

Predictors of Diabetes Self-Management Behaviors among Thai Adolescents with Type 1 Diabetes: A Cross-Sectional Study

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Abstract: Effective diabetes self-management behaviors are essential for optimal glycemic control in adolescents with type 1 diabetes. However, global evidence suggests that many current interventions fail to achieve sustained clinical improvements, highlighting a need to identify modifiable factors. In Thailand, research addressing the psychological and contextual determinants of adherence remains scarce, leaving a critical gap in localized evidence. This cross-sectional design study aimed to examine predictors of diabetes self-management behaviors among Thai adolescents with type 1 diabetes. Ninety adolescents (aged 10–19 years) receiving basal-bolus insulin injections and their primary caregivers were recruited via convenience sampling from pediatric diabetes clinics at two university hospitals in Bangkok, Thailand. Data were collected using validated instruments to assess intrinsic motivation, perceived health status, family and friend support, perceived social stigma, the relationship with the diabetes nurse, and diabetes self-management behaviors. Descriptive statistics, Pearson's and Spearman's correlations, and stepwise regression were performed.

Results showed that intrinsic motivation, perceived health status, and family support significantly correlated with diabetes self-management behaviors. However, intrinsic motivation was the sole significant predictor, explaining 9.5% of the variance. Findings underscore the critical role of intrinsic motivation in adolescents. Thus, nurses should be trained in strategies to increase this motivation. However, given that 90.5% of the variance remains unexplained, future research should use qualitative and mixed-method designs to deeply explore additional contextual factors in more diverse healthcare settings.

Keywords: Adolescents, Diabetes self-management, Glycemic control, Intrinsic motivation, Outpatient care, Pediatric nursing, Perceived health status, Social stigma, Social support, Type 1 diabetes

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Introduction

Type 1 diabetes (T1D) is a critical global health challenge for pediatric and adolescent populations. In 2024, approximately 1.81 million children and adolescents under 20 were living with T1D, with 219,000 new cases reported annually.¹ This trend is mirrored in Thailand, where prevalence

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rose from 17.6 per 100,000 in 2015 to 29.5 per 100,000 in 2020,² signaling an urgent need for

robust management strategies within the Thai healthcare system. Adolescence represents a pivotal window for fostering autonomy in health behaviors.³ However, achieving consistent diabetes self-management behaviors (DSMB), including glucose monitoring, insulin titration, and carbohydrate counting, is exceptionally difficult during this period.⁴ The standard basal-bolus injection regimen, while physiologically superior,⁵ imposes a significant “treatment burden” that often results in behavioral and emotional strain.⁶ Its intensive requirements make it a critical context for examining predictors of self-management behaviors.

Failure to maintain consistent DSMB leads to poor glycemic control, characterized by high glycemic variability and elevated glycated hemoglobin (HbA1c) levels. In the short term, this increases the risk of life-threatening acute complications like diabetic ketoacidosis (DKA) and severe hypoglycemia.⁷ In the long term, poor control during these years accelerates the onset of chronic microvascular complications, significantly diminishing the individual’s long-term quality of life and increasing the socioeconomic burden on the healthcare system.⁷

Despite existing educational frameworks, global evidence suggests that traditional psychoeducational interventions often fail to achieve sustained clinical improvements.⁸ Many programs do not sufficiently address the specific behavioral mediators that drive long-term success. While the Diabetes Association of Thailand advocates for the integration of motivational interviewing (MI) and Diabetes Self-Management Education and Support (DSMES),⁹ empirical evidence on nursing-led interventions tailored for Thai adolescents remains scarce. Identifying modifiable predictors—such as specific psychosocial or environmental factors—is a mandatory preliminary step. Only by understanding these predictive factors can healthcare teams design targeted, precision-based interventions that empower Thai adolescents to manage their condition confidently and independently.

Literature Review and Conceptual Framework

Current evidence indicates that DSMB is shaped by complex and multifactorial processes. Thus, the Revised Self- and Family Management Model, originally developed by Grey and colleagues in 2006,¹⁰ and updated by an expanded collaborative group in 2015,¹¹ and related literature were used to guide this study. In this Model, self-management is defined as a recursive process, focusing on illness needs, activating resources, and living with a chronic illness. This is the result of interactions among individual, family, and contextual factors, and so self-management usually occurs in the context of family management in most cases.¹¹ The framework of the Model highlights four key constructs: facilitators and barriers, self- and family management processes, proximal outcomes, and distal outcomes. In this study, DSMB were conceptualized as proximal outcomes: the immediate health behaviors including exercise, hypoglycemia management, diet, blood glucose testing, and insulin administration and dose adjustment, which result from self- and family management processes. Among facilitators and barriers, intrinsic motivation and perceived health status (individual factors), psychosocial support from family and friends (resources, interpersonal factors), perceived social stigma (environmental/social-contextual factors), and the relationship with diabetes nurses (health care system factors) were integrated into a single analytical model to predict overall self-management behaviors among Thai adolescents with T1D.

