CHAPTER 4

Results and Discussion

This chapter is organized into four parts consisting of the results of data analysis and the research findings discussion. The first part presents demographics and the clinical characteristics of the sample. The second part is composed of the descriptive characteristics of the study variables. Correlation coefficients of the study variables are described in the third part. Finally, the hypothesized and the modified model are presented. The discussions are illustrated by following the two specific objectives of this study. Consequently, all of the obtained findings are integrated to nursing implications and recommendations for the future research in nursing.

Results of the Study

Part I: Demographics and Clinical Characteristics of the Sample

The sample of this study were 341 Thai older adults with hypertension aged 60 years and over who received at least one antihypertensive drugs at the hypertension clinics of five community hospitals in Phayao Province during March 2014 to May 2014. The demographics characteristics of the sample are presented in Table 4-1. The clinical characteristics of the sample are shown in Table 4-2. With regard to the mean, standard deviation, number and percentage of the sample as described by systolic and diastolic blood pressure and blood pressure control are displayed in Table 4-3.

Table 4-1

Demographics Characteristics of the Sample (n = 341)

Characteristics	n (%)
Gender	
Male	129 (37.83)
Female	212 (62.17)
Age (year)	
(Range = 60-88, $\bar{X}$= 69.36, *SD* = 6.09)	
60-69	191 (56.01)
70-79	131 (38.42)
80 and over	19 (5.57)
Employment	
Unemployed	197 (57.77)
Agriculturist	104 (30.50)
Storekeeper/ vender	25 (7.33)
Worker	14 (4.11)
Retired government officer	1 (0.29)
Marital status	
Married	217 (63.64)
Widowed/ Divorced/ Separated	111(32.55)
Single	13 (3.81)
Educational level	
No formal education	79 (23.17)
High school	11 (3.22)
Bachelor	3 (.88)
Elementary school	248 (72.73)

Table 4-1 (continued)

Characteristics	n (%)
Personal income (Baht per month)	
< 5,000	276 (80.94)
5,000-10,000	52 (15.25)
> 10,000	13 (3.81)
Medical payment	
Elderly health care coverage insurance	257 (75.37)
Government officer reimbursement	61 (17.89)
Health care coverage insurance	12 (3.52)
Health volunteer	7 (2.05)
Veteran card	4 (1.17)
Living arrangements	
Living alone	49 (14.37)
Living with spouse	102 (29.91)
Living with legitimate children	55 (16.13)
Living with spouse and legitimate children	99 (29.03)
Living with spouse and grand children	11 (3.23)
Living with grand children	10 (2.93)
Living with other people	15 (4.40)

The demographics characteristics of the sample are shown in Table 4-1. The participants in this study are composed of 129 men (37.83%) and 212 women (62.17%). The age of the participants ranged from 60 to 88 years, with a mean of 69.36 (*SD* = 6.09). Most of the participants were unemployed (57.77%). For those who were employed, most of them were agriculturist (30.50%) and storekeeper or vendor (7.33%). Approximately sixty-three percent of them were married and 32.55% were widowed/divorced/separated. Most of the participants had completed elementary school (72.73%) and 23.17% had no formal education. Regarding the personal income of the sample, most of them had income lower than 5,000 Bath per month (80.94%). With regard to medical payment, most of the participants (75.37%) had elderly health care coverage insurance, while 17.89% had government officer reimbursement. Nearly

thirty percent of the sample lived with their spouse, whereas 29.03% lived with spouse and legitimate children.

Table 4-2

Clinical Characteristics of the Sample (n = 341)

Characteristics	n (%)
Duration of being diagnosed with hypertension (years)	
(Range = 0.75-35, $\bar{X}$= 7.57, *SD* = 5.50)	
< 1	7 (2.05)
1- 4	108 (31.67)
5-10	155 (45.46)
> 10	71 (20.82)
In-patient admitted with hypertension or complications	
None	313 (91.79)
Admitted	28 (8.21)
Admitted with	
Hypertension	21 (6.16)
Cerebrovascular disease	7 (2.05)
Complications of hypertension	
None	247 (72.43)
Complications	94 (27.57)
Kidney disease	70 (20.53)
Heart disease	10 (2.93)
Cerebrovascular disease	8 (2.35)
Kidney disease & Heart disease	6 (1.76)
Number of antihypertensive medication (types)	
1	157 (46.04)
2	157 (46.04)
3	22 (6.45)
4	5 (1.47)

Table 4-2 (continued)

Characteristics	n (%)
Types of antihypertensive medication	
Calcium channel blockers (CCBs)	202 (59.24)
Angiotensin-converting enzyme inhibitors (ACE-I)	116 (34.02)
Diuretics	83 (24.34)
Beta-adrenergic blockers	78 (22.88)
Angiotensin II receptor blocker (ARBs)	50 (14.66)
Alpha- adrenergic agonist	15 (4.40)
Alpha adrenergic blocker	6 (1.76)
Number of medicines taken per day (tablets)	
0.5-1	131 (38.42)
1.5-3	152 (44.57)
3.5-5	47 (13.78)
> 5	11 (3.23)
Number of time of medication used per day (time per day)	
1	224 (65.69)
2	114 (33.43)
3	3 (0.88)
Interval of follow up visits (month)	
(Range = 1-4, $\bar{X}$ = 3.04, *SD* = 5.50)	
1-1.5	3 (.88)
2-2.5	25 (7.33)
3	264 (77.42)
> 3	49 (14.37)

In accordance with the clinical characteristics of the sample as shown in Table 4.2, all of the results showed that the duration of being diagnosed with hypertension ranged from 0.75 to 35 years with a mean of 7.57 years (*SD* = 5.50). Less than half participants (45.45%) reported being diagnosed with hypertension from 5 to 10 years, while 31.67% ranged from 1 to 4 years and about one fifth (20.82%) reported being diagnosed with hypertension of more than 10 years. The majority of participants

(91.79%) had not been admitted to hospital with any complications, especially hypertension, while the rest of them had been admitted (8.21%) with hypertension (7.04%) and cerebrovascular disease (2.05%), respectively. Most of the sample (72.43%) reported no complications of hypertension, while 27.57% had complications, including kidney disease (20.53%), heart disease (2.93%), cerebrovascular disease (1.76%) and both kidney disease and heart disease (1.76%), respectively.

Moreover, participants reported that they received number of antihypertensive medication ranging from 1 to 4 types. Forty six percent of participants received one type of antihypertensive medication and two types of antihypertensive medication. By types of antihypertensive medication, most of participants (59.24%) often received calcium channel blockers, followed by angiotensin-converting enzyme inhibitors (34.02%), diuretics (24.34%) and beta-adrenergic blockers (22.88%). The number of medications taken per day ranged from 0.5 to 8 pills per day. Less than half participants 44.57% used antihypertensive medication in the group of 1.5 to 3 pills per day and 38.42% of them were in the group of 0.5 to 1 pill per day. Furthermore, the sample reported that they took their medication ranged from 1 to 3 times per day. The majority of the participants (65.69%) took their drugs 1 time per day followed by 2 times per day (33.43%). The interval of follow-up visits ranged from 1 to 4 months. The average duration of a follow-up visit was 3.04 (*SD* = 0.50) months. Most of participants (77.42%) had an interval of follow up visit 3 months and 14.37% of them who had an interval of follow-up visit were more than 3 months.

Table 4-3

Mean, Standard Deviation, Number and Percentage of Sample as Described by Systolic and Diastolic Blood Pressure and Blood Pressure Control (n = 341)

Blood pressure level (mmHg)	Systolic blood pressure (BPs)		Diastolic blood pressure (BPd)		Blood pressure control	
					Uncontrolled	Controlled
	$\bar{X}$	*SD*	$\bar{X}$	*SD*	n (%)	n (%)
Previous blood pressure level	133.55	14.85	74.98	10.26	56 (16.42)	285 (83.58)
Current blood pressure level	133.87	15.03	74.02	9.50	61 (17.89)	280 (82.11)

Note. Uncontrolled blood pressure meant BP ≥ 140/90 mmHg. Controlled blood pressure meant BP < 140/90 mmHg. Range of blood pressure level of previous blood pressure level = (Bpd = 114-29 mmHg; Bps = 200-80mmHg), Range of blood pressure level of current blood pressure level = (Bpd = 126-45 mmHg; Bps = 202-100 mmHg).

According to previous and current blood pressure levels of the participants as shown in Table 4.3, the results showed that both of them had a mean systolic blood pressure was not different; 133.55 mmHg (*SD* = 14.85) and 133.87 mmHg (*SD* = 15.03), respectively. In addition, they had a mean of both previous and current diastolic blood pressure was 74.98 mmHg (*SD* = 10.26) and 74.02 mmHg (*SD* = 9.50), respectively. Additionally, most of participants (83.58%) had good control of both previous and current blood pressures by keeping them under 140/90 mmHg.

