A Causal Model of Autonomous Motivation to Modify Dietary Behavior among People with Early-stage Chronic Kidney Disease

Anucha Taiwong, Tipaporn Wonghongkul, Chiraporn Tachaudomdach, Chomphoonut Srirat*

Abstract: Dietary behavior is significant for delaying chronic kidney disease progression but is difficult to modify. Autonomous motivation is one of the key concepts that seem to be useful for behavior modification. Thus, this descriptive cross-sectional study was purposed to develop and test a causal model of autonomous motivation to modify dietary behavior among people with early-stage chronic kidney disease. Participants comprised 308 people with early-stage chronic kidney disease from ten tertiary hospitals in Thailand. Data collection employed a demographic and health information form, the Regulation of Eating Behaviour Scale: Autonomous Motivation Subscale, the General Causality Orientation Scale: Autonomy Orientation Subscale, the Health Care Climate Questionnaire Short-Form, the Importance Domain of the Aspiration Index: Intrinsic Life Aspiration Subscale, the Importance Domain of the Aspiration Index: Extrinsic Life Aspiration Subscale, and the Basic Need Satisfaction in General Scale. Data were analyzed through descriptive statistics and structural equation modeling using M-plus.

The results showed the final model explained 57% of the variance in autonomous motivation to modify dietary behavior. Intrinsic life aspiration, autonomy support from healthcare providers, and autonomy orientation had a positive direct effect on autonomous motivation and an indirect effect through basic psychological need satisfaction. Basic psychological need satisfaction had a positive direct effect on autonomous motivation. On the other hand, extrinsic life aspiration had neither a direct nor an indirect effect on autonomous motivation. Nurses can use these findings to design and test nursing interventions by integrating autonomy orientation, autonomy support from healthcare providers, and intrinsic life aspirations for enhancing autonomous motivation to modify the dietary behavior of this population.

Keywords: Autonomous motivation, Causal model, Dietary behavior modification, Early-stage chronic kidney disease, Thailand

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Introduction

Early-stage chronic kidney disease (CKD) remains a concealed public health issue worldwide. The global estimated prevalence of early-stage CKD stands at 13.4%,[1] affecting nearly 800 million people globally in 2022.[2] In the Asian population, the

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prevalence of early-stage CKD has been reported at 7.0%-34.3%.[3] Remarkably, a survey carried out in rural sub-districts of northeastern Thailand among 2,789 participants revealed a prevalence of early-stage CKD of 25.10%. This population's primary risk-contributing factors were hypertension, diabetes mellitus, and renal stones. Only 3.5% of the participants demonstrated awareness regarding CKD.[4] Aggressive treatment is essential for those with early-stage CKD to prevent the deterioration to a more advanced stage known as end-stage renal disease (ESRD). Both global[5] and Thai[6] healthcare strategies aim at delaying CKD progression, focusing on two critical approaches: 1) medication management,[5,6] involving the control of co-morbidities with antihypertensive drugs, antihyperglycemic agents, and hypolipidemic agents, as well as 2) lifestyle modifications[5,6] such as appropriate exercise, weight control, and dietary behavior modifications. These findings highlight the significant global health problem posed by early-stage CKD, particularly among Thai adults. There are various aggressive treatments to delay CKD progression, including dietary behavior modifications.

Dietary behavior modification is one of the lifestyle modifications to control co-morbidities and delay CKD progression. Dietary behavior modification for those with early-stage CKD consists of three main categories: selecting the right food choice, appropriate eating behavior, and suitable dietary intake/nutrition.[7] It assists in reducing blood pressure,[5,8] lowering blood glycemic levels,[5,8] minimizing proteinuria,[5,9] and decreasing the accumulation of non-excreted metabolic products[5,9] that contribute to increased glomerular hyperfiltration,[5] intraglomerular pressure,[5] and disease progression.[5,8,9] One of the influencing factors in performing dietary behavior modification among people with early-stage CKD is autonomous motivation. This is the internal psychological energy that drives an individual's specific behavior and facilitates the maintenance of sustainable healthy behaviors.[10,11] A literature review illustrated that autonomous motivation to modify dietary behavior positively correlated to and predicted dietary behavior modification among those with type 2 diabetes mellitus (T2DM),[12,13] adult women,[14] and adults.[15] Previous studies regarding influencing factors on autonomous motivation to modify dietary behavior showed that autonomy orientation, autonomy support from healthcare providers, intrinsic life aspirations, and basic psychological need satisfaction positively correlated and predicted autonomous motivation to modify dietary behavior in people with CKD,[16] hemodialysis,[17] T2DM,[18] and adult women.[19] Nevertheless, there is limited research on autonomous motivation to modify dietary behavior among adults with early-stage CKD, especially in Thailand. Thus, this study intended to develop and test a causal model of various factors influencing autonomous motivation to modify dietary behavior among people with early-stage CKD.

Conceptual Frameworks and Review of Literature

The Self-Determination Health Behavior Model (SDHBM) was presented by Ryan et al. in 2008, based on the Self-Determination Theory (SDT),[11] which points to the processes by which individuals generate autonomous motivation to initiate and modify health-related behaviors, as well as maintain these behaviors over time.[10,11] This model consists of four factors influencing autonomous motivation: 1) personality differences in autonomy, 2) autonomy supportive health care climate and controlling health care climate, 3) intrinsic life aspiration and extrinsic life aspiration, and 4) satisfaction for autonomy, competence, and relatedness, which is the mediator that links between other influencing factors and autonomous motivation.[11] In this study, five factors influencing autonomous motivation to modify dietary behavior among people with early-stage CKD were derived from the SDHBM: autonomy orientation, autonomy support from healthcare providers, intrinsic life aspirations, extrinsic life aspirations, and basic psychological need satisfaction.

Autonomy orientation refers to a person's tendency to initiate and regulate their behaviors based

on personal interests, values, and the perception of a supportive environment that allows for freedom of choice.[20] People with early-stage CKD who possess these characteristics can think and determine for themselves to start dietary behavior modification. They may sense the opportunity of free choice, exercise their freedom to make decisions and experience ownership of their behaviors. These may lead to the gratification of basic psychological needs and greater autonomous motivation.[11,21] Previous studies have shown a positive correlation between autonomy orientation and autonomous motivation to modify health behaviors among people with weight loss.[22] Autonomy orientation has also been positively correlated with and predicted basic psychological need satisfaction among older adult persons.[23]

Autonomy support from healthcare providers refers to a person's perception of receiving choices, encouragement, and support from physicians and nurses for initiating dietary behavior modification.[20] When people with early-stage CKD are provided with options, motivation, and assistance from healthcare providers and when their opinions are valued, they may feel empowered and capable of changing their diet. Consequently, their basic psychological needs are fulfilled, resulting in an increased sense of autonomous motivation.[24] Previous studies have identified a positive correlation and prediction between autonomy support from healthcare providers and autonomous motivation to perform behaviors related to dietary behavior modification among people with CKD,[16] hemodialysis,[17] and T2DM.[18] Autonomy support from healthcare providers has also been found to positively correlate with and predict basic psychological need satisfaction among people with hemodialysis[25] and kidney transplants.[26]