At the individual level, intrinsic motivation, defined as the internal drive to engage in diabetes self-management willingly, has been strongly recommended as vital for initiating and sustaining self-management behaviors.¹² However, empirical evidence remains limited, with only a few studies demonstrating its association with self-management

among adolescents with T1D.^{12,13} Next, perceived health status reflects individuals' subjective evaluation of their overall physical and psychological well-being in relation to their personal circumstances, expectations, and social comparisons.¹⁴ Perceived health status is associated with engagement in self-management, particularly in the context of chronic disease complexity.¹⁵ However, evidence specifically related to DSMB is scarce. Only one study has examined this relationship among Thai patients with type 2 diabetes,¹⁶ while another has primarily focused on self-care rather than self-management.¹⁷ Therefore, the relevance between perceived health status and self-management behaviors in adolescents with T1D remains unclear.

At the interpersonal level, social support from family and friends has consistently been identified as a key facilitator of self-management behaviors by enhancing motivation, providing practical assistance, and promoting adherence to treatment regimens.^{18,19} Even in the Thai context, evidence suggests that such support enhances adolescents' ability to manage T1D and other chronic conditions.^{17,20,21} In contrast, negative social influences (environmental factors), such as perceived social stigma, may act as barriers by discouraging adolescents from engaging in self-management behaviors due to concerns about social judgment or discrimination. In our study, the school setting is viewed as a primary social environment in which adolescents with T1D spend much of their time interacting with peers. Previous research indicates that perceived social stigma can interfere with diabetes self-management,^{22,23} however, empirical evidence regarding this in Thailand remains limited.

At the health care system level, the quality of relationships with health care providers is another important determinant of self-management behaviors among individuals with chronic conditions. Poor relationships may act as barriers, whereas supportive and collaborative relationships can facilitate

engagement in self-management.¹¹ While previous studies have examined general patient-health care team relationships,^{17,24} limited attention has been paid to the specific role of diabetes nurses. Such nurses are central to the care of adolescents with T1D and their families, providing ongoing education, support, and motivation from diagnosis throughout the disease trajectory to sustain effective self-management.²⁵ Therefore, the relationship between adolescents with T1D and the diabetes nurse warrants further investigation.

Overall, the literature review suggests that key predictors of DSMB among Thai adolescents remain insufficiently understood. To address this gap, our study integrated individual, interpersonal, and social-contextual factors within a single analytical model to provide a more comprehensive understanding of the predictors of DSMB in this population.

Study Aim and Hypothesis

This study aimed to examine the predictive effects of intrinsic motivation, perceived health status, family support, friend support, perceived social stigma, and the relationship with the diabetes nurse on DSMB among Thai adolescents with T1D. It was hypothesized that these factors would significantly predict DSMB.

Methods

Design: This study used a cross-sectional design, with reporting guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

Sample and Setting: Convenience sampling was used to recruit 90 adolescent-primary caregiver dyads from pediatric diabetes clinics at two university hospitals affiliated with the same university in Bangkok, Thailand. Eligible adolescents were Thai citizens (aged 10–19 years) diagnosed with T1D for ≥ 1 year, treated with basal-bolus multiple daily insulin injections,

currently attending school, and contactable via phone or LINE. Exclusion criteria for adolescents included those using continuous subcutaneous insulin infusion or continuous glucose monitoring (CGM), an IQ < 90, or diagnosed with developmental/mental health disorders (e.g., attention deficit hyperactivity disorder, autism spectrum disorder, depression, or anxiety). To address potential attrition in this three-phase study, participants were discontinued if they failed to return the questionnaires within one week or could not be contacted for follow-up interviews. Primary caregivers who were parents or biological relatives and accompanied the adolescents, aged ≥ 18 years, able to communicate in Thai, and contactable via phone or LINE, were also recruited to provide demographic data.

The sample size was estimated for multiple regression analysis following Hair et al.,²⁶ requiring 15 participants per predictor. With six predictors, at least 90 adolescent–primary caregiver dyads were required.

Ethical Considerations: Ethical study approval was obtained from the Mahidol University Multi-Faculty Cooperative IRB Review (MU-MOU CoA No. IRB-NS2024/860.0105). Participants received a consent form outlining their rights, including voluntary participation, confidentiality, and the option to withdraw at any time without affecting their care or services provided. After receiving detailed information about the study from the primary investigator (PI) and agreeing to participate, adolescents aged 18 years or older provided informed consent. For those aged 13–17 years, both the adolescent and the parent/guardian signed a joint consent form.