Table 4-4

Descriptive Data of Studied Variables (n = 341)

Variables	Possible score	Actual score	$\bar{X}$	*SD*	Level
Physical function	0-9	3-9	8.65	.69	High
Cognitive function	0-19	13-19	17.91	1.22	Normal
Knowledge of hypertension	0-22	11-21	16.77	2.28	Inadequate
Provider-patient communication	9-36	21-36	32.26	2.32	High
Clarity	2-8	2-8	5.22	1.59	Moderate
Responsiveness	3-12	5-12	11.44	1.01	High
Explanation	4-16	10-16	15.61	1.14	High
Perceived susceptibility	7-28	12-28	27.07	1.92	High
Perceived severity	6-24	6-24	23.17	2.36	High
Perceived benefits	6-24	10-24	22.76	2.02	High
Perceived barriers	7-28	9-28	23.96	3.58	Low
Social support from family	20-80	32-80	70.28	9.17	High
Emotional support	6-24	10-24	22.56	2.52	High
Appraisal support	5-20	5-20	18.34	2.59	High
Informational support	4-16	4-16	14.04	2.77	High
Instrumental support	5-20	5-20	15.33	3.36	High
Perceived self efficacy to adherence	26-104	60-104	93.36	8.80	High
Adherence to therapeutic regimens	29-116	60-116	101.60	9.29	High
Alignment of patients' behaviors and recommendations	16-64	30-64	57.92	5.92	High
Mastery of new behaviors	4-16	4-16	15.14	1.71	High
Ongoing collaboration	7-28	9-28	20.96	3.91	High
Perceived ability to meet optimal blood pressure	2-8	2-8	7.58	.97	High

According to the study variables, they consisted of physical function, cognitive function, knowledge of hypertension, provider-patient communication, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, social support from family, and perceived self-efficacy to adherence and adherence to therapeutic regimens. These variables are explained as follows.

The overall physical function score of the participants ranged from 3 to 9 with a mean of 8.65 (*SD* = 0.69) which was at a high level.

The overall score of cognitive function ranged from 13 to 19 with a mean of 17.91 (*SD* = 1.22) and it showed at a normal level of cognitive function.

The knowledge of hypertension score of the participants ranged from 11 to 21 with a mean of 16.77 (*SD* = 2.28) which was at an inadequate level.

The overall of provider-patient communication score ranged from 21 to 36 with a mean of 32.26 (*SD* = 2.32) and it showed at a high level. Also, in three sub-scales of provider-patient communication score, responsiveness ($\bar{X}$ = 11.44, *SD* = 1.01) and explanation ($\bar{X}$ = 15.61, *SD* = 1.14) were reported at a high level. Whereas, the score of clarity ($\bar{X}$ = 5.22, *SD* = 1.59) was reported at moderate level.

The overall score of perceived susceptibility ranged from 12 to 28 with a mean of 27.07 (*SD* = 1.92) and it was at a high level.

The perceived severity score of participants ranged from 6 to 24 with a mean of 23.17 (*SD* = 2.36) which was at a high level.

The perceived benefits score of participants ranged from 10 to 24 with a mean of 22.76 (*SD* = 2.02) and it was at a high level.

The overall score of perceived barriers ranged from 9 to 28 with a mean of 23.96 (*SD* = 3.58) which was at a low level.

The overall score of social support from family ranged from 32 to 80 with a mean of 70.28 (*SD* = 9.17) and it was at a high level. Moreover, all the sub-scales of social support from family consisted of emotional support ($\bar{X}$ = 22.56, SD = 2.52), appraisal

support ($\bar{X}$ = 18.34, SD = 2.59), informational support ($\bar{X}$ = 14.04, SD = 2.77) and instrumental support ($\bar{X}$ = 15.33, SD = 3.36) were at a high level.

The perceived self-efficacy to adherence score of the participants ranged from 60 to 104 with a mean of 93.36 (SD = 8.80) and it was at a high level.

Finally, the total score of adherence to therapeutic regimens ranged from 60 to 116 with a mean of 101.60 (*SD* = 9.29) which was at a high level. In addition, all four attributes including alignment of patients' behaviors and recommendations ($\bar{X}$ = 57.92, *SD* = 5.59), mastery of new behaviors ($\bar{X}$ = 15.14, SD = 1.71), ongoing collaboration ($\bar{X}$ = 20.96, *SD* = 3.91) and perceived ability to meet optimal blood pressure ($\bar{X}$ = 7.58, *SD* = .97) were at a high level.

Part II: Correlations Among the Study Variables

In this part demonstrated the correlation between the predicting variables, including physical function, cognitive function, knowledge of hypertension, provider-patient communication, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, social support from family, and perceived self-efficacy to adherence and adherence to therapeutic regimens. These findings described in Table 4-5

Table 4-5

Intercorrelations Between ADTR and Predicting Variables (n = 341)

Variables	ADTR	Attribute of ADTR			
		1	2	3	4
Physical function	-.07	-.11*	-.12*	.09	-.11*
Cognitive function	-.20*	-.17**	-.20**	-.11*	-.11*
Knowledge of hypertension	.01	.02	-.09	.04	-.03
Provider-patient communication	.24**	.21**	.17**	.11*	.22**
Clarity	.01	.01	-.08	.03	-.01
Responsiveness	.21**	.20**	.22**	.03	-.01
Explanation	.29**	.24**	.27**	.15**	.25**
Perceived susceptibility	.36**	.33**	.37**	.11*	.31**
Perceived severity	.33**	.36**	.33**	-.00	.40**
Perceived benefits	.26**	.32**	.26**	-.04	.28**
Perceived barriers	.08	.16**	.01	-.10	.20**
Social support from family	.44**	.39**	.44**	.19**	.35**
Emotional support	.41**	.39**	.44**	.12*	.33**
Appraisal support	.38**	.33**	.37**	.18**	.28**
Informational support	.31**	.25**	.29**	.17**	.23**
Instrumental support	-.04	-.03	.02	-.05	-.02
Perceived self-efficacy to adherence	.75**	.76**	.61**.	.23**	.50**

Note. ADTR = adherence to therapeutic regimens; Attribute 1 = alignment of patients' behaviors and recommendations; Attribute 2 = mastery of new behaviors; Attribute 3 = ongoing collaboration; Attributes 4 = perceived ability to meet optimal blood pressure. * $p < .05$. **$p < .01$.

With regard to the correlation between adherence to therapeutic regimens and ten independent variables, the findings demonstrated that provider-patient communication (r = .24, p < .01) and perceived benefits (r = .26, p < .01) had a low positive relationship with adherence to therapeutic regimens. While, cognitive function (r = -.20, p < .05) had a low negative relationship with adherence to therapeutic regimens. Perceived susceptibility (r = .36, p < .01), perceived severity (r = .33, p < .01) and social support from family (r = .44, p < .01) had a moderate positive relationship with adherence to therapeutic regimens. Moreover, perceived self-efficacy to adherence had a high positive relationship (r = .75, p < .01) with adherence to therapeutic regimens. Whereas, physical function, knowledge of hypertension and perceived barriers had no significant relationship with adherence to therapeutic regimens.

Regarding the relationship between the four attributes of adherence to therapeutic regimens and ten predicting variables, the finding demonstrated that physical function had a low negative relationship with three attributes of adherence to therapeutic regimens including alignment of patients' behaviors and recommendations (r = -.11, p < .05), mastery of new behaviors (r = -.12, p < .05) and perceived ability to meet optimal blood pressure (r = -.11, p < .05). While, physical function was not significantly related to ongoing collaboration.

As regards to cognitive function, it was found that cognitive function had a low negative relationship with four attributes of adherence to therapeutic regimens including alignment of patients' behaviors and recommendations (r = -.17, p < .01), mastery of new behaviors (r = -.20, p < .01), ongoing collaboration (r = -.11, p < .05), and perceived ability to meet optimal blood pressure (r = -.11, p < .05).

When focusing on knowledge of hypertension, it was not significantly associated with four attributes of adherence to therapeutic regimens.

Concerning the relation of provider-patient communication and the three sub-scales (clarity, responsiveness and explanation) and the four attributes of adherence to therapeutic regimens, it was found that provider-patient communication had a low positive relationship with alignment of patients' behaviors and recommendations

(r = .21, p < .01), mastery of new behaviors (r = .17, p < .01), ongoing collaboration (r = .11, p < .05), and perceived ability to meet optimal blood pressure (r = .22, p < .01).

Among the four attributes of adherence to therapeutic regimens, clarity was not significantly associated with all attributes of adherence to therapeutic regimens. Secondly, responsiveness had a low positive relationship with alignment of patients' behaviors and recommendations (r = .20, p < .01), and mastery of new behaviors (r = .22, p < .01), but it was not significantly related to ongoing collaboration and perceived ability to meet optimal blood pressure. Lastly, explanation had a low positive relationship with four attributes of adherence to therapeutic regimens including alignment of patients' behaviors and recommendations, mastery of new behaviors, ongoing collaboration, perceived ability to meet optimal blood pressure with the correlation coefficient ranging from .15 to .27 (p < .01).

In regard to the relationship between perceived susceptibility and the four attributes of adherence to therapeutic regimens, it was found that perceived susceptibility had a moderate positive relationship with three sub-scales of adherence to therapeutic regimens, including alignment of patients' behaviors and recommendations, mastery of new behaviors and perceived ability to meet optimal blood pressure with the correlation coefficient ranging from .31 to .37 (p < .01). While, it had a low positive relationship with ongoing collaboration (r = .11, p < .05).