Intrinsic life aspirations refer to a person's goal-seeking behaviors that align with their basic psychological needs.[20] When such people strive for life goals encompassing their desired physical and psychological growth, helping others, cultivating warm relationships, and pursuing a healthy lifestyle, they align with their intrinsic desires.[10] Consequently, they are more prone to fulfill their basic psychological needs and ultimately develop autonomous motivation to engage in such behaviors.[10] Previous studies have shown a positive correlation and predictive relationship between intrinsic life aspirations and autonomous motivation to modify dietary behavior among women,[19] and to positively correlate with and predict basic psychological need satisfaction.[19, 27]

Extrinsic life aspirations refer to goal-seeking behaviors that involve obtaining external rewards or social praise.[20] When people with early-stage CKD pursue life goals driven by external factors such as wealth, popularity, and physical appearance, their focus is on meeting the expectations of others rather than aligning with their intrinsic desires.[10] If these goals are inconsistent with their basic psychological needs, the generation of autonomous motivation may be prohibited.[10] Previous studies have indicated a non-significant correlation and predictive relationship between extrinsic life aspirations and autonomous motivation among women.[19] However, the SDHBM suggested that extrinsic life aspiration negatively and indirectly affects autonomous motivation to modify dietary behavior through basic psychological need satisfaction.[11] Therefore, this theoretical relationship must be examined to confirm the SDHBM.

Basic psychological need satisfaction refers to a person's perception of fulfilling three innate needs essential for growth, health, and well-being.[28] When people with early-stage CKD perceive freedom to make choices, take ownership of their actions, and have their thoughts and opinions respected (autonomy); when they develop a sense of competence and confidence in effectively modifying their dietary behaviors (competence); and when they experience a sense of connection, warmth, and care from healthcare providers and loved ones (relatedness), they may experience autonomous motivation driving them towards action.[11,28] Previous research has shown that basic psychological need satisfaction positively correlates with and predicts autonomous motivation for dietary behavior modification among people with T2DM[12, 13] and women.[29]

In summary, from the literature review, existing research reveals two main knowledge gaps. Firstly, the study of autonomous motivation for dietary behavior modification among people with early-stage CKD is limited. Secondly, no evidence is available regarding the relationship pattern among factors influencing autonomous motivation to modify dietary behavior. Thus, the intervention to modify diet behaviors is limited.

Study Aim

This study aimed to develop and test the causal model of factors influencing autonomous motivation to modify dietary behavior among persons with early-stage CKD. The causal and direction of relationships of all factors are shown in **Figure 1.** It was hypothesized that 1) autonomous orientation, autonomous support from healthcare providers, and intrinsic and extrinsic life aspiration had both direct on autonomous motivation to modify dietary behavior and indirect effects through basic psychological need satisfaction, and 2) basic psychological need satisfaction had a direct effect on autonomous motivation to modify dietary behavior among people with early-stage CKD.

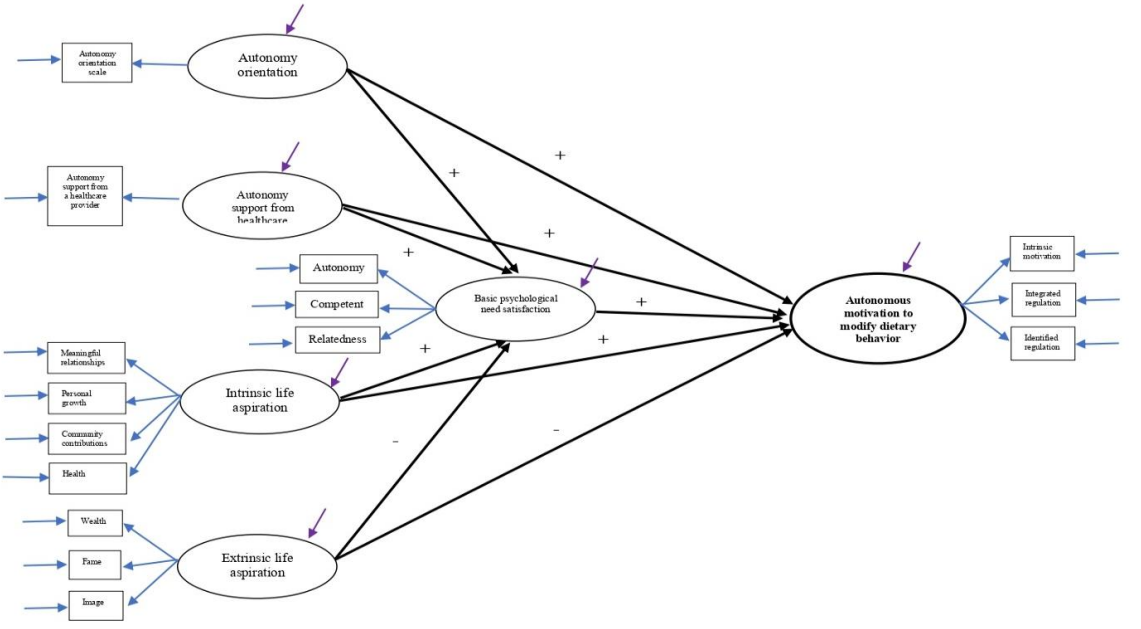

Figure 1. The hypothesized model of autonomous motivation to modify dietary behavior among persons with early-stage CKD

Methods

Design: In this study, we used a cross-sectional model testing design. This report was written following the STROBE Checklist for cross-sectional studies.

Sample and Setting: The participants were people with early-stage CKD who visited a medical clinic at outpatient departments of tertiary hospitals in Thailand. Structural equation modeling (SEM) was applied to determine the sample size with a subject-to-parameter ratio of 5:1.[30] In this study, the hypothesized model consisted of 56 free parameters, quantified using the M-plus program (including 13 parameters for intercept, 22 for factor loading, four for variance, and 17 for residual variance). Therefore, a total of 280 cases were used. However, based on a previous study, the

missing data and outliers were defined as 8.95%,[18] so the estimated sample size was increased to 10% to ensure the questionnaires were completed. The final sample in this study comprised 308 participants, which was sufficient for SEM.[30]

A multi-stage random sampling method was applied. Firstly, Thailand's five geographical regions, consisting of the northern, northeastern, central, eastern, and southern regions, were clustered. Secondly, ten tertiary hospitals were randomly selected from each region based on proportional random sampling (2:3:2:1:2). Finally, participants were recruited randomly based on the proportion of early-stage CKD cases for each selected hospital. The ratio for the sample (308) was determined based on the primary data, specifically, the average number of early-stage CKD persons for each hospital chosen in 2018-2020 (9,496), resulting in a ratio of 30.83:1. The sample size was recruited from ten hospitals (18, 30, 29, 30, 32, 40, 20, 40, 33, 36), a total of 308 participants. The requirements for the inclusion criteria were: Thai adults aged 18-60 years; diagnosed with early-stage CKD (stage 1-3); receiving only medication treatment and suggestions of lifestyle modification; having the ability to read, comprehend, and communicate in Thai; expressing a willingness to engage in the study; and demonstrating cognitive competence as evaluated by the Short Portable Mental Status Questionnaire with a minimum score ≥ 8 of 10.[31]

Ethical Consideration: Our research received approval from the Research Ethics Committee at Chiang Mai University (Research ID: 2565-042; Study Code: 2565-EXP026) and all ten hospitals. All eligible participants provided their informed consent by signing after being informed of study objectives, risks and benefits, protection of privacy and anonymity, and having the right to terminate involvement without adverse consequences.