Children aged 7–12 years provided assent alongside parental consent. All primary caregivers also provided informed consent. To ensure privacy, responses were de-identified by coding the questionnaires, and all participant rights were safeguarded throughout the study in accordance with ethical research standards.

Research Instruments: This study used eight questionnaires. Permission was obtained from the original developers of each instrument for their translation, adaptation, and use. Additionally, permission was secured to use existing Thai versions of previously translated questionnaires. Two instruments, the Patient–Nurse Relationship Questionnaire (PNRQ-9) and the Diabetes Self-Management Profile for Flexible Regimens (DSMP-F),²⁷ were translated using a back-translation process. Content validity of the Perceived Social Stigma in Diabetes Questionnaire (PSSDQ)²⁸ and the DSMP-F²⁷ was evaluated by experts. The remaining instruments were not subjected to content validity assessment, as they have been widely used and have demonstrated established psychometric properties. A pilot study was conducted to assess the reliability of the study questionnaires among 15 adolescents with T1D who met the study’s eligibility criteria. These adolescents were recruited via convenience sampling from the study settings and did not overlap with those in the main study. All research instruments, except the General Information Form, underwent reliability testing. The results, including the content validity index (CVI), Cronbach’s alpha coefficients, and sample items from the instruments, are presented in **Table 1**.

Table 1. Content validity index, Cronbach’s alpha reliability, and sample items of the instruments

Instruments	Content validity index		Cronbach’s alpha		Example of item
	S-CVI/UA	S-CVI/Ave	Pilot study	Main study	
1. IMI-DM	N/A	N/A	0.93	0.89	It is important for me to do well at managing my diabetes.
2. SAH	N/A	N/A	N/A	N/A	In general, would you say your health is: excellent, very good, good, fair or poor?

Table 1. Content validity index, Cronbach's alpha reliability, and sample items of the instruments (Cont.)

Instruments	Content validity index		Cronbach's alpha		Example of item
	S-CVI/UA	S-CVI/Ave	Pilot study	Main study	
3. PSS-Fa	N/A	N/A	0.84	0.85	Members of my family are good at helping me solve problems.
4. PSS-Fr	N/A	N/A	0.78	0.77	My friends are sensitive to my personal needs.
5. PSSDQ	0.90	0.98	0.86	0.86	When friends invite each other to go somewhere or do something, they don't invite me along because I have diabetes.
6. PNRQ-9	N/A	N/A	0.92	0.95	Access to the nurse is not difficult.
7. DSMP-F	0.97	0.92	0.80	0.77	Do you measure your food, count carbs (or use exchanges) to figure out how much you should eat?

Note. S-CVI/UA = Scale-level content validity index, Universal Agreement, S-CVI/Ave = Scale-level content validity index/Average, IMI-DM = Intrinsic Motivation Inventory-Diabetes Management, SAH = Self-assessed Health, PSS-Fa = Perceived Social Support from Family Scale, PSS-Fr = Perceived Social Support from Friends Scale, PSSDQ = Perceived Social Stigma in Diabetes Questionnaire, PNRQ-9 = The Patient-Nurse Relationship Questionnaire, DSMP-F = The Diabetes Self-Management Profile for Flexible Regimens, N/A = Not applicable as no modification was done in the present study and its content validity was conducted by original developers.

A *General Information Form* was developed by the researchers to collect demographic and health data of adolescents (including age, sex, whom they live with, source of T1D information, healthcare coverage, duration of being diagnosis, appointment adherence, practice of sequential diabetes management, HbA_{1c} levels, and insulin treatment) and primary caregivers (including relationship to adolescents, sex, age, educational level, and household income) via interviews and from medical records.

The *Intrinsic Motivation Inventory-Diabetes Management* (IMI-DM)¹² is a 12-item self-report questionnaire used for assessing intrinsic motivation related to T1D management. Items are rated on a 7-point rating scale (1 = not true at all to 7 = very true); two items were reverse-scored. Total scores range from 12 to 84, with higher scores indicating

greater intrinsic motivation. A previously reported Cronbach's alpha coefficient was 0.92.¹² The Thai version of this instrument used in this study was back-translated by Kwansomkid et al.¹³

Self-assessed Health (SAH)²⁹ is a single-item global health measure to capture an individual's subjective evaluation of their overall health. Responses are rated on a 5-point scale (1 = poor to 5 = excellent), with higher scores reflecting a more positive perception of one's health.