The results further showed that perceived severity had a moderate positive relationship with alignment of patients' behaviors and recommendations, mastery of new behaviors, and perceived ability to meet optimal blood pressure with the correlation coefficient ranging from .33 to .40 (p < .01). Whereas, it had no significant relationship with ongoing collaboration.

With regard to perceived benefits, it had a low positive relationship with mastery of new behaviors (r = .26, p < .01) and perceived ability to meet optimal blood pressure (r = .28, p < .01). Furthermore, there was a moderate positive relationship between perceived benefits and alignment of patients' behaviors and recommendations (r = .32, p < .01), whereas there was no significant relationship between perceived benefits and ongoing collaboration.

The results also revealed that perceived barriers had a low positive relationship with alignment of patients' behaviors (r = .16, p < .01), and perceived ability to meet optimal blood pressure (r = .20, p < .01), while it was not significantly related to the rest two attributes.

According to social support from family and the four sub-scales (emotional, appraisal, informational and instrumental support) and the four attributes of adherence to therapeutic regimens, it had a moderate positive relationship with alignment of patients' behaviors and recommendations, mastery of new behaviors and perceived ability to meet optimal blood pressure with the correlation coefficient ranging from .35 to .44 (p < .01). While, it had a low positive relationship with ongoing collaboration (r = .19, p < .01). Among the four attributes of adherence to therapeutic regimens, emotional support had a moderately positive relationship with alignment of patients' behaviors and recommendations, mastery of new behaviors and perceived ability to meet optimal blood pressure with the correlation coefficient ranging from .33 to .44 (p < .01). Also, it had a low positive relationship with ongoing collaboration (r = .12, p < .05). Secondly, appraisal support had a moderately positive relationship with alignment of patients' behaviors and recommendations and mastery of new behaviors with the correlation coefficient ranging from .33 to .37 (p < .01), whereas, it had a low positive relationship with ongoing collaboration and perceived ability to meet optimal blood pressure with the correlation coefficient ranging from .18 to .28 (p < .01). Thirdly, informational support had a low positive relationship with all four attributes of adherence to therapeutic regimens with correlation coefficient ranging from .17 to .29 (p < .01). Finally, focusing on instrumental support, it had no significant relationship with all attributes of adherence to therapeutic regimens.

The results further showed that perceived self-efficacy to adherence had a high positive relationship with alignment of patients' behaviors and recommendations (r = .76, p < .01) and mastery of new behaviors (r = .61, p < .01). Additionally, it had a moderate positive relationship with perceived ability to meet optimal blood pressure (r = .50, p < .01). While, perceived self-efficacy to adherence had a low positive relationship with ongoing collaboration (r = .23, p < .01).

Part III: The Hypothesized Model Testing and Modified Model Testing

The hypothesized model of adherence to therapeutic regimens among older adults with hypertension was tested with the structural equation modeling (SEM) which was analyzed by the LISREL 8.80 (Student edition). Before analyzing data, the assumption of multivariate was tested in terms of normality, linearity and multicollinearity. The findings showed that most of variables did not meet multivariate normality (Appendix F). Additionally, the transformation of those variables could not greatly improve the normality of the data. Thus, the generalized least squares (GLS) technique, alternative method, was used to test the model fit. Because, this method is suitable to estimate the model testing with SEM using LISREL in the set of general data having non-normal distributions (Kline, 2011). In addition, in order to test 11 variables in linearity and multicollinearity, the findings showed that all variables showed no evidence of nonlinearity between pairs of variables (Apendix G) and multicollinearity (Appendix H).

The computer program LISREL was used to determine the magnitude of the pathways among variables of this study and test the model fit with the data. Generally, the principle rule for estimating the model fit usually uses the maximum likelihood estimation for the variables (Hair et al., 2006; Kline, 2011). On the contrary, most of the variables in this study did not meet multivariate normal distribution, the generalized least squares (GLS) technique was needed to estimate all parameters and testing the model fit (Kline, 2011). Considering the initial hypothesized model of this study, there were three exogenous variables, including physical function (IADLs), cognitive function, and social support from family and eight endogenous variables, including knowledge of hypertension, provider-patient communication, perceived benefits, perceived severity, perceived barriers, perceived self-efficacy to adherence, and adherence to therapeutic regimens. These variables were analyzed to test the relationships with adherence to therapeutic regimens.

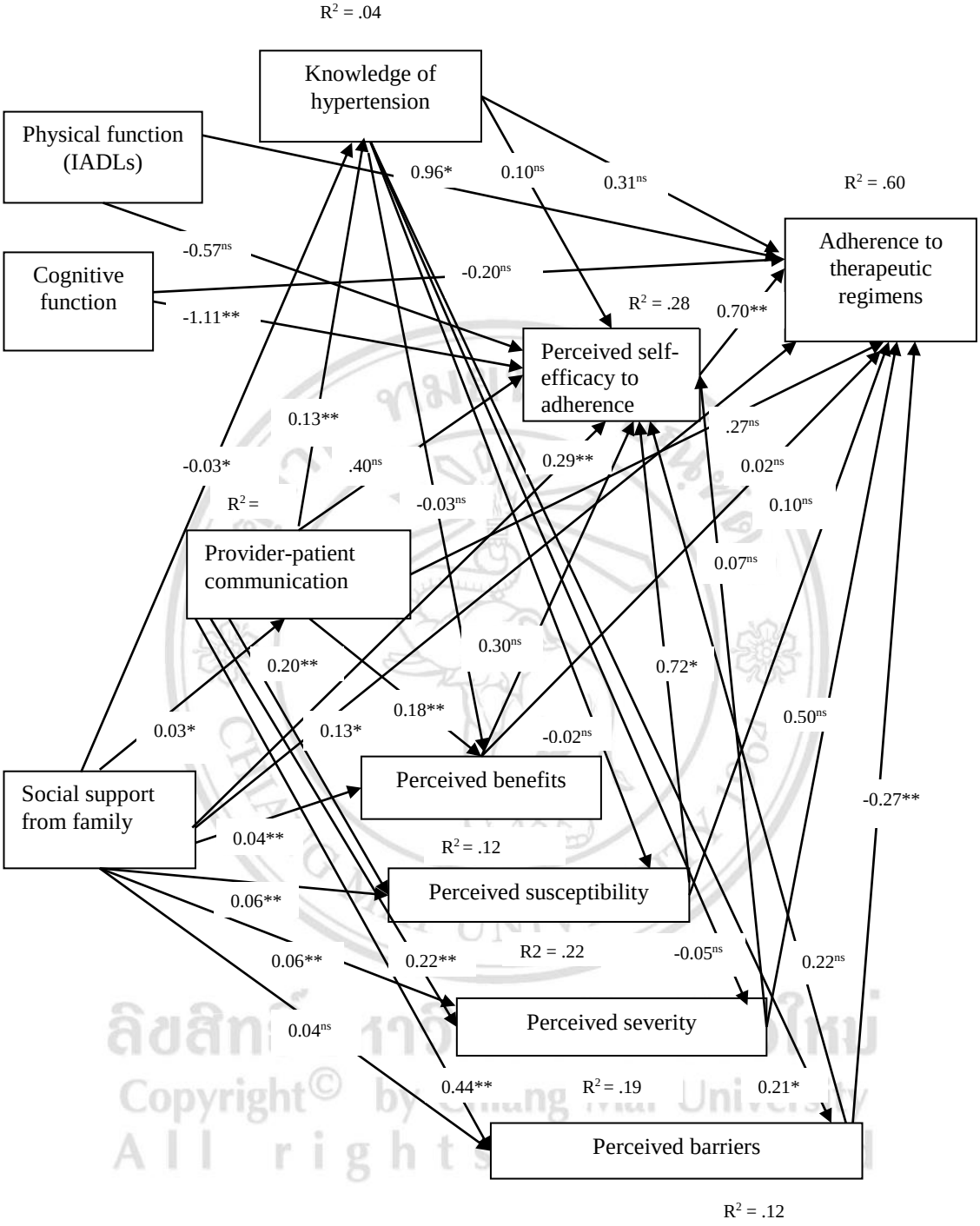
According to the hypothesized model testing, it showed Chi-square (χ^2) = 581.28, *df* = 18, *p* = .00, RMSEA = 0.30. Also, all of fit indices showed in unacceptable range, such as value of AGFI = 0.78, CFI = .64, SRMR = 0.19 and the largest standardized residual = 8.04 (Table 4-6). In addition, concerning the coefficient of paths, there were

three main results, including significant coefficients, non significant coefficients and negative in direction of relationship. Specifically, the coefficient of paths were significant, including the paths from physical function to adherence to therapeutic regimens (ß = .96, $p < .05$), from perceived self-efficacy to adherence to therapeutic regimens (ß = .70, $p < .01$), from provider-patient communication to knowledge of hypertension (ß = .13, $p < .01$), perceived benefits (ß = .18, $p < .01$), perceived susceptibility (ß = .20, $p < .01$), perceived severity (ß = .22, $p < .01$) and perceived barriers (ß = .44, $p < .01$), from social support from family to provider-patient communication (ß = .03, $p < .05$), perceived self-efficacy to adherence (ß = .29, $p < .01$), perceived severity (ß = .06, $p < .01$), perceived benefits (ß = .04, $p < .01$), perceived susceptibility (ß = .06, $p < .01$) and adherence to therapeutic regimens (ß = .13, $p < .05$), from perceived susceptibility to perceived self-efficacy (ß = .72, $p < .05$), from perceived barriers to adherence to therapeutic regimens (ß = -.27, $p < .01$), from knowledge of hypertension to perceived barriers (ß = .21, $p < .05$).