Instruments: Seven instruments were employed for data collection. Permission was obtained for the instruments from the developers and translators before use. Four instruments: the Regulation of Eating Behaviour Scale: Autonomous Motivation Subscale, the General Causality Orientation Scale: Autonomy Orientation Subscale, the Importance Domain of the Aspiration Index: Intrinsic Life Aspiration Subscale, and the Importance Domain of the Aspiration Index: Extrinsic Life Aspiration Subscale, were translated from the original English into Thai using the back-translation technique[32] and using six experts: a nurse educator expert in CKD, a theory expert, an instrumental expert, a nephrologist, and two certified medical-surgical advanced practice nurses. The scale-level content validity index was 1.00, 0.97, 0.99, and 0.99, respectively. Reliability coefficients from the pilot study with 30 patients with early-stage CKD and from the actual study (n = 308), along with examples of items, are shown in **Table 1.**

Table 1. Cronbach's alpha reliability and examples of items of instruments (n = 308)

Instruments	Number of items	Cronbach's alpha coefficient		Example of items
		Pilot study	Actual study	
1. REBS-AM	12	0.94	0.94	
- Intrinsic motivation	4	0.79	0.84	Because I take pleasure in fixing healthy meals
- Integrated regulation motivation	4	0.87	0.86	Because eating healthy is an integral part of my lifestyle
- Identified regulation motivation	4	0.85	0.87	Because eating healthy is a way to ensure long-term health benefits
2. GCOS-AO	12	0.90	0.87	You have been offered a job opportunity in a company where you have worked for some time. The first question that is likely to come to mind is: I wonder if the new job will be interesting?

Table 1. Cronbach's alpha reliability and examples of items of instruments (n = 308) (Cont.)

Instruments	Number of items	Cronbach's alpha coefficient		Example of items
		Pilot study	Actual study	
3. HCCQ-SF	6	0.92	0.90	My physician and nurse convey confidence in my ability to make changes.
4. ID-AI-IA	20	0.90	0.95	
- Meaningful relationships	5	0.72	0.84	To have great friends that I can count on. How important is this goal to you?
- Personal growth	5	0.80	0.75	To grow and learn new things. How important is this goal to you?
- Community contributions	5	0.72	0.86	To operate for the betterment of society. How important is this goal to you?
- Physical health	5	0.73	0.90	To be physically healthy. How important is this goal to you?
5. ID-AI-EA	15	0.97	0.95	
- Wealth	5	0.92	0.86	To be a very wealthy person. How important is this goal to you?
- Fame	5	0.90	0.91	To have my name recognized by many people. How important is this goal to you?
- Appealing image	5	0.90	0.87	To successfully conceal the signs of aging. How important is this goal to you?
6. BSN-GS	21	0.90	0.81	
- Autonomy	7	0.81	0.80	I feel like I am free to arbitrate for myself how to live my life.
- Competence	6	0.80	0.84	Often, I do not feel very competent.
- Relatedness	8	0.81	0.86	I really prefer the people I interact with.

Note: The Regulation of Eating Behaviour Scale: Autonomous Motivation Subscale (REBS-AM), the General Causality Orientation Scale: Autonomy Orientation Subscale (GCOS-AO), the Health Care Climate Questionnaire Short-Form (HCCQ-SF), the Importance Domain of the Aspiration Index: Intrinsic Life Aspiration Subscale (ID-AI-IA), the Importance Domain of the Aspiration Index: Extrinsic Life Aspiration Subscale (ID-AI-EA), the Basic Need Satisfaction in General Scale (BSN-GS)

The Demographic and Health Information Form comprises gender, age, educational level, marital status, religion, career, household income, medication payment method, duration of illness with CKD, history of smoking, history of alcohol consumption, multimorbidity, CKD staging, and estimated glomerular filtration rate (eGFR).

The Regulation of Eating Behaviour Scale: Autonomous Motivation Subscale (REBS-AM) was first generated by Pelletier et al.[33] based on the SDT. The full version consists of 24 items and six subscales: intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation. Only the autonomous motivation subscale (AM) was used in this study to measure autonomous motivation to modify dietary behavior. The REBS-AM consists of 12 items and three subscales: intrinsic motivation, integrated regulation, and identified regulation, all positive question items. Each item's responses are scored on a 7-point rating

scale, ranging from 1 (does not correspond at all) to 7 (corresponds exactly). Possible total scores range from 12 to 84. A higher score than the mean score of this instrument (48) indicates a high level of autonomous motivation to modify dietary behavior.[33]

The General Causality Orientation Scale: Autonomy Orientation Subscale (GCOS-AO) was developed by Deci and Ryan[21] based on the SDT. The full version consists of 36 items and three subscales: autonomy orientation, controlled orientation, and impersonal orientation. Only the autonomy orientation subscale (AO) was used in this study to measure autonomy orientation. The GCOS-AO consists of 12 items, which are all positive question items. Each item's responses are scored on a 7-point Likert scale, ranging from 1 (very unlikely) to 7 (very likely). Possible total scores range from 12 to 84. A higher score than the mean score of this instrument (48) indicates a high level of autonomy orientation.[21]

The Health Care Climate Questionnaire Short-Form (HCCQ-SF) was developed by Williams[34] based on the SDT and translated into Thai by Serametakul et al.[35] using the back-translation technique.[32] It was employed to measure autonomy support from healthcare providers. The HCCQ-SF consists of six items, all of which are positive question items. Each item's responses are scored on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Possible total scores range from 6 to 42. A higher score than the mean score of this instrument (24) suggests a high degree of autonomy support from healthcare providers.[34]