The *Perceived Social Support from Family Scale* (PSS-Fa)³⁰ is a self-report questionnaire containing 20 items with responses of yes (1), no (0), or do not know (not scored) to measure family support from an individual's perspective. Five items are reverse-scored. Total scores range from 0 to 20, with higher scores indicating greater perceived

family support. A reported Cronbach's alpha coefficient was 0.90.³⁰ The Thai version used in this study was back-translated by Sangngam et al.²⁰

The *Perceived Social Support from Friends Scale* (PSS-Fr)³⁰ is a self-report questionnaire containing 20 items, with responses of yes (1), no (0), or do not know (not scored) to assess an individual's perception of how well friends generally provide his or her needs for assistance, communication, and feedback. Six items are reverse-scored. Total scores range from 0 to 20, with higher scores indicating greater perceived friend support. Reported Cronbach's alpha coefficient was 0.88.³⁰ The Thai version used was also back-translated by Sangngam et al.²⁰

The *Perceived Social Stigma in Diabetes Questionnaire* (PSSDQ)²⁸ was developed by the researchers. This self-administered questionnaire measures the perception of social stigma from the patient's perspective. The development of this questionnaire was guided by the framework for understanding diabetes-related stigma,³¹ a literature review on social stigma, and the experience of perceived social stigma by adolescents with T1D. The PSSDQ consists of 20 items with a 5-point rating scale (1 = never true to 5 = always true). Total scores range from 20 to 100, with higher scores indicating higher perceived social stigma. Content validity of the questionnaire was assessed by five diabetes experts, including a pediatric endocrinologist, two advanced practice pediatric nurses, a nurse instructor specialized in pediatric diabetes, and a child psychologist.

The *Patient-Nurse Relationship Questionnaire* (PNRQ-9) was modified from the original Patient-Doctor Relationship Questionnaire (PDRQ-9)³² with the developers' permission to assess the therapeutic relationship in a nursing context. It contains 9 items rated on a 5-point scale, with total scores ranging from 9 to 45; higher scores indicate a stronger patient-nurse relationship. While the original nine

items were retained, the response options were rephrased to improve comprehension for Thai adolescents. The scale was adjusted from "appropriate" descriptors (for example, 1 = not at all appropriate) to agreement-based descriptors (1 = disagree to 5 = strongly agree). The original PDRQ-9 reported a Cronbach's alpha coefficient was 0.94.³²

The PNRQ-9 underwent a back-translation process and was modified to align with the developer's suggestions. Although formal content validity was not re-evaluated because the original item meanings were preserved, the modified version was reviewed by a panel of three pediatric experts (a pediatrician, a pediatric nurse, and a diabetes nurse educator). Furthermore, to ensure linguistic appropriateness and readability, the questionnaire was piloted with a separate group of ten adolescents (ages 10–19) living with chronic conditions, such as diabetes and asthma. These participants were recruited via snowball sampling from community settings outside the study hospital to provide an external perspective on language clarity. They confirmed that the content and rephrased response options were easy to understand and relevant to their experiences with nurses.

The *Diabetes Self-Management Profile for Flexible Regimens* (DSMP-F)²⁷ is a semi-structured interview questionnaire used to assess DSMB over the past three months in children and adolescents with T1D whose prescribed regimen includes carbohydrate counting. The scale contains 25 questions across five domains: exercise, hypoglycemia management, diet, blood glucose testing, and insulin administration and dose adjustment. The number of response options varies by item. Each item is assigned predetermined scores for its response options, yielding a total possible score ranging from 0 to 89. Higher scores indicate greater adherence to DSMB. A Cronbach's alpha coefficient of 0.65 was reported for the original DSMP-F.²⁷

The DSMP-F was back-translated by the researchers into Thai and adapted to align with the Clinical Practice Guideline for Diabetes 2023 of Thailand.⁹ Content validity was assessed by three diabetes experts (two pediatric endocrinologists and an advanced practice pediatric nurse) to confirm its suitability for the Thai context.

Data Collection: Data were collected by the first researcher (MK) between June and December 2024 at two pediatric diabetes clinics. At each site, a nurse was designated by the clinic to oversee recruitment, who was solely responsible for identifying and approaching eligible adolescents and their primary caregivers throughout the data collection period. To reduce the participants' burden, data collection was conducted in three phases. Phase I took place during a clinic visit, where adolescents and their primary caregivers were interviewed using the General Information Form (approximately 5 minutes each). Subsequently, adolescents completed four self-administered questionnaires (IMI-DM, SAH, PSSDQ, and PNRQ-9), which required approximately 20 minutes. Phase two involved adolescents completing the PSS-Fa and PSS-Fr within one week of Phase one, either via Google Forms or mailed questionnaires, depending on their preference; this phase took approximately 20 minutes. Phase three consisted of a scheduled 30-minute video-call interview with adolescents for the DSMP-F, conducted within one week after completion of Phase two.