While, there were many non significant coefficients of paths, including the path from knowledge of hypertension to perceived self-efficacy to adherence, perceived benefits, perceived severity, perceived susceptibility and adherence to therapeutic regimens, from physical function to perceived self-efficacy, from cognitive function to adherence to therapeutic regimens, from physical function to perceived self-efficacy to adherence, from social support from family to knowledge of hypertension and perceived barriers, from provider-patient communication to perceived self-efficacy to adherence and adherence to therapeutic regimens, from perceived benefits to perceived self-efficacy to adherence, and adherence to therapeutic regimens, from perceived susceptibility to adherence to therapeutic regimens, from perceived severity to perceived self-efficacy to adherence and adherence to therapeutic regimens, from perceived barriers to perceived self-efficacy to adherence (Figure 4-1).

Furthermore, examining the coefficient of the causal pathways of the proposed model, the initial hypothesized model was able to explain 60% of variance in adherence to therapeutic regimens among older adults with hypertension. Considering to examine the coefficient of paths and the goodness of fit statistics which were used to assess the overall fit of the model, these diagnostics suggested that the hypothesized model was

not acceptable to indicate a model fit with the actual data in this study. As a result, this model should be modified based on both reasonability of statistical findings and theoretical framework which depended on theoretical knowledge.



Chi-square (χ^2) = 581.28, *df* = 18, *p* = .00, RMSEA = 0.30

Figure 4-1. The hypothesized causal model of adherence to therapeutic regimens among older adults with hypertension

Note. ns = Not statistically significant. *$p < .05$. **$p < .01$.

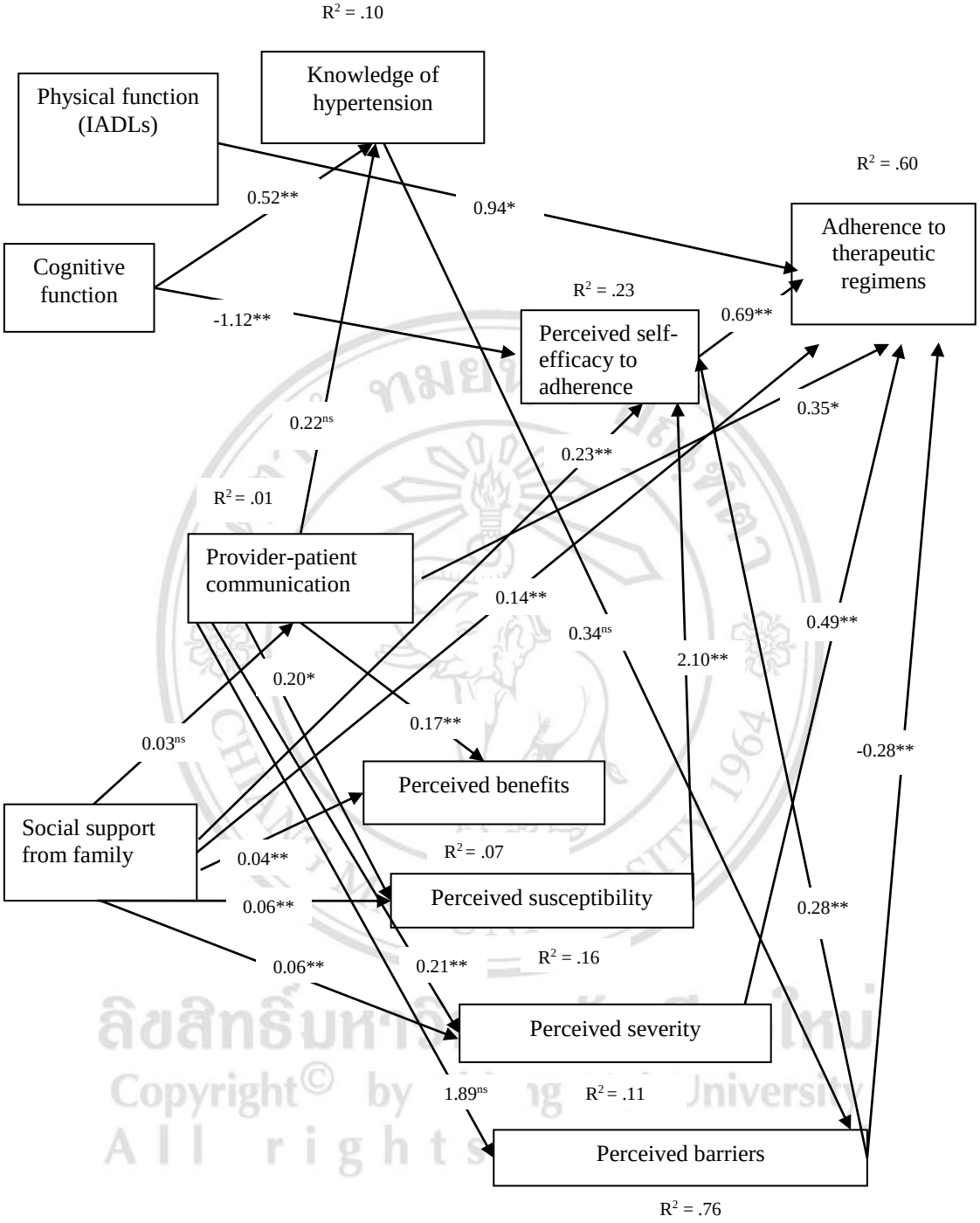
Modifying the model. According to modification of the model, it can be considered simultaneously with both the literature review supporting the hypothesized causal model and the statistical value (Hair et al., 1998; Hair et al., 2006). Also, the step for modifying the model should be performed by cutting of the non-significant paths or adding paths or parameters with a large modification index (Hair et al., 2006). Also, concerning a better fit of model, it is recommended by using the value of modification indices should be approximately of 4 or greater (Hair et al., 2006). Therefore, the step of model modification of this study was performed concurrently using the value of modification indices and the empirical evidence.

The first modified model was performed by deleting the twelve pathways from knowledge of hypertension, physical function, provider-patient communication, perceived benefits, and perceived severity to perceived self-efficacy to adherence, from knowledge of hypertension, cognitive function, perceived benefits and perceived susceptibility to adherence to therapeutic regimens, from provider-patient communication to perceived self-efficacy to adherence, from social support from family to knowledge of hypertension and perceived barriers. Because, the coefficients of these pathways were not significant and some paths were negative in direction of relationship. While, the researcher decided to add the pathway from cognitive function to knowledge of hypertension based on suggestions of the modification index. Moreover, the researcher decided to set the errors covariance of perceived susceptibility, perceived benefits, perceived severity, perceived barriers, knowledge of hypertension and perceived self-efficacy to adherence in order to improve the p-value and the goodness of fit indices. The results showed that the first modified model was a better fit with the data.

It could be seen that the model fit was improved, χ^2 = 20.18, *df* = 15, *p* = .17, RMSEA = 0.032, GFI = .99, AGFI = .96, CFI = .99, SRMR = 0.033. Also, the coefficients between variables were improved and had a better fit than the hypothesized model. However, the first modified model was better fit with the observed data, it was found that some coefficient paths were significant and some were not. Considering the significant pathways, seventeen coefficients paths were significant, including the pathways from cognitive function to knowledge of hypertension (ß = .52, $p < .01$) and

perceived self-efficacy to adherence (ß = -1.12, $p < .01$), from provider-patient communication to perceived benefits (ß = .17, $p < .01$), perceived susceptibility (ß = .20, $p < .01$), perceived severity (ß = .21, $p < .01$) and adherence to therapeutic regimens (ß = .35, $p < .01$), from social support to perceived benefits (ß = .04, $p < .01$), perceived susceptibility (ß = .06, $p < .01$), perceived severity (ß = .14, $p < .01$), perceived self-efficacy to adherence (ß = .23, $p < .01$) and adherence to therapeutic regimens (ß = .14, $p < .01$), from perceived susceptibility (ß = 2.10, $p < .01$) and perceived barriers (ß = .28, $p < .01$) to perceived self-efficacy to adherence, and from perceived self-efficacy to adherence (ß = .69, $p < .01$), physical function (ß = .94, $p < .05$), perceived severity (ß = .49, $p < .01$) and perceived barriers (ß = -.28, $p < .01$) to adherence to therapeutic regimens. In addition, four parameters were not significant, including the paths from social support from family to provider-patient communication, from provider-patient communication to knowledge of hypertension, from knowledge of hypertension to perceived barriers and from provider-patient communication to perceived barriers (Figure 4-2).

Although, these nonsignificant pathways did not meet according to the hypothesized model, the researcher decided to keep their relationships continuously and try to set the errors of covariance in their relationships between variables in order to improve p-value and the goodness of fit indices. Therefore, the first modified model should be further revised again according to the suggestions of the modification indices and evidence-based support. Adjustment of the model was done until the final model showed that the goodness of fit statistics was absolutely acceptable and better fit with the observed data and it also strongly explained the final model.