The Importance Domain of the Aspiration Index: Intrinsic Life Aspiration Subscale (ID-AI-IA) was developed by Kasser and Ryan[36] based on the SDT. The full version of the Aspiration Index consists of 35 items and three components: importance, likelihood to attain, and achievement. In this study, only the importance domain's intrinsic life aspiration subscale (IL) was used to measure intrinsic life aspiration. The ID-AI-IA consists of 20 items and four subscales: meaningful relationships, personal growth, community contributions, and physical health, all positive question items. Each item's responses are scored on a 7-point Likert scale, ranging from 1 (not at all) to 7 (very much). Possible total scores range from 20-140. A higher score than the mean score of this instrument (80) indicates a high level of intrinsic life aspiration.[36]

The Importance Domain of the Aspiration Index: Extrinsic Life Aspiration Subscale (ID-AI-EA) was developed by Kasser and Ryan[36] based on the SDT. The full version of the Aspiration Index consists of 35 items and three components: importance, likelihood to attain, and achievement. In this study, only the importance domain's extrinsic life aspiration subscale (EL) was used to measure extrinsic life aspiration. The ID-AI-EA consists of 15 items and three subscales: wealth, fame, and appealing image, which are all positive question items. Each item's responses are scored on a 7-point Likert scale, ranging from 1 (not at all) to 7 (very much). Possible total scores range from 15-105. A higher score than the mean score of this instrument (60) indicates a high level of extrinsic life aspiration.[36]

The Basic Need Satisfaction in General Scale (BSN-GS) was developed by Gagne[37] based on the SDT and translated into Thai by Serametakul et al.[35] using the back-translation technique.[32] The scale assesses basic psychological need satisfaction. The BSN-GS consists of 21 items and three subscales: autonomy need satisfaction, competence need satisfaction, and relatedness need satisfaction. Each item's responses are scored on a 7-point Likert scale, ranging from 1 (not true at all) to 7 (definitely true). Possible total scores range from 21 to 147. A higher score than the mean score of this instrument (84) indicates a high level of satisfaction with basic psychological needs.[37]

Data Collection: Data were collected between September and November 2022 by the primary investigator (PI) and nine research assistants (RAs). All RAs were trained and registered nurses working in the outpatient department and had experience caring for persons with early-stage CKD and conducting research or collecting data. The PI or the RAs at each hospital approached

and asked eligible participants to participate in the study. All were provided with information regarding the study. Moreover, they were advised to wear face masks and maintain social distancing throughout the data collection process to prevent respiratory infection disease. The participants answered all seven questionnaires by dividing them into two intervals with a five-minute break. Responding to the questionnaires took 60-90 minutes. In this study, all participants could completely answer the questionnaires without getting tired during the data collection.

Data Analysis: Demographic characteristics of data were analyzed using applied descriptive statistics. Pearson's product-moment correlation coefficient was utilized to examine the bivariate relationship among all variables studied. Before running the SEM, assumptions were tested. The results showed no missing data and no outliers. A normal distribution, homoscedasticity, linearity, and multicollinearity were not violated. The M-plus Program was employed to test the hypothesized model. Using a maximum likelihood estimation method, SEM was employed to assess how well the hypothesized model fits the collected data based on specific criteria.

Results

Demographic Data and Health Information

In this study, two-thirds (n = 192, 62.34%) of the participants were female. Their ages ranged from 24 to 60 years (mean = 52.19, SD =7.43). Most participants were married (n = 219, 71.10%) and Buddhist (n = 295, 95.78%). Half of the participants (n = 157, 50.97%) had primary school education while a quarter (n = 85, 27.60%) were farmers. For most, their monthly family income was less than or equal to 18,000 THB or 505 USD per month (n = 186, 60.38%) (median = 12,000 THB or 367 USD per month). Half the participants had health care coverage insurance (n = 175, 56.82%). Most were diagnosed with stage 2 of CKD (n = 140, 45.45%) with eGFR 67.14 ± 19.26 ml/min/1.73 m^2 (Min = 30.00, Max = 95.38). A quarter (n = 88, 28.57%) had a duration of illness with CKD of less than 12 months (mean = 36.65, SD = 35.34, Min = 1, Max = 194). Most of them did not currently smoke (n = 236, 76.62%), had no current alcohol consumption (n = 212, 68.83%), and had one or more co-morbidities (n = 268, 87.01%): hypertension (n = 188, 70.15%) and diabetes mellitus (n = 167, 62.31%).

Correlation Coefficients of the Study Variables

Regarding the relationships between predicting factors and autonomous motivation to modify dietary behavior, a significantly positive high level of relationships was found between intrinsic life aspiration, basic psychological need satisfaction, autonomy support from healthcare providers, autonomy orientation, and autonomous motivation to modify dietary behavior. A significantly positive moderate relationship was found between extrinsic life aspiration and autonomous motivation to modify dietary behavior (**Table 2**).

Table 2. The correlation coefficient matrix of the study variables

Study variables	1	2	3	4	5	6
1. Autonomy orientation (AO)	1.000					
2. Autonomy support from healthcare providers (AS)	.516*	1.000				
3. Intrinsic life aspiration (IL)	.569*	.562*	1.000			
4. Extrinsic life aspiration (EL)	.342*	.261*	.405*	1.000		
5. Basic psychological need satisfaction (BSN)	.456*	.458*	.530*	.178*	1.000	
6. Autonomous motivation to modify dietary behavior (AM)	.522*	.528*	.610*	.301*	.538*	1.000

Note: * p < .01

Model Testing

The hypothesized model was tested using the M-plus program, employing six indices to explore the goodness of fit.[30,38] These indices were non-significant of chi-square value (χ^2), relative chi-square (χ^2/df) ≤ 2, comparative fit index (CFI) and Tucker-Lewis fit index (TLI) ≥ 0.90, root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) ≤ 0.05.[30,38]

First, a measurement model assessment was carried out for each of the four variables, including autonomous motivation to modify dietary behavior, intrinsic life aspiration, extrinsic life aspiration and basic psychological need satisfaction using confirmatory factor analysis (CFA).[30,38] The results indicated that each of the four variables had an acceptable model fit, supporting construct validity consistent with the theory.