Data Analysis: Data were analyzed using SPSS version 18.0 with statistical significance set at $p < 0.05$. Descriptive statistics were used to summarize participants' characteristics. Prior to correlation analysis, the normality of all variables was assessed. In the present study, only the dependent variable (DSMB) and one independent variable (intrinsic motivation) were normally distributed, while the

remaining independent variables were not. Accordingly, Pearson's product-moment correlation was used for normally distributed variables, whereas Spearman's rank correlation was applied to non-normally distributed variables. Finally, stepwise multiple regression analysis was conducted to identify predictors of DSMB, and all assumptions required for conducting regression analysis (including appropriate measurement level of dependent variable, normality of dependent variable, linearity, absence of multicollinearity, independence of errors, and homoscedasticity) were satisfied.

Results

Characteristics of the study participants

The study included 90 adolescent-caregiver dyads. As detailed in **Table 2**, the adolescent participants were predominantly female and typically lived with their parents. Most adolescents identified their parents or primary caregivers as their primary source of diabetes-related information when in doubt, followed by the internet and healthcare providers. Most of the cohort had healthcare coverage and demonstrated high adherence to scheduled clinic appointments. Nearly all had healthcare coverage and consistently attended scheduled appointments. Regarding their clinical profile, the average duration of T1D was over six years. While more than half of the participants reported consistently practicing sequential diabetes management as advised by their diabetes nurse educators, a significant majority exhibited poor glycemic control. All participants used Aspart as their rapid-acting insulin, with the majority also using Glargine U100 for long-acting coverage.

The primary caregivers involved in the study were predominantly female and the adolescents' mothers. On average, caregivers were in their mid-forties. More than half had attained a bachelor's degree or higher, and the majority reported having sufficient monthly household income.

Table 2. Characteristics of adolescents with T1D (N = 90) and primary caregivers (N = 90)

Characteristics	Mean $\pm$ SD	n (%)
Adolescents		
Age (years)	14.86 $\pm$ 2.48	
Female		54 (60)
Whom they lived with		
Parent(s)		80 (88.9)
Relative(s)		8 (8.9)
No one		2 (2.2)
Primary source of T1D information when in doubt		
Parent/caregiver		52 (57.8)
Internet		22 (24.4)
Healthcare provider		16 (17.8)
Healthcare coverage		85 (94.5)
Duration of being diagnosis (years)	6.58 $\pm$ 3.46	
Appointment adherence		88 (97.8)
Sequential diabetes management		
Always practice		49 (54.5)
Often practice		27 (30)
Sometimes practice		13 (14.4)
Never practice		1 (1.1)
Poor glycemic control (HbA _{1c} $\geq$ 7 %)	8.81 $\pm$ 1.63	78 (86.7)
Insulin treatment		
Rapid-acting insulin: Aspart		90 (100)
Long-acting insulin: Glargine U100		62 (68.9)
Primary caregivers		
Relationship with adolescents		
Mother		64 (71.1)
Father		22 (24.5)
Relative		4 (4.4)
Female		69 (76.7)
Age (years)	45.26 $\pm$ 7.85	
Educational level: Bachelor's degree or higher		52 (57.8)
Sufficient monthly household income		72 (80.0)

Note. T1D = Type 1 Diabetes, HbA_{1c} = Glycated hemoglobin

Description of diabetes self-management behaviors and the study factors

Table 3 provides descriptions of all main study variables. The overall mean scores of DSMB and two subscale scores: engagement in insulin administration and dose adjustment, and dietary regulation, were positioned above the midpoint of the possible score range. Conversely, engagement in exercise was notably lower than the scale midpoint, while scores for

hypoglycemia management and blood glucose testing were centered around the middle of their possible ranges.

Intrinsic motivation was generally high, trending above the scale midpoint. Regarding perceived health status, the vast majority of adolescents reported their health as “good” and “very good,” with no participants rating their health as poor. For interpersonal factors, median scores for family support and friend support positioned above their respective midpoints, as well as

the health care system factor, and the relationship with the diabetes nurse. Finally, scores for perceived social

stigma were relatively low, falling below the midpoint of the possible score range.