Chi-square (χ^2) =20.18, df = 15, p = .17, RMSEA = 0.032

Figure 4-2. The first modified model of adherence to therapeutic regimens among older adults with hypertension

Note. ns = Not statistically significant. *$p < .05$. **$p < .01$.

The first model was tested again until the modified model showed that the final model was greatly improved fitness with the empirical data. During modifying the model, the researcher considered adding the relationships of the errors of covariance of perceived benefits, perceived susceptibility, perceived severity, perceived barriers, knowledge of hypertension, perceived self-efficacy to adherence, cognitive function and adherence to therapeutic regimens. Lastly, the results of the final model revealed that all coefficients of pathways were statistically significant and showed an improvement of the structural equation model fit with the empirical data, χ^2 = 23.73, *df* = 16, *p* = .10, RMSEA= 0.038, GFI = .99, AGFI = .95, CFI = .98, SRMR = 0.037 (Figure 4-3).

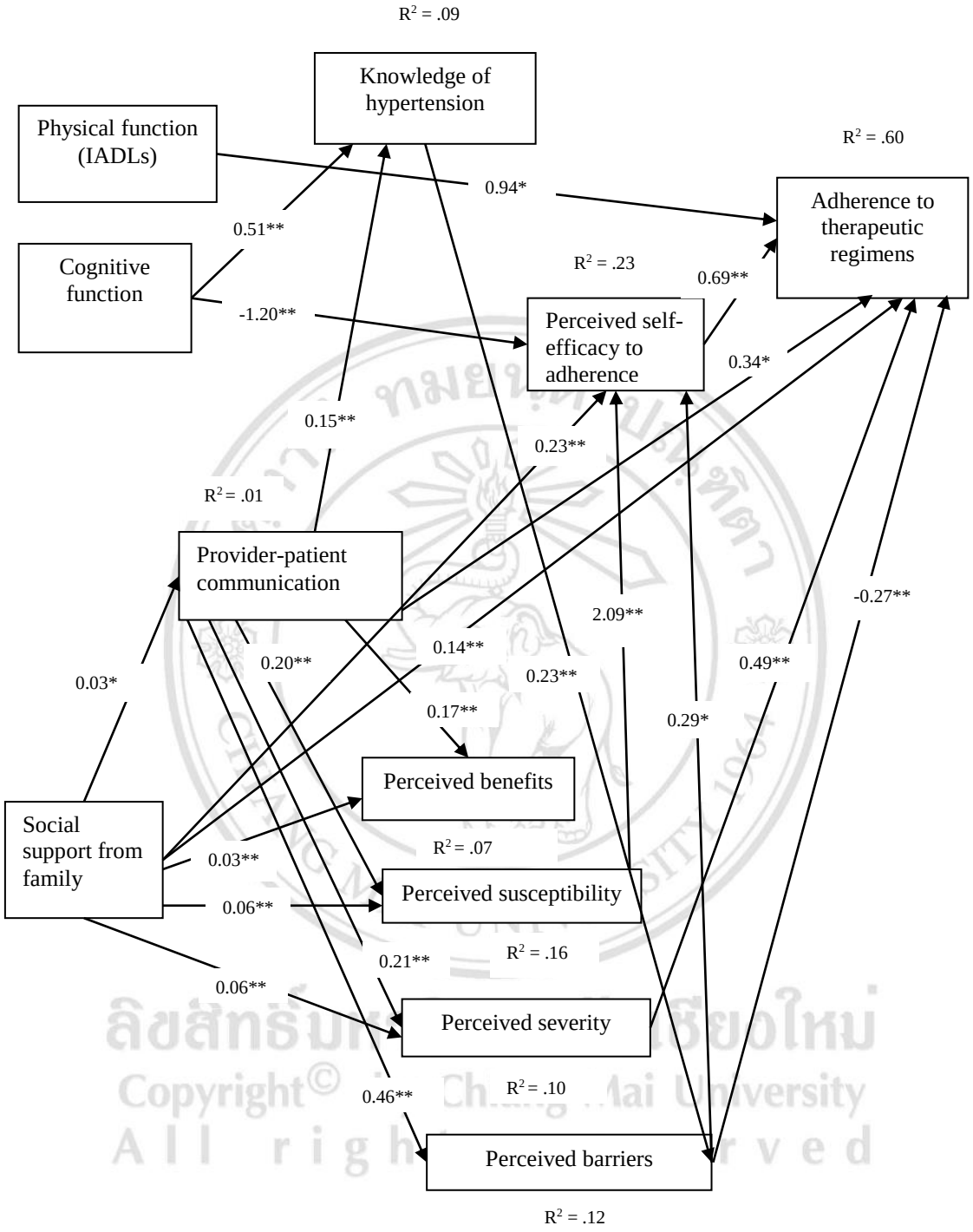


Figure 4-3. The final model of adherence to therapeutic regimens among older adults with hypertension

*p < .05. **p < .01.

Table 4-6

Comparison of Goodness-of-fit Indices in Hypothesized and Final Model

Goodness-of-fit Indices	Standard of Fit	Hypothesized Model	Final Model
p value of χ^2	$p > .05$	$p = .00$	$p = .10$
χ^2		581.28	23.73
Df		18	16
χ^2 : *df*	≤ 3 : 1	32.29 : 1	1.48 : 1
RMSEA	≤ .05	.30	0.038
GFI	≥ .90	.94	.99
AGFI	≥ .90	.78	.95
CFI	≥ .90	.64	.98
SRMR	≤ .05	.19	.037

Note. RMSEA = Root Mean Square Error of Approximation, GFI = Goodness-of-fit, AGFI = Adjust Goodness-of-fit, SRMR = Standard Root Mean Square Residual.

The standardized coefficients of the final model of adherence to therapeutic regimens among older adults with hypertension showed that adherence to therapeutic regimens was directly positively influenced by physical function (ß = .94, $p < .05$), perceived self-efficacy to adherence (ß = .69, $p < 01$) provider-patient communication (ß = .34, $p < .05$), social support from family (ß = .14, $p < .01$), perceived severity (ß = .49, $p < .01$) whereas, perceived barriers directly and negatively in direction (ß = -.27, $p < .01$). Moreover, social support from family positively and indirectly affected adherence to therapeutic regimens (ß = .30, $p < .01$) through perceived self-efficacy to adherence, provider-patient communication, perceived susceptibility, knowledge of hypertension, perceived barriers and perceived severity. Cognitive function and perceived susceptibility did not directly influence adherence to therapeutic regimens. Cognitive function indirectly and negatively affected adherence to therapeutic regimens (ß = -0.84, $p < .01$) via perceived self-efficacy to adherence, knowledge of hypertension and perceived barriers. Provider-patient communication positively and indirectly affected adherence to therapeutic regimens (ß = .35, $p < .01$) through perceived susceptibility, perceived self-efficacy to adherence, perceived severity, perceived barriers and

knowledge of hypertension. Likewise, perceived barriers indirectly and positively influenced adherence to therapeutic regimens (ß = .20, $p < .05$) via perceived self-efficacy to adherence. Similarly, perceived susceptibility indirectly and positively affected adherence to therapeutic regimens (ß = 1.45, $p < .01$) through perceived self-efficacy to adherence. Knowledge of hypertension indirectly affected adherence to therapeutic regimens (ß = -0.02) via perceived barriers and perceived self-efficacy to adherence. Also, it was influenced by cognitive function (ß = .51, $p < .01$) and provider-patient communication (ß = .15, $p < .01$). Although, perceived benefits did not affect adherence to therapeutic regimens, it was directly influenced by provider-patient communication (ß = .17, $p < .01$) and social support from family (ß = .03, $p < .01$).

In the final model, nine predicting variables, including physical function, cognitive function, perceived self-efficacy to adherence, provider-patient communication, social support from family, perceived susceptibility, perceived severity, perceived barriers and knowledge of hypertension could explain 60% of total variance in adherence to therapeutic regimens ($R^2 = .60$). Furthermore, the finding also showed that perceived self-efficacy to adherence was a strong mediator of adherence to therapeutic regimens among older adults with hypertension. Notably, six variables including cognitive function, social support from family, perceived susceptibility, perceived barriers, knowledge of hypertension and provider-patient communication could explain 23% of variance of perceived self-efficacy to adherence ($R^2 = .23$). In addition, the final model revealed that provider-patient communication, cognitive function and social support from family could explain 9% of variance of knowledge of hypertension ($R^2 = .09$). Social support from family could explain 1% of variance of provider-patient communication ($R^2 = .01$). Also, provider-patient communication and social support from family could explain 16% of variance of perceived susceptibility ($R^2 = .16$) and 1% of variance of perceived severity (R2 = .01). While, provider-patient communication, knowledge of hypertension, social support from family and cognitive function could explain 12% of variance of perceived barriers ($R^2 = .12$).