Secondly, the structural model assessment of the hypothesized model (**Figure 1**) was tested. The results showed that this model did not fit the empirical data (**Table 3**). Then, the hypothesized model was firstly modified using the fix and free parameter technique due to the factor loading values of some indicators within the measurement model of autonomous motivation to modify dietary behavior (AM) variable and basic psychological need satisfaction (BSN) variable with values exceeding 1. These values were adjusted to ensure the highest loading value became 1. In addition, autonomy orientation (AO) and autonomy support from healthcare providers (AS) were transformed from observed variables to latent variables for reducing error, and their error values were fixed at 0 using the fix parameter technique. However, even with these adjustments, the results still showed that the goodness of fit did not meet acceptable criteria (**Table 3**). Then, the hypothesized model was further adapted by adding correlation paths considering the constructs with the highest values of error shown by the program. The correlation between 4 pairs of errors was added: 1) intrinsic motivation (IM) and integrated regulation (INR) of autonomous motivation, 2) physical health (PHIL) and meaningful relationships (MIL) of intrinsic life aspiration, 3) physical health (PHIL) and community involvement (CIL) of intrinsic life aspiration, and 4) appealing image (AEL) and fame (FEL) of extrinsic life aspiration (**Figure 2**). The result showed that the final model best fits the empirical data (**Table 3**). Although the p-value of the chi-square did not meet the criteria, this was acceptable because the p-value associated with the chi-square value is extremely highly sensitive to the sample size – when the sample size is more than 250 cases, it may be statistically significant.[30,38] In addition, researchers could consider the value of relative Chi-square and other indices to claim the final model to be accepted.[30,38]

Table 3. The goodness-of-fit indices statistics on the hypothesized model, first model modification, and final model

Goodness-of-fit indices	Criteria of acceptability	Hypothesized model	First model modification	Final model
Chi-square (χ^2)		387.158	215.423	136.153
Degree of freedom		81	77	73
P-value	Non-Significant	< 0.001	< 0.001	< 0.001
Relative chi-square (χ^2/df)	≤ 2	4.78	2.79	1.86
Comparative fit index (CFI)	≥ 0.90	0.90	0.96	0.98
Tucker-Lewis fit index (TLI)	≥ 0.90	0.88	0.94	0.97
Root means square error of approximation (RMSEA)	≤ 0.05	0.11	0.07	0.05
Standardized root means square residual (SRMR)	≤ 0.05	0.20	0.06	0.03

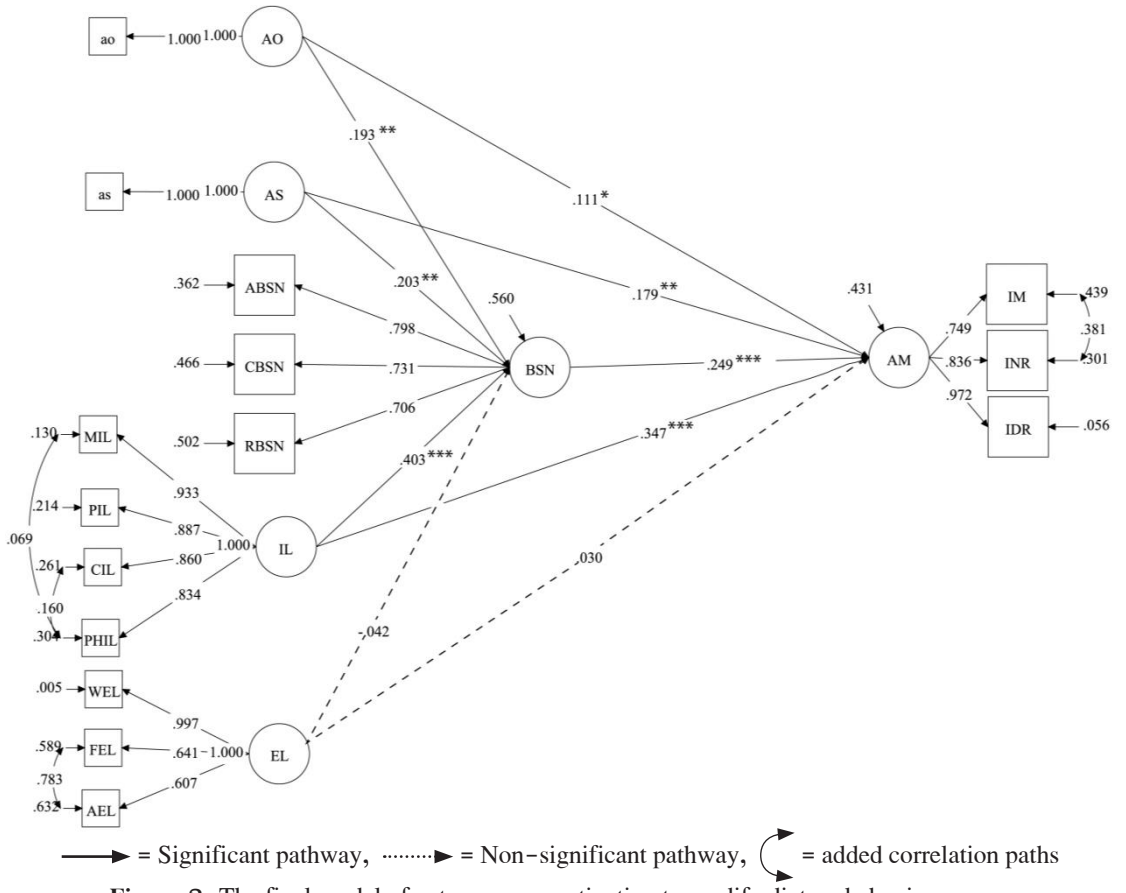

Figure 2. The final model of autonomous motivation to modify dietary behavior among persons with early-stage CKD

Note: Autonomy orientation (AO), Autonomy support from healthcare providers (AS), Intrinsic life aspiration (IL) [meaningful relationships (MIL), personal growth (PIL), community contributions (CIL), and physical health (PHIL)], Extrinsic life aspiration (EL) [wealth (WEL), fame (FEL), and appealing image (AEL)], Basic psychological need satisfaction (BSN) [autonomy need satisfaction (ABSN), competence need satisfaction (CBSN), and relatedness need satisfaction (RBSN)], Autonomous motivation to modify dietary behavior (AM) [intrinsic motivation (IM), integrated regulation (INR), and identified regulation (IDR)]

*p < .05, ** p < .01, ***p < .001

From the final model **(Figure 2)**, the results showed both direct and indirect effects on autonomous motivation to modify dietary behavior as follows. Autonomy orientation, autonomy support from healthcare providers, and intrinsic life aspiration significantly positively affected autonomous motivation to modify dietary behavior. These three variables had significantly positive indirect effects on autonomous motivation to modify dietary behavior through basic psychological need satisfaction. Basic psychological need satisfaction had a significantly positive direct effect on autonomous motivation to modify dietary behavior. Extrinsic life aspiration did not directly or indirectly affect autonomous motivation to modify dietary behavior.

Autonomy orientation, autonomy support from healthcare providers, intrinsic life aspiration, and basic psychological need satisfaction explained 57% of the variance in autonomous motivation to modify dietary behavior. The top three strongest positive effects were intrinsic life aspiration ($\beta = 0.44$, $p < .001$), basic psychological need satisfaction ($\beta = 0.25$, $p < .001$), and autonomy support from healthcare providers ($\beta = 0.23$, $p < .001$), respectively **(Table 4)**.