Table 3. Description of diabetes self-management behaviors and the study factors (N = 90)

Variable (items)	Possible range	Actual range	Mean (SD)	Median (IQR)	n (%)
Diabetes self-management behaviors (25)	0-89	26-69	47.37 (10.69)		
Exercise (3)	0-12	0-12	3.59 (4.35)		
Hypoglycemia management (4)	0-11	1-10	5.37 (2.67)		
Diet (6)	0-17	5-17	11.37 (2.60)		
Blood glucose testing (8)	0-33	7-26	15.74 (3.28)		
Insulin administration and dose adjustment (4)	0-16	0-16	11.39 (3.50)		
Intrinsic motivation (12)	12-84	42-82	61.54 (11.28)		
Perceived health status (1)	1-5	2-5	3.26 (0.92)	3 (1)	
Excellent					10 (11.1)
Very good					22 (24.4)
Good					39 (43.3)
Fair					19 (21.1)
Poor					0 (0)
Family support (20)	0-20	6-20	14.24 (4.17)	15 (7)	
Friend support (20)	0-20	8-20	15.13 (3.48)	16 (6)	
Perceived social stigma (20)	20-100	24-67	36.41 (10.50)	34 (13)	
Relationship with the diabetes nurse (9)	9-45	25-45	37.43 (6.90)	39 (13)	

Note. IQR = Interquartile range

Correlational analysis

Correlations among study variables are presented in **Table 4**. DSMB was positively correlated with intrinsic motivation ($r = 0.31$, $p < 0.01$), perceived health status ($r = 0.23$, $p < 0.05$), and family support ($r = 0.22$, $p < 0.05$). No significant correlations were observed between diabetes self-management and friend support, perceived social stigma, and the relationship with the diabetes nurse.

Predictive analysis

Multiple linear regression using the Enter method was first performed to examine whether intrinsic motivation, perceived health status, family support, friend support, perceived social stigma, and relationship with the diabetes nurse jointly predicted DSMB. The overall model was not statistically significant ($F_{(6, 83)} = 2.093$, $p = 0.063$, $R^2 = 0.131$).

Table 4. Correlation coefficients between the study variables (N = 90)

Variables	1	2	3	4	5	6	7
1. Intrinsic motivation	1.000						
2. Perceived health status	0.62**	1.000					
3. Family support	0.56**	0.39**	1.000				
4. Friend support	0.46**	0.32**	0.56**	1.000			
5. Perceived social stigma	-0.21*	-0.23*	-0.29**	-0.23*	1.000		
6. Relationship with diabetes nurse	0.45**	0.24*	0.49**	0.41**	-0.11	1.000	
7. Diabetes self-management behaviors	0.31**†	0.23*	0.22*	0.10	-0.17	0.18	1.000

Note. † Pearson's correlations; all other correlations were Spearman's correlations.

* $p < 0.05$, ** $p < 0.01$

A subsequent stepwise multiple linear regression analysis was conducted to identify the most parsimonious predictor. As shown in **Table 5**, intrinsic motivation was the only variable that demonstrated a statistically significant unique contribution in

the regression model ($\beta = 0.31$, $p = 0.003$), explaining 9.5% of the variance in DSMB ($R^2 = 0.095$). The model was statistically significant ($F_{(1, 88)} = 9.26$, $p = 0.003$).

Table 5. Stepwise multiple linear regression analysis of diabetes self-management behaviors (N = 90)

Variable	B	SE B	95% CI	β	t	p
Constant	29.38	6.01	17.443, 41.321		4.89	< 0.001
Intrinsic motivation	0.29	0.10	0.101, 0.483	0.31	3.04	0.003
R = 0.309, $R^2 = 0.095$, Adjusted $R^2 = 0.085$, $F_{(1, 88)} = 9.26$, $p = 0.003$						

Note. B = Unstandardized regression coefficient, β = Standardized regression coefficient, SE B = Standard error of the coefficient B, CI = Confidence interval for B

Discussion

This study revealed that Thai adolescents with T1D on a basal-bolus regimen had moderate DSMB levels. Among the hypothesized predictors, only intrinsic motivation significantly predicted DSMB. This finding is noteworthy, as all adolescent participants had received formal DSMES aimed at achieving optimal glycemic control and reducing long-term complications.⁹ However, a significant discrepancy between healthcare engagement and clinical outcomes was observed; while nearly all adolescents (97.8%) attended scheduled appointments, the vast majority (86.7%) exhibited poor glycemic control. Furthermore, only about half (54.5%) consistently performed essential behaviors, such as SMBG, carbohydrate counting, insulin administration, and appropriate food consumption, that are fundamental to a basal-bolus regimen. As Cockcroft and colleagues⁸ recently highlighted, this disconnect suggests that regular healthcare engagement and standard education alone are insufficient to ensure sustained behavioral adherence or optimal glycemic health.