Table 4-7

Structural Path Coefficients of the Final Model of Adherence to Therapeutic Regimens (N = 341)

Causal variables	Affected variables											
	Provider-patient communication			Knowledge of hypertension			Perceived benefits			Perceived susceptibility		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE
Knowledge of hypertension	-	-	-	-	-	-	-	-	-	-	-	-
Physical function	-	-	-	-	-	-	-	-	-	-	-	
Cognitive function	-	-	-	0.51**	-	0.51**	-	-	-	-	-	-
Social support from family	0.03*	-	0.03*	-	-	-	0.04**	-	0.04**	0.07**	0.01	0.06**
Provider-patient communication	-	-	-	0.15**	-	0.15**	0.17**	-	0.17**	0.20**	-	0.20**

Table 4-7 (continued)

Causal variables	Affected variables											
	Perceived severity			Perceived barriers			Perceived self-efficacy to adherence			Adherence to therapeutic regimens		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE
Knowledge of hypertension	-	-	-	0.23**	-	0.23**	0.07	0.07	-	-0.02	-0.02	-
Physical function	-	-	-	-	-	-	-	-	-	0.94*	-	0.94*
Cognitive function	-	-	-	0.12*	0.12*	-	-1.16**	0.03	-1.19**	-0.84**	-0.84**	-
Social support from family	0.06**	0.01	0.06**	0.01	0.01	-	0.38**	0.15**	0.23**	0.44**	0.30**	0.14**
Provider-patient communication	0.21**	-	0.21**	0.49**	0.03*	0.46**	0.55**	0.55**	-	0.69**	0.35**	0.34**

Table 4-7 (continued)

Causal variables	Affected variables											
	Perceived severity			Perceived barriers			Perceived self-efficacy to adherence			Adherence to therapeutic regimens		
	TE	IE	DE	TE	IE	DE	TE	IE	DE	TE	ID	DE
Perceived benefits	-	-	-	-	-	-	-	-	-	-	-	-
Perceived susceptibility	-	-	-	-	-	-	2.09**	-	2.09**	1.45**	1.45**	-
Perceived severity	-	-	-	-	-	-	-	-	-	0.49**	-	0.49**
Perceived barriers	-	-	-	-	-	-	0.29*	-	0.29*	-0.07	0.20*	-0.27**
Perceived self-efficacy to adherence	-	-	-	-	-	-	-	-	-	0.69**	-	0.69**

Note. TE = Total effect, IE = Indirect effect, DE = Direct effect. **$p < .01$. *$p < .05$.

Discussion of the Study

With regard to discussion of this study, the results are explained based on two specific objectives of the study, the relationship between ten selected predicting variables (knowledge of hypertension, physical function, cognitive function, perceived self-efficacy to adherence, provider-patient communication, social support from family, perceived benefits, perceived susceptibility, perceived severity and perceived barriers) and adherence to therapeutic regimens and the causal model of adherence to therapeutic regimens among older adults with hypertension.

The finding of this study showed that 60% of the total variance in adherence to therapeutic regimens was explained by the nine predictors. The possible reason could be that the effects of the combination of the other causal variables which resulted in moderate strength of the structural pathways may not be examined, including nonmodified variables and modified variables which are managed by other health care providers which do not depend on the nursing role only. According to nine variables affecting adherence to therapeutic regimens in this study, two out of five dimensions of WHO were modified by the nursing role. These factors can be divided into two groups, including patient-related factors and health care team-related factors. In general, patients-related factors among older adults with hypertension are concerned with their specific characteristics differentiated from adult persons, principally cognitive function and physical function. In this study, patients-related factors can be alienated into three groups, including patients' characteristics, factors-related patients' perception, and patients' cognition.

First, patients' characteristics focusing on physical function described as follow:

Physical Function

Physical function which is patients' characteristics was the strongest predictor directly affecting adherence to therapeutic regimens. When, older adults with hypertension have impairment of physical function in instrument activities of daily living (IADLs), mainly walking out doors, transportation, they mostly are at risk of reducing adherence to therapeutic regimens. In this study, physical function directly

affected adherence to therapeutic regimens. This finding was consistent with previous studies which found that physical function in chronically ill older patients had a positive relationship with adherence to therapeutic regimens (Sowapak, 2006) and self-care behavior (Chen & Wang, 2007; Song et al., 2010). Also, a previous study which revealed that physical function contributed to increase the ability of older adults with hypertension to engage in adherence behaviors (Caskie et al., 2010). As well, several studies found that physical function of chronically ill patients affected adherence to treatment, adherence to self-management, and self-care behavior (Chen & Wang, 2007; Song et al., 2010; Tanner, 2004). Moreover, Sowapak (2006) found that older adults with hypertension who have IADLs deficit were more likely to be nonadherent to medication. This study was also consistent with the study of Sanjaithum (2006) who showed that physical function evaluated by IADLs was positively and significantly had a strongest predictor and explained 21.7% of the variance in the level of nutritional self-management in the diabetic older patients. Also, physical function in IADLs had a positive direct effect on self-management behaviors among older persons with pre-dialysis chronic kidney disease (Sritarapipat et al., 2012)

It could be explained that most of participants had a high level of physical function especially good walking out doors and using public transportation by themselves. It indicated that most participants did not appear to have a physical function impairment which affected their lifestyles. In general, persons with hypertension are more likely to be healthy unless they have certain complications from hypertension. They usually could do daily activities which integrated in their lifestyles regarding performing adherence to therapeutic regimens such as taking antihypertensive medication, dietary control, doing exercise and going to hospital to follow up visits. Even though, the participants were older than sixty years, they still had a high level of physical function.

In addition, older people who had higher level of physical function are more likely to perform adherence to therapeutic regimens. It means that physical function can cause increase the ability of older adults with hypertension to engage in adherence behaviors. Also, older people who can independently perform complex tasks related to advancing activities in daily life may affect adherence to medication and lifestyle modification.

This finding could be explained that physical function in IADLs regarding advancing activities, including walking outdoors, cooking, using public transport, doing heavy housework and money exchange might encourage older people to perform recommended behaviors (Jittapunkul et al., 1994). Moreover, older people who have better physical function especially, using the telephone, preparing food, using transportation and handling medications and finances, may have the abilities to perform persistently recommended behaviors (Lawton & Brody, 1969). Thus, physical function was important factor in affecting adherence to therapeutic regimens. Therefore, older adults with hypertension are more likely to have a high risk in nonadherence to their therapeutic regimens resulting from having poorer physical function. Notably, health care providers should usually assess advanced physical function among older adults with hypertension before providing treatment in order to improve adherence to therapeutic regimens leading to the achievement of optimal goal.

Second, factors-related patients' perception significantly affecting adherence to therapeutic regimens consists of perceived self-efficacy to adherence, perceived susceptibility, perceived severity, perceived barriers and perceived social support from family. While, perceived benefits, could not affect adherence to therapeutic regimens among older adults with hypertension. These results can be explained in more detail as follows:

Perceived Self-Efficacy to Adherence

The finding showed that perceived self-efficacy to adherence was associated with adherence to therapeutic regimens and it also was related to four attributes of adherence, including alignment of patients' behaviors and recommendations and mastery of new behaviors, perceived ability to meet optimal blood pressure and ongoing collaboration. Moreover, perceived self-efficacy to adherence was a predictor (ß = .69, $p < .01$) and as a strongly mediated factor of adherence to therapeutic regimens. According to this result, it clearly confirmed the notion that the hypertensive older patients who had a higher level of perceived self-efficacy to adherence were more likely to adherence to therapeutic regimens and more likely to perform recommended behaviors in their daily life, apply the new knowledge or information to solve the health problems, perform new good behaviors, work with healthcare providers about their treatments, and make their

ability to achieve controlling blood pressure into the target goal. The result supported the initial hypothesized model expecting a significant relationship between perceived self-efficacy to adherence and adherence to therapeutic regimens.

Consistent with previous studies, which also found that perceived self-efficacy was the strongest factor influencing adherence to therapeutic regimens among hypertensive patients and had a significant direct effect on patient adherence (Roh, 2005). In Thai studies, Pinprapapan, Panuthai, Vannarit, and Srisuphan (2013) found that perceived self-efficacy had a direct positive effect on adherence to therapeutic regimens in both medication and lifestyle modification among hypertensive patients. Also, a previous finding of Sritarapipat et al. (2012) revealed that self-efficacy directly affected self-management behavior which included communication with health care providers, partnership in care, self-care activities, self-advocacy behaviors and medication adherence behaviors in Thai elderly with pre-dialysis chronic kidney disease. Notably, perceived self-efficacy to adherence is well known as a strong factor contributing to both self-management and adherence to therapeutic regimens among chronic illness patients.

Self-efficacy refers to the beliefs of persons which enhance an individual's self confidence concerning their capabilities to perform a specific situation or task behavior for achieving a desired outcome (Bandura, 1977; Lenz & Shortridge-Baggett, 2002). The older people with hypertension who have a higher belief in their ability to perform the desired behaviors may increase their ambition to perform the favorable behaviors. When the tasks are difficult to do, persons usually perceived a limited ability to deal with their tasks that can cause to have a lower perceived self-efficacy. In contrast, when these tasks are at a simple level, persons are likely to have high perceived self-efficacy (Bandura, 1977). In this study, the finding confirmed that self-efficacy to adherence is one of factors affecting adherence to therapeutic regimens among older adults with hypertension. Thus, older persons who have higher perceived self-efficacy to adherence are more likely to plan about the optimal outcome of performing adherence to therapeutic regimens and decide to engage in their recommended behaviors.