Table 4. Standardized total effects, direct effects, and indirect effects of the independent variables on the dependent variable

Endogenous variables	R^2	Independent variables	TE	DE	IE
AM	0.57	AO	0.16**	0.11*	0.05*
		AS	0.23***	0.18**	0.05*
		IL	0.44***	0.35***	0.10**
		EL	0.02	0.03	-0.01
		BSN	0.25***	0.25***	-
BSN	0.44	AO	0.19**	0.19**	-
		AS	0.20**	0.20**	-
		IL	0.40***	0.40***	-
		EL	-0.04	-0.04	-

Note: Autonomy orientation (AO), Autonomy support from healthcare providers (AS), Intrinsic life aspiration (IL), Extrinsic life aspiration (EL), Basic psychological need satisfaction (BSN), Autonomous motivation to modify dietary behavior (AM), Direct effect (DE), Indirect effect (IE), Total effect (TE)
*$p < .05$, **$p < .01$, ***$p < .001$

Discussion

The final model of the causal relationship among influencing factors and autonomous motivation to modify dietary behavior among people with early-stage CKD partially supported some of the SDHBM. The findings indicated that autonomy orientation, autonomy support from healthcare providers, and intrinsic life aspirations had positive direct and indirect effects on autonomous motivation to modify dietary behavior through satisfying basic psychological needs. However, extrinsic life aspirations did not directly or indirectly affect autonomous motivation, which contradicted the hypothesized model.

Autonomy orientation directly affected autonomous motivation to modify dietary behavior and had an indirect effect through basic psychological need satisfaction. Autonomy orientation involves the experience of making choices and regulating behavior based on personal values and interests.[11] People with early-stage CKD who have strong autonomy orientation may seek opportunities for self-determination or seek choices and employ strategies provided by health professionals to support their dietary behavior modification. It results in the satisfaction of the basic psychological needs and greater autonomous motivation.[10,11] These findings support the SDHBM that autonomy orientation directly affected autonomous motivation and had an indirect effect through the basic psychological need satisfaction.[10,11]

Autonomy support from healthcare providers directly affected autonomous motivation to modify dietary behavior and indirectly affected basic psychological need satisfaction. The most important factor contributing to behavior change is the expertise and autonomy support provided by healthcare providers.[10,11] When people with early-stage CKD receive choices and encouragement, or when their opinion is accepted and respected by healthcare providers, they may perceive themselves as independent and capable of changing their dietary behavior. Moreover, they may recognize

the concern and care provided by healthcare providers. These may lead to the fulfillment of their basic psychological needs, generating internal energy and enhancing autonomous motivation to modify health behaviors.[10,11] These findings align with previous studies conducted among people with hemodialysis[17] and type 1 diabetes mellitus,[39] demonstrating that autonomy support from healthcare providers positively predicted autonomous motivation to modify dietary behavior.

Intrinsic life aspirations directly affected autonomous motivation to modify dietary behavior and indirectly affected basic psychological need satisfaction. Intrinsic life aspirations had the strongest effect. People with early-stage CKD who have intrinsic life aspirations are more likely to satisfy their basic psychological needs and foster autonomous motivation.[10,11] In this study, most participants had one or more co-morbidities. They might be aware and concerned about their health status by seeking life goals that encompass self-acceptance and acceptance of their health status and illness (growth), generativity and helping others (community involvement), having a satisfying and good relationship with healthcare providers, family, and friends (meaningful relationships), and feeling healthy, free of other complications from CKD, and being able to control co-morbidity themselves (physical health). These goals are inward orientation congruent with their basic psychological needs, finally fostering autonomous motivation to act the behavior.[36] These findings align with prior research conducted among female adults,[19] demonstrating that intrinsic life aspirations positively predicted autonomous motivation to modify dietary behavior.

Basic psychological need satisfaction directly affected autonomous motivation to modify dietary behavior and was a mediator variable linking other factors with autonomous motivation.[11] Basic psychological needs are fundamental for continuous psychological development, maintaining integrity, and promoting overall well-being. Basic psychological need satisfaction plays a central role within the SDT.[40] When people with early-stage CKD perceive the freedom to make choices, take ownership of their actions, and experience warmth and care from healthcare providers and loved ones, their basic psychological needs are fulfilled, finally affecting autonomous motivation, mental health, and physical health.[11] These results accord with previous research among people with DM type II[12, 13,] and adult persons,[29] demonstrating that basic psychological need satisfaction positively predicted autonomous motivation to modify dietary behavior.

Contradictory, extrinsic life aspirations had no significant direct or indirect effect on autonomous motivation to modify dietary behavior. This finding does not support the SDHBM.[11] The explanation for this phenomenon may lay in extrinsic life aspirations. Extrinsic life aspirations are those centered around external rewards such as fame, image, or monetary success. These external objectives do not directly fulfill basic psychological.[36] Extrinsic life aspirations in people with early-stage CKD may be less important and less of a concern because people's external factors influence them. In addition, this could be due to the low correlation coefficient between extrinsic life aspirations and autonomous motivation to modify dietary behavior, resulting in no effect of extrinsic life aspirations on basic psychological need satisfaction and autonomous motivation to modify dietary behavior.

Limitations

This study employed a cross-sectional design, which might limit our ability to draw inferences about causal relationships. Future research should consider employing a longitudinal design to examine this population's autonomous motivation to modify dietary behavior. This study focused on autonomous motivation to modify dietary behavior, as mentioned in the SDHBM, but did not directly investigate dietary behavior as the outcome of autonomous motivation. Further studies should examine dietary behavior modification as the dependent variable. The final model can explain 57% of the variance in autonomous motivation to modify

dietary behavior. It is worth noting that some variables based on the SDHBM were not included in this study, such as controlled orientation, impersonal orientation, and controlling healthcare climate. These factors should be tested in future studies.

Conclusions and Implications for Nursing Practice

Our findings provide empirical evidence that autonomy orientation, autonomy support from healthcare providers, and intrinsic life aspirations had positive direct and indirect effects on autonomous motivation to modify dietary behavior through satisfying basic psychological needs, which partially supported some of the SDHBM. Intrinsic life aspirations had the strongest influence, directly affecting autonomous motivation to modify dietary behavior and indirectly affecting the satisfaction of basic psychological needs. In addition, extrinsic life aspiration had no direct or indirect effects on autonomous motivation to modify dietary behavior. Nurses should develop nursing interventions to promote autonomous motivation to modify dietary behavior by integrating supporting autonomy orientation, autonomy support from healthcare providers, and intrinsic life aspirations, especially intrinsic life aspirations since they have the strongest effect. However, the SDHBM does not provide specific strategies or explanations for enhancing intrinsic life aspirations to promote autonomous motivation. Using other theories to explain and enhance intrinsic life aspirations may be necessary.