As hypothesized, intrinsic motivation was the sole variable to provide a statistically significant unique contribution to DSMB, accounting for 9.5% of the variance after controlling for other factors in

the model. This aligns with prior research indicating that intrinsic motivation predicts diabetes care activities, problem-solving, and goal setting.¹³ Intrinsic motivation refers to engaging in behaviors because they are personally meaningful and congruent with one's values rather than driven by external rewards or pressure.³³ When adolescents experience a sense of autonomy and receive supportive feedback, they are more likely to sustain health-related behaviors over time.³⁴

Adolescence represents a critical transitional phase characterized by increasing independence and a progressive shift of management responsibilities from the parent to the youth.³ Without sufficient intrinsic motivation, adolescents are more likely to neglect self-management tasks, leading to the high proportion of poor glycemic control (86.7%) observed in this cohort. This underscores the need to foster intrinsic motivation within DSMES programs. While approaches such as motivational interviewing (MI) are intended to support autonomy, these findings emphasize that healthcare providers must further strengthen their MI techniques to effectively translate clinical advice into sustained, internally driven patient action.³⁵

In contrast, perceived health status, family support, friend support, perceived social stigma, and

the relationship with the diabetes nurse did not demonstrate significant predictive effects on DSMB. Notably, all five variables were significantly correlated with intrinsic motivation (see **Table 4**), suggesting they may not directly affect self-management but instead operate indirectly through internal drive. Additionally, the lack of predictive significance may be due to the limited variability in these factors within this specific cohort. These adolescents generally hailed from families with stable socioeconomic status and received high-standard care from university hospitals. Their scores reflected a relatively homogeneous, supportive environment—characterized by positive family and peer relationships and low perceived stigma—which statistically constrains the ability of these variables to explain differences in self-management behaviors.

Notably, the hypothesized predictive model in this study left a substantial amount of the variance unexplained (90.5%), suggesting that self-management behaviors in Thai adolescents are influenced by a complex array of factors beyond those captured in the current model. As Cockcroft and colleagues highlighted in their global systematic review, current interventions fail to achieve sustained behavioral change, likely because critical behavioral mediators are not yet fully understood or addressed.⁸ Future research should expand upon these findings by integrating additional modifiable variables that were beyond the scope of the present study. Specifically, health literacy remains an under-researched area in the Thai T1D population, with only limited evidence currently available.¹³ Furthermore, while self-efficacy has been identified as a robust predictor of self-management in international literature, as noted in the Cockcroft et al. review,⁸ empirical evidence specifically involving Thai adolescents is still lacking. Including these factors, along with variables such as parenting styles²⁴ or treatment burden,³⁶ may provide a more comprehensive understanding of the mechanisms required to close existing behavioral gaps.

Limitations

Generalizability is limited because participants were recruited from only two super-tertiary university hospitals, where specialized diabetes nurses provide comprehensive DSMES. This level of care may not represent other healthcare settings in Thailand. The relatively small sample size ($N = 90$) may have reduced statistical power to detect modest effects. Additionally, the cross-sectional design precludes causal inference.

Conclusions and Implications for Nursing Practice and Future Research

The findings from this study demonstrate that intrinsic motivation is the primary individual-level predictor of DSMB among Thai adolescents with T1D. While perceived health status and family support showed significant correlations with self-management, they did not emerge as unique predictors in the final model. These findings suggest that for adolescents managed with intensive basal-bolus regimens, an internal drive and a sense of personal autonomy are more critical for daily adherence than external support alone. Therefore, clinical care must shift from a traditional knowledge-transfer model toward strategies that actively foster the adolescent's intrinsic motivation to manage their lifelong condition.

Diabetes nurses play a key role in supporting adolescent autonomy while meeting clinical demands. To foster intrinsic motivation in busy outpatient settings, nurses should use autonomy-supportive rather than directive approaches. For example, instead of using a standard checklist approach (e.g., “Are you checking your blood sugar four times a day?”), a nurse can utilize a brief “Collaborative Agenda Setting” technique.³⁷ By asking, “*Of the different parts of your diabetes routine—such as carb counting, injections, or school-day monitoring—which one feels the most challenging for you to manage right now?*”,

the nurse allows the adolescent to direct the conversation. This approach empowers problem-solving, reduces emotional burden, and promotes sustained adherence, even within limited consultation time.

Future research should examine additional modifiable factors to explain the large proportion of unexplained variance. Longitudinal designs are recommended to capture changes across puberty, along with more diverse samples from non-university and rural settings to improve generalizability. Additionally, incorporating qualitative and mixed-method designs would be highly valuable. Qualitative methodologies can provide deeper, nuanced insights into the lived experiences of both adolescents and their primary caregivers, capturing contextual barriers, psychosocial dynamics, and relational nuances that quantitative metrics alone may fail to detect.

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Declaration of AI used for Scientific Writing

AI-assisted technology (ChatGPT, Quillbot, and Gemini) was used solely to assist with language editing and clarity. All scientific content, interpretation, and conclusions were developed and verified by the authors, who take full responsibility for the integrity and accuracy of the manuscript.