Furthermore, perceived susceptibility (ß = 2.09, $p < .01$), cognitive function (ß = -1.2, $p < .01$), perceived barriers (ß = 0.29, $p < .01$) and social support from family

(ß = .23, $p < .01$) directly affected perceived self-efficacy to adherence. Also, knowledge of hypertension indirectly affected perceived self-efficacy through perceived barriers and provider-patient communication indirectly affected perceived self-efficacy via perceived barriers and perceived susceptibility. These six variables could explain 23% of variance of perceived self-efficacy to adherence. Therefore, perceived self-efficacy to adherence was a strongly mediated predictor of adherence to therapeutic regimens among the elderly with hypertension. This finding could support the claim that perceived self-efficacy was the active predictor that could affect the capacity of the hypertensive older patients to perform their recommended behaviors which may lead to improve adherence to therapeutic regimens. Also, the result confirmed the self-efficacy concept of Bandura (1997) that self-efficacy is a predicting factor mediated health behaviors.

Perceived Susceptibility

The finding showed that perceived susceptibility had a moderate positive relationship with adherence to therapeutic regimens. Also, it had positive relationship with four attributes adherence to therapeutic regimens, including alignment of patients' behaviors and recommendations, mastery of new behaviors and perceived ability to meet optimal blood pressure and ongoing collaboration. This finding indicated that older adults with hypertension who had higher level of perceived susceptibility were more likely to perform adherence to therapeutic regimens. On the other hand, when the hypothesized model was tested, the final model showed that perceived susceptibility had no direct effect on adherence to therapeutic regimens, where as it had a positive direct effect on perceived self-efficacy to adherence (ß = 2.09, $p < .01$) and an indirect effect on adherence to therapeutic regimens via perceived self-efficacy to adherence (ß = 1.45, $p < .01$). The finding could be explained that older adults with hypertension who have a better perceived susceptibility, have a high level of perceived self-efficacy to adherence and therefore are more likely to have better adherence to therapeutic regimens. The finding was consistent with a previous study of Pinprapapan (2013) who studied a causal model of adherence to therapeutic regimens and found that health belief had no direct effect on adherence to therapeutic regimens. Similar to a study of Atulomah et al. (2010), who examined factors effecting treatment adherence and non

adherence found that there was no significant difference in measures of adherence to treatment and perception of risk of poor treatment. As well, Feng (2009) who studied factors influencing compliance to hypertensive therapeutic regimens among Chinese immigrants and found that there was not significant relationship between perceived susceptibility and compliance.

A possible explanation may be that most of above studies focused on examining adherence to medication or one behavior such as exercise, eating behavior while this study examined adherence to therapeutic regimens both medication and lifestyle modification which were more complex behaviors requiring changing behaviors in a long time and required more active participation of patients in their treatment. Also, the finding showed most participants had no complications from hypertension (72.43%) and were able to control their blood pressure under 140/90 mmHg (80%). Also, they had not been admitted to hospital with hypertension or its complications (91.79%) and the majority of them took an antihypertensive drug once per day (65.69%). As a result, when the participants did not have a high impact from their disease, they might not be aware about the risk of uncontrolled hypertension and they were more likely to have a lower level of perceived susceptibility. Consistently, a previous study of a meta-analysis on health behavior concluded that perceived susceptibility was to be weakest predictor of health behavior (Carpenter, 2010). Also, Hyman et al. (1994) indicated that persons will not have a higher perceived susceptibility if they are not suffering from negative health outcomes. Thus, perceived susceptibility was significantly related to adherence to therapeutic regimens, whereas it did not have a sufficient effect on adherence to therapeutic regimens among old adults with hypertension.

Interestingly, perceived susceptibility had a positive direct effect on perceived self-efficacy to adherence (ß = 1.45, $p < .01$) and a positive indirect effect adherence to therapeutic regimens via perceived self-efficacy to adherence. This finding indicated that older adults with hypertension who have a higher level of perceived susceptibility and a higher level of perceived self-efficacy to adherence were more likely to perform adherence to therapeutic regimens. Perceived self-efficacy to adherence was a mediating factor between perceived susceptibility and adherence to therapeutic regimens. This finding was consistent with a previous study of Pinprapapan (2013)

who found that health belief including perceived susceptibility positively directly affected perceived self-efficacy to adherence and indirectly affected adherence to therapeutic regimens via perceived self-efficacy and also indicated that this finding was interesting to explore the effect of health belief on perceived self-efficacy among persons with hypertension in the further study.

In the current study, it could be explained that self-efficacy is concerned with individuals' judgments about how well they can deal with prospective situations. Older adults with hypertension who have a higher level of perceived susceptibility may usually be concerned about their illness and their risk in suffering from complications of disease. When they are concerned with their risk perception, they may estimate their ability to overcome this risk and belief in positive health outcome through being giving verbal persuasion from their health care provider and their successful past experiences about performing healthy behavior. Normally, persons who tend to perform and change their behavior, must have belief first and trust the desired outcome (Champion & Skinner, 2008). Moreover, in general, persons tend to perceive their risk of illness and its treatment throughout their experience (Champion & Skinner, 2008; Janz et al., 2002). When persons have learned about their own experience of illness, they may be alert to the susceptibility in negative impacts affecting their health. Persons may evaluate and analyze the level of their ability to change and avoid high risk behaviors for eventually leading to the desired outcome. Thus, older adults with hypertension, who have a high level of perceived susceptibility, are more likely to increase belief in their self-efficacy to adherence that may lead them to perform adherence to therapeutic regimens. Therefore, perceived self-efficacy to adherence is a significant mediated factor that connects perceived susceptibility and adherence to therapeutic regimens among older adults with hypertension. Perceived self-efficacy is influenced by many significant factors and depends on different phenomena involving capabilities which composed of cognitive, social, and behavioral skills of individuals in daily lives (Bandura, 1982). When older adults with hypertension believe in their capacity to deal with the specific task especially the risk of complications from uncontrolled blood pressure, they may decide to act a new healthy behavior and perform adherence to therapeutic regimens.

Perceived Severity

The result revealed that perceived severity had a moderate positive relationship with adherence to therapeutic regimens. This finding demonstrated that older adults with hypertension who had a high level of perceived severity were more likely to perform adherence to therapeutic regimens. Individuals who have a high perception about the seriousness of disease which tend to have severe impacts on their health outcomes are more likely to perform in recommended behaviors from health care providers. These findings are supported by several previous studies regarding the relationship between perceived severity which is one of four aspects of health belief and medication adherence (DiMatteo et al., 2007; Riounin, 2007; Sowapak, 2006; Pinpr apapan, 2013; Tepsuriyanont, 2010; Wungthanakorn et al., 2008), disease control (Riounin, 2007), eating behavior (Nangyaem, 2007), exercise behavior (Tantayothin, 2004) and lifestyle modification of hypertensive patients (Pinprapapan, 2013).

When the hypothesized model was tested, the final model found that perceived severity had a positive direct effect on adherence to therapeutic regimens (ß = .49, $p < .01$). It could be described that older adults with hypertension who have greater perceived severity are more likely to have better adherence to therapeutic regimens. This finding is congruent with a previous study revealed that health belief including perceived severity had a positive direct effect on medication adherence among the elderly with hypertension (Tepsuriyanont, 2010). This finding was described by Janz et al. (2002) who indicated that the important perceptions of individuals estimating about the seriousness of their diseases come from knowledge of treatment or individuals' belief in complicated disease that would affect one's life. Persons who tend to continually perform and change their behaviors must have belief first and trust in the desirable outcomes (Champion & Skinner, 2008). The probable reason to explain that older adults with hypertension who perceived that they may be affected by the impacts of the severe complications of hypertension, mainly cardiovascular disease, stroke and renal failure which could lead to have severe mortality, disability and eventually death, are more likely to employ their healthy lifestyle related hypertensive treatments, take on in a healthier behaviors and be able to achieve the optimal goal for blood pressure control.

In addition, the finding showed that the participants, 91.79% had not been admitted to hospital with hypertension or its complications, 72.43% reported no complications of hypertension and 80% of the participants had good control their blood pressures by keeping them under 140/90 mmHg. These findings indicated that most participants had adequately performed recommended behaviors. It could be due to they were aware and highly perceived severity of complications from hypertension. Another possible reason to describe that the participants might be adequately given information about disease and treatments of hypertension by health care providers in hypertension clinics and also their family members. When, participants had enough information of the seriousness of uncontrolled hypertension, they may have to plan and make decisions to perform adherence to therapeutic regimens of hypertension. Therefore, to improve adherence to therapeutic regimens among older adults with hypertension, health care providers should assess patient's perceptions regarding the seriousness of uncontrolled blood pressure and complications eventually leading to the harmful impacts on their lives and provide intensive information regarding the severity of uncontrolled hypertension and its complication in order to control blood pressure eventually leading to achieve the optimal level.

Perceived Barriers

The result showed that overall perceived barriers had no significant relationship with adherence to therapeutic regimens. This finding was consistent with two previous studies which found that the correlation between perceived barriers and adherence to therapeutic regimens among hypertensive persons was not statistically significant (Feng, 2009; Pinprapapan, 2013).

