrated good psychometric properties [52].

Limitations

Although we calculated the sample size in advance for gaining sufficient statistical power to support the findings, a greater sample might have increased the possibility to generalize the results and control for confounding factors. Furthermore, the relatively large number of dropouts, 30% of the target participants whose address could not be found, might be a drawback. However, it was a factor beyond our control since the Thai system of finding accurate addresses is complicated.

The results found by using the IPQ-R diabetic version and DSMQ-R instruments may only be generalized to non-insulin-treated people with T2D because the number of insulin-treated participants in this study was too small, only 16 persons. In addition, the three items regarding the Self-Monitoring of Blood Glucose levels (SMBG) may not be suitable for the Thai context because the SMBG practice is not commonly used for checking plasma glucose level in Thai populations with T2D. Furthermore, because the interviews were conducted during the daytime, we lost one-fifth of the conceivable participants occupied at work, which would have provided additional information.

Conclusion

This study focused on the influences of socioeconomic status, especially income and educational level, on the illness perception and self-management of Thai people with T2D. Socioeconomic status showed some relationship with illness perception and self-management. Furthermore, education was seen to be more influential than income and was shown to be a predictor of self-management. The results suggest that more effort should be put into proactive care to assist adults with T2D with low socioeconomic status in order to improve their lifestyle habits and disease management. It may also be important for healthcare professional to be aware of the relationship between the patients' educational level and their illness perception and self-management when planning self-care activities and designing proper interventions for Thai population with diabetes. Supporting people to undertake behavioral change is not simple and ideally, and the challenge goes beyond the healthcare system across many different sectors—education providers, non-governmental organizations, the food industry, the media, urban planners and politicians.

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Competing Interest

The authors declare they have no competing interests.

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