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References

1. Lv JC, Zhang LX. Prevalence and disease burden of chronic kidney disease. Renal fibrosis: mechanisms and therapies. Adv Exp Med Biol. 2019;1165:3-15. doi:10.1007/978-981-13-8871-2_1.
2. Kovesdy CP. Epidemiology of chronic kidney disease: an update 2022. Kidney Int Suppl (2011). 2022;12(1):7-11. doi:10.1016/j.kisu.2021.11.003.
3. Liyanage T, Toyama T, Hockham C, Ninomiya T, Perkovic V, Woodward M, et al. Prevalence of chronic kidney disease in Asia: a systematic review and analysis. BMJ Glob Health. 2022;7(1):e007525. doi:10.1136/bmjgh-2021-007525.
4. Cha'on U, Tippayawat P, Sae-Ung N, Pinlaor P, Sirithanaphol W, Theeranut A, et al. High prevalence of chronic kidney disease and its related risk factors in rural areas of Northeast Thailand. Sci Rep. 2022;12(1):18188. doi: 10.1038/s41598-022-22538-w.
5. Kidney Disease: Improving Global Outcomes (KDIGO) Diabetes Work Group. KDIGO 2020 clinical practice guideline for diabetes management in chronic kidney disease. Kidney Int. 2020;98(Suppl 4):S1-115. doi:10.1016/j.kint.2020.06.019.
6. Nephrology Society of Thailand. Clinical recommendations for evaluation and management of chronic kidney disease in adults 2022. Bangkok: Nephrology Society of Thailand; 2022 (in Thai).
7. Marijn Stok F, Renner B, Allan J, Boeing H, Ensenauer R, Issanchou S, et al. Dietary behavior: an interdisciplinary conceptual analysis and taxonomy. Front Psychol. 2018;9:1689. doi:10.3389/fpsyg.2018.01689.
8. Naber T, Purohit S. Chronic kidney disease: role of diet for a reduction in the severity of the disease. Nutrients. 2021;13(9):3277. doi:10.3390/nu13093277.
9. Pereira RA, Ramos CI, Teixeira RR, Muniz GA, Claudino G, Cuppari L. Diet in chronic kidney disease: an integrated approach to nutritional therapy. Rev Assoc Med Bras (1992). 2020;66(Suppl 1):s59-67. doi:10.1590/1806-9282.66.S1.59.
10. Ryan RM, Deci EL. Self-determination theory. In: Maggino F, editor. Encyclopedia of quality of life and well-being research. Springer; 2022. pp.1-7. doi: 10.1007/978-3-319-69909-7_2630-2.

11. Ryan RM, Patrick H, Deci EL, Williams GC. Facilitating health behaviour change and its maintenance: interventions based on self-determination theory. Eur Health Psychol. 2008;10:2-5. Available from: www.ehps.net/ehp
12. Oumrait NG, Daivadanam M, Absetz P, Guwatudde D, Berggreen-Clausen A, Alvesson HM, et al. Can self-determination explain dietary patterns among adults at risk of or with type 2 diabetes? A cross-sectional study in socio-economically disadvantaged areas in Stockholm. Nutrients. 2020;12(3):620. doi:10.3390/nu12030620.
13. De Man J, Wouters E, Delobelle P, Puoane T, Daivadanam M, Absetz P, et al. Testing a self-determination theory model of healthy eating in a South African township. Front Psychol. 2020;11:2181. doi:10.3389/fpsyg.2020.02181.
14. Guertin C, Pelletier L. Motivational dynamics in the prediction of self-regulation strategies for the quality and quantity of eating, eating behaviors, and life satisfaction: a longitudinal investigation. Food Qual Prefer. 2023;107:104829. doi:10.1016/j.foodqual.2023.104829.
15. Hoffman RK, Jobe MC, Dodge T. A brief self-persuasion intervention to strengthen health-promoting dietary intentions through autonomous motivation. Appetite. 2023;180:106371. doi:10.1016/j.appet.2022.106371.
16. van Pelt A. Psychosocial factors related to sodium adherence among patients with chronic kidney disease. Netherlands: Leiden University; 2015.
17. Yamamoto K, Okumiya A. Factors that promote autonomous and controlled motivation in self-management behavior of hemodialysis patients. J Health Sci. 2018;6:393-405. doi:10.17265/2328-7136/2018.06.001.
18. Koponen AM, Simonsen N, Suominen S. How to promote fruits, vegetables, and berries intake among patients with type 2 diabetes in primary care? A self-determination theory perspective. Health Psychol Open. 2019;6(1):2055102919854977. doi:10.1177/2055102919854977.
19. Guertin C. A self-determination theory perspective on the success and failure of eating regulation in women: does planning and self-monitoring the quality versus the quality of eating matter? [master's thesis]. [Ottawa, Canada]: University of Ottawa; 2020. 266 p.
20. Ng JY, Ntoumanis N, Thøgersen-Ntoumani C, Deci EL, Ryan RM, Duda JL, et al. Self-determination theory applied to health contexts: a meta-analysis. Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) Multivariate Data Analysis. 7th Edition, Pearson, New York. Perspect Psychol Sci. 2012;7(4):325-40.doi:10.1177/1745691612447309.
21. Deci EL, Ryan RM. The general causality orientations scale: self-determination in personality. J Res Pers. 1985;19(2):109-34.
22. Williams GC, Grow VM, Freedman ZR, Ryan RM, Deci EL. Motivational predictors of weight loss and weight-loss maintenance. J Pers Soc Psychol. 1996;70(1):115-26. doi:10.1037//0022-3514.70.1.115.
23. Souesme G, Martinent G, Akour D, Giraudeau C, Ferrand C. Causality orientations and supportive/controlled environment: understanding their influence on basic needs, motivation for health and emotions in French hospitalized older adults. Front Psychol. 2020;11:575489. doi:10.3389/fpsyg.2020.575489.
24. Ryan RM, Deci EL. Self-determination theory: basic psychological needs in motivation, development, and wellness. New York: Guilford Press; 2017. doi: 10.1521/978.14625/28806.
25. Chen MF, Chang RE, Tsai HB, Hou YH. Effects of perceived autonomy support and basic need satisfaction on the quality of life in hemodialysis patients. Qual Life Res. 2018;27(3):765-73. doi:10.1007/s11136-017-1714-2.
26. Jeong HW, So HS. Structural equation modeling of self-care behaviors in kidney transplant patients based on self-determination theory. J Korean Acad Nurs. 2018;48(6):731-42. doi: 10.4040/jkan.2018.48.6.731 (in Korean).
27. Behzadnia B, Deci EL, DeHaan CR. Predicting relations among life goals, physical activity, health, and well-being in elderly adults: a self-determination theory perspective on healthy aging. In: Ng B, Ho G, editors. Self-determination theory and healthy aging. Singapore: Springer; 2020. pp. 47-71.
28. Deci EL, Ryan RM. The" what" and" why" of goal pursuits: human needs and the self-determination of behaviour. Psychol Inq. 2000;11(4):227-68. doi:10.1207/S15327965P LI1104_01.
29. Bégin C, Fecteau A, Côté M, Bédard A, Senécal C, Ratté C. Disordered eating behaviors through the lens of self-determination theory. Eur J Psychol. 2018;14(3):571-80. doi:10.5964/ejop.v14i3.1577.
30. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis: a global perspective. 7th ed. Upper Saddle River: Pearson Prentice Hall; 2010.
31. Kahn RL, Goldfarb AI, Pollack M, Peck A. Brief objective measures

for the determination of mental status in the aged. Am J Psychiatry. 1960;117(4):326-8. doi:10.1176/ajp.117.4.326.

32. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186-91. doi:10.1097/00007632200012150-00014.
33. Pelletier LG, Dion SC, Slovinec-D'Angelo M, Reid R. Why do you regulate what you eat? Relationships between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment. Motiv Emot. 2004;28(3):245-77. doi:10.1023/B:MOEM.0000040154. 40922.14.
34. Williams GC, McGregor HA, Zeldman A, Freedman ZR, Deci EL. Testing a self-determination theory process model for promoting glycemic control through diabetes self-management. Health Psychol. 2004;23(1):58-66. doi:10.1037/0278-6133.23.1.58.
35. Serametakul D, Wonghongkul T, Klunklin P, Mesukko J. A causal model of self-management behavior for adolescents with asthma. Pacific Rim Int J Nurs Res. 2019;23(4):320-33. Available from: https://he02.tci-thaijo.org/index.php/PRIJNR/article/view/151662
36. Kasser T, Ryan RM. Further examining the American dream: differential correlates of intrinsic and extrinsic goals. Pers Soc Psychol Bull. 1996;22(3):280-7. doi:10.1177/0146167296223006.
37. Gagne M. Autonomy support and need satisfaction in the motivation and well-being of gymnasts. J Appl Sport Psychol. 2003;15(4):372-90. doi:10.1080/714044203.
38. Schumacker RE, Lomax RG. A beginner's guide to structural equation modeling. Mahwah, NJ: Lawrence Erlbaum Associates; 2004.
39. Miežienė B, Šinkariova L, Adomavičiūtė E. The importance of perceived autonomy support and previous behaviour for autonomous motivation in patients with type 1 diabetes. Int J Psychol Biopsychosoc Approach. 2015;17:57-78. doi:10.7220/2345-024X.17.4.
40. Schüler J, Baumann N, Chasiotis A, Bender M, Baum I. Implicit motives and basic psychological needs. J Pers. 2019;87(1):37-55. doi:10.1111/jopy.12431.

แบบจำลองเชิงสาเหตุของแรงจูงใจแบบมีอิสระในตนเองเพื่อปรับเปลี่ยนพฤติกรรมการบริโภคอาหารในผู้ที่เป็นโรคไตเรื้อรังระยะเริ่มต้น

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บทคัดย่อ: พฤติกรรมการบริโภคอาหารเป็นสิ่งสำคัญมากในการชะลอการลุกลามของโรคไตเรื้อรัง และเป็นการยากที่จะปรับเปลี่ยน แรงจูงใจแบบมีอิสระในตนเองเป็นหนึ่งในแนวคิดสำคัญที่ดูเหมือนว่าจะมีประโยชน์สำหรับการปรับเปลี่ยนพฤติกรรม ดังนั้นการศึกษาภาคตัดขวางเชิงพรรณนานี้มีวัตถุประสงค์เพื่อทดสอบแบบจำลองเชิงสาเหตุของแรงจูงใจแบบมีอิระในตนเองเพื่อปรับเปลี่ยนพฤติกรรมการบริโภคอาหารในผู้ที่เป็นโรคโรคไตเรื้อรังระยะเริ่มต้น โดยใช้แบบจำลองพฤติกรรมสุขภาพที่กำหนดด้วยตนเอง (Self-Determination Health Behavior Model) เป็นกรอบแนวคิด กลุ่มตัวอย่างเป็นผู้ที่เป็นโรคไตเรื้อรังระยะเริ่มต้น จำนวน 308 คน คัดเลือกโดยใช้การสุ่มแบบหลายขั้นตอนจากโรงพยาบาลระดับตติยภูมิ 10 แห่งในประเทศไทย รวบรวมข้อมูลโดยใช้แบบบันทึกข้อมูลส่วนบุคคลและข้อมูลสุขภาพ แบบวัดแรงจูงใจแบบมีอิสระในตนเองในการปรับเปลี่ยนพฤติกรรมการบริโภคอาหาร แบบวัดการกำหนดเป้าหมายแบบมีอิสระในตนเอง แบบวัดการได้รับการสนับสนุนความอิสระจากบุคลากรทางการแพทย์ แบบวัดความทะเยอทะยานในชีวิตภายในตน แบบวัดความทะเยอทะยานในชีวิตภายนอกตน และแบบวัดความพึงพอใจต่อความต้องการขั้นพื้นฐาน วิเคราะห์ข้อมูลโดยใช้สถิติบรรยายและวิเคราะห์สมการโครงสร้างด้วยโปรแกรม M-plus

ผลการศึกษาแสดงให้เห็นว่าแบบจำลองสุดท้ายสามารถอธิบายความแปรปรวนของแรงจูงใจแบบมีอิสระในตนเองในการปรับเปลี่ยนพฤติกรรมการบริโภคอาหารได้ร้อยละ 57 โดยความทะเยอทะยานในชีวิตภายในตน การสนับสนุนความอิสระจากบุคลากรทางการแพทย์ และการกำหนดเป้าหมายแบบมีอิสระในตนเองมีอิทธิพลในเชิงบวกทั้งโดยตรงต่อแรงจูงใจแบบมีอิสระในตนเองและมีอิทธิพลโดยอ้อมผ่านความพึงพอใจความต้องการขั้นพื้นฐาน ความพึงพอใจความต้องการขั้นพื้นฐานมีอิทธิพลในเชิงบวกโดยตรงต่อแรงจูงใจแบบมีอิสระในตนเอง ในทางกลับกันความทะเยอทะยานในชีวิตภายนอกตนไม่มีอิทธิพลทั้งทางตรงและทางอ้อมต่อแรงจูงใจแบบมีอิสระในตนเองในการปรับเปลี่ยนพฤติกรรมการบริโภคอาหาร สรุปได้ว่าพยาบาลควรใช้ข้อค้นพบนี้เพื่อออกแบบการจัดกระทำทางการพยาบาลโดยบูรณาการกำหนดเป้าหมายแบบมีอิสระในตนเอง การสนับสนุนความอิสระจากบุคลากรทางการแพทย์ และความทะเยอทะยานในชีวิตภายในตน สำหรับการเพิ่มแรงจูงใจแบบมีอิสระในตนเองในการปรับเปลี่ยนพฤติกรรมการบริโภคอาหารของประชากรกลุ่มนี้

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คำสำคัญ: แรงจูงใจแบบมีอิสระในตนเอง ปรับเปลี่ยนพฤติกรรมการบริโภคอาหาร โรคไตเรื้อรังระยะเริ่มต้น แบบจำลองเชิงสาเหตุ ประเทศไทย

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