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ปัจจัยทำนายพฤติกรรมการจัดการตนเองด้านโรคเบาหวานในวัยรุ่นไทย โรคเบาหวานชนิดที่ 1 : การศึกษาแบบภาคตัดขวาง

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บทคัดย่อ: พฤติกรรมการจัดการตนเองเรื่องโรคเบาหวานที่มีประสิทธิภาพมีความสำคัญอย่างยิ่งต่อการควบคุมระดับน้ำตาลในเลือดให้เหมาะสมในวัยรุ่นที่เป็นโรคเบาหวานชนิดที่ 1 หลักฐานเชิงประจักษ์ในระดับสากลชี้ให้เห็นว่าโปรแกรมการปรับเปลี่ยนพฤติกรรมในปัจจุบันจำนวนมากยังไม่สามารถทำให้อาการทางคลินิกดีขึ้นได้อย่างยั่งยืน ซึ่งเน้นย้ำถึงความจำเป็นในการศึกษาหาปัจจัยที่สามารถปรับเปลี่ยนได้ สำหรับในประเทศไทย งานวิจัยที่ศึกษาปัจจัยทางจิตวิทยาและบริบทที่มีผลต่อการร่วมมือในการรักษาด้านนี้ยังมีอยู่อย่างจำกัด ส่งผลให้เกิดช่องว่างสำคัญของหลักฐานเชิงประจักษ์ในบริบทของไทย การวิจัยแบบภาคตัดขวางนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยทำนายพฤติกรรมการจัดการตนเองเรื่องโรคเบาหวานในวัยรุ่นไทยที่เป็นโรคเบาหวานชนิดที่ 1 กลุ่มตัวอย่างประกอบด้วยวัยรุ่น (อายุ 10–19 ปี) ที่รับการรักษาโดยฉีดอินซูลินแบบพื้นฐานร่วมกับแบบมืออาหาร จำนวน 90 คน และผู้ดูแลหลัก เลือกตัวอย่างด้วยวิธีแบบสะดวกจากคลินิกผู้ป่วยนอกโรคเบาหวานในเด็กของโรงพยาบาลมหาวิทยาลัยสองแห่ง ในกรุงเทพมหานคร ประเทศไทย เก็บรวบรวมข้อมูลโดยใช้แบบสอบถามที่ผ่านการตรวจสอบคุณภาพแล้ว โดยประเมินแรงจูงใจภายใน การรับรู้ภาวะสุขภาพ การสนับสนุนจากครอบครัวและเพื่อน การรับรู้การตีตราทางสังคม ความสัมพันธ์ระหว่างผู้ป่วยกับพยาบาลเบาหวาน และพฤติกรรมการจัดการตนเองเรื่องโรคเบาหวาน วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา สถิติสหสัมพันธ์ของเพียร์สันและสเปียร์แมน และการวิเคราะห์ถดถอยแบบขั้นตอน

ผลการศึกษาพบว่า แรงจูงใจภายใน การรับรู้ภาวะสุขภาพ และการสนับสนุนจากครอบครัวมีความสัมพันธ์อย่างมีนัยสำคัญกับพฤติกรรมการจัดการตนเองเรื่องโรคเบาหวาน อย่างไรก็ตามแรงจูงใจภายในเป็นปัจจัยทำนายที่มีนัยสำคัญเพียงปัจจัยเดียว โดยสามารถอธิบายความแปรปรวนได้ร้อยละ 9.5 ผลการศึกษานี้เน้นย้ำถึงบทบาทสำคัญของแรงจูงใจภายในของวัยรุ่น ดังนั้น พยาบาลควรได้รับการฝึกอบรมกลยุทธ์ต่าง ๆ เพื่อเพิ่มแรงจูงใจภายใน อย่างไรก็ตาม เมื่อพิจารณาว่าความแปรปรวนอีกร้อยละ 90.5 ยังไม่สามารถอธิบายได้ การวิจัยในอนาคตจึงควรใช้รูปแบบการวิจัยเชิงคุณภาพและการวิจัยแบบผสมวิธีเพื่อสำรวจเชิงลึกเกี่ยวกับปัจจัยเชิงบริบทเพิ่มเติมในสถานบริการสุขภาพที่มีความหลากหลายมากขึ้น

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คำสำคัญ: วัยรุ่น การจัดการตนเองโรคเบาหวาน การควบคุมระดับน้ำตาลในเลือด แรงจูงใจภายใน การดูแลผู้ป่วยนอก พยาบาลเด็ก การรับรู้ภาวะสุขภาพ การตีตราทางสังคม การสนับสนุนทางสังคม เบาหวานชนิดที่ 1

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