When the hypothesized model was tested, the final model showed that perceived barriers had a negative direct effect on adherence to therapeutic regimens (ß = -0.07, $p > .05$) and indirect effect on adherence to therapeutic regimens (ß = 0.20, $p > .05$) via perceived self-efficacy. Older adults with hypertension who have a better perceived their obstacles related to adopt newly recommended behaviors are more likely to have higher performing adherence to therapeutic regimens. The finding is consistent with a prior research regarding perceived barriers of hypertensive older people which found that patients who had high perceived barriers were more likely to nonadhere to the drug

regimens (Sowapak, 2006). As well, one study found that perceived barriers which was one component of health belief directly affected medication adherence in the elderly with hypertension (Tepsuriyanont, 2010). Similarly, another study found perceived barriers to medication was the main predictor of medication non-adherence in congestive heart failure patients (George & Shalansky, 2007). As well, a previous study of Wungthanakorn et al. (2008), who studied factors influencing hypertensive medication taking behaviors among patients with hypertension and found that perceived barriers was significant predictor of medication taking behaviors. Moreover, one study which examined the relationship between health belief and eating behavior among hypertensive patients showed that perceived barriers was a predicting factors of eating behavior (Nangyaem, 2007). Congruence with a study on factors influencing nutritional and exercise behaviors among hypertensive patients which found that perceived barriers had a positive correlation with nutritional-exercise behaviors (Tantayothin, 2004). Also, in concordance with one meta-analysis revealed that perceived barriers variable was the strongest predictors in negative direction of health behaviors (Carpenter, 2010).

Considering perceived barriers, it refers to an individual's perception about evaluating obstacles to their newly adopted behaviors and also is well known as a significant factor influencing individuals for changing their behavior (Champion & Skinner, 2008; Janz et al., 2002). When individual belief in the strongly negative consequence resulting from performing specific health behaviors such as physical, psychological, financial, social problems, they will be unlikely to take action (Rosenstock et al., 1988). The hypertensive older persons who have a low level of perceived barriers regarding the complexity of taking pills, socioeconomic problems, inconvenience of follow-up and having the hassles of daily lives, were more likely to perform adherence in recommended treatments.

Interestingly, perceived barriers had a positive indirect effect on adherence to therapeutic regimens (ß = 0.20, $p < .05$) via perceived self-efficacy. It could be described that older adults with hypertension who had a high level of perceived barriers might not necessarily perform adherence to therapeutic regimens except they had a higher level of perceived self-efficacy to adherence. Considering perceived self-efficacy based on Bandura (1982), it was influenced by many significant factors and

depended on different phenomena involving capabilities which composed of cognitive, social, and behavioral skills of individuals in daily lives. Self-efficacy is concerned with individuals' judgments about how well they can deal with prospective situations. Moreover, when individuals have to face more difficult tasks, self-efficacy is especially important to take on a challenging and overcoming the obstacles to access accomplishment in provision of therapeutic regimens (Aljasem, Peyrot, Wissow, & Rubin, 2001). According to this finding, it could be explained that when the hypertensive older patients who have to face many obstacles in daily lives, these difficult situations may unfavorably affect their thought patterns and experiences. However, if they strongly convince optimistic perceptions in those obstacles which can motivate them to persist their belief in efficacy, they may try to cope with the external obstacles through rigorous effort and perform adherence to therapeutic regimens.

Therefore, perceived self-efficacy to adherence is crucial mediating factor between perceived barriers and adherence to therapeutic regimens among older adults with hypertension. Thus, for achieving optimum hypertension control, promoting adherence to therapeutic regimens among older adults with hypertension should focus on enhancing perceived self-efficacy to adherence and lowering perceived barriers of performing recommended behaviors.

Social Support From Family

The finding showed that social support from family and the four subscales (emotional, appraisal, informational and instructional support) had a moderate positive relationship with adherence to therapeutic regimens. Also, it had a moderate positive relationship with alignment of patients' behaviors and recommendations, mastery of new behaviors and perceived ability to meet optimal blood pressure. However, it had a low positive relationship with ongoing collaboration. This finding indicated that older adults with hypertension who received support from their family may be more likely to have better adherence to therapeutic regimens.

When the hypothesized model was tested, the finding showed that social support from family positively directly influenced adherence to therapeutic regimens (ß = .14, $p < .01$) and it positively indirectly affected adherence to therapeutic regimens (ß = .30,

$p < .01$) through perceived self-efficacy to adherence, provider-patient communication, perceived susceptibility, together with perceived severity. This finding could be explained that participants who perceived and received the assistance from their families were more able to accessible changing their behaviors. The finding showed that most participants were married (63.64%) and living with family members (85.63%). This result indicated that older adults with hypertension may be provided with love, caring, information regarding hypertension and treatment, encouragement to adhere recommended behavior, preparation of a hypertension diet, transportation to hospital for follow-up visits, reminders for taking medication and also feedback to perform recommended behaviors from their family members. Older adults with hypertension who perceived support from their family may feel comfortable and stress relief. These significant assistances from family are more advantageous for the elderly with hypertension who have to comply to perform recommended behaviors. Therefore, participants who perceived and were given greater social support from family are more likely to perform adherence to therapeutic regimens.

A possible reason may be that social support family is a significant approach that might be helpful for older adults with hypertension by promoting, empowering them to solve their problems, supporting them to make decisions related to their treatments and giving full responsibility to take care them (Hassan et al., 2006). Older adults with hypertension who had better social support from family may be able to adopt their recommended behaviors into their daily activities, manage and solve their health problems, modify to their new behaviors and work together with health care providers for achieving the optimum of treatment goals. Essentially, support from family is an important facilitative resource assisting older adults with hypertension who usually depend on caring from family member. It can help patients in reducing their negative attitude of treatment, increasing patient's motivation and remembering in their treatments (Jin et al., 2008).

Congruent with a meta-analysis reviewed literature from 1948 to 2001 by DiMatteo (2004) who explored the effect of social support on adherence to medical treatment demonstrated that there is evidently a reliable relationship between social support and adherence to medical treatment. Furthermore, Pinprapapan (2013), who

conducted a causal model of adherence to therapeutic regimens (medication adherence and lifestyle modification) in persons with hypertension, found that social support had a positive direct effect on adherence to therapeutic regimens. Similar to a prior study of Tepsuriyanont (2010) who found that social support had a strongly positive direct effect and also was the most powerful predicting factor affecting mediation adherence behavior in elderly with hypertension. Also, a study by Sritarapipat et al. (2012) revealed that social support from family members had a direct positive effect on self-management among older patients with pre-dialysis chronic kidney disease. In general, comparing the need for social support in the human population, social support and social networking has a greater effect on older person's life than on other age groups because of declining in general health and cognitive function (Al-Kandari, 2011).

Moreover, in this study social support from family positively indirectly affected adherence to therapeutic regimens (ß = .30, $p < .01$) through perceived self-efficacy to adherence, provider-patient communication, perceived susceptibility, and perceived severity. Also, it positively directly influenced provider-patient communication (ß = .03, $p < .01$, perceived benefits (ß = .03, $p < .01$, perceived susceptibility (ß = .06, $p < .01$, and perceived severity (ß = .06, $p < .01$). It could be described that older adults with hypertension who had better social support from family were more likely to have better provider-patient communication, have a higher level of perceived self-efficacy to adherence, have a higher level of perceived susceptibility, and have a higher level of perceived severity. There was no previous study which indicated the effect of social support on perceived susceptibility and perceived severity and provider-patient communication among older adults with hypertension. However, there were some studies examining the effect of social support on self-efficacy to adherence. The finding was compared with Pinprapapan et al. (2013) who studied a causal model of adherence to therapeutic regimens in persons with hypertension and found that social support had a positive direct effect on self-efficacy and an indirect effect on adherence to therapeutic regimens via self-efficacy. Similar to Xu (2005) who examined factors affecting diabetes self-management in Chinese patients and found that social support from family had an indirect effect on diabetes self-management via perceived self-efficacy and belief of treatment effectiveness. Also, Sritarapipat et al. (2012) found that social support from family members had a positive direct effect on self-efficacy and an

indirect effect on self-management behaviors among older persons with pre-dialysis chronic kidney disease. Consistent with Maeda et al. (2013) found that social support positively directly affected self-efficacy and indirect affected treatment adherence in heart failure patients.

A possible explanation may be that perceived self-efficacy is a crucial cognitive mechanism regarding mediator between adherence to therapeutic regimens and social support (Maeda et al., 2013). Social support in terms of emotional, informational, instrumental, and appraisal support are important sources affecting health behavior in persons. In particular, in chronic illness persons, emotional support and appraisal support are stronger supports that can affect perceived self-efficacy by enhancing verbal persuasion which may influence self- efficacy judgment of persons (Bandura, 1997). Older adults with hypertension who have greater levels of social support from family are more likely to have greater external sources of efficacy expectation, especially verbal encouragement and giving a chance for observing other persons as modeling who have successfully performed the recommended behaviors. These mechanisms for enhancing self-efficacy may facilitate increasing perceived self-efficacy to adherence. Moreover, when older adults with hypertension perceived and received a high level of social support from family regarding given information of disease and treatments, they were help to have clear understanding and belief in their abilities to persistently perform their recommended behaviors from health care providers. Also, they usually received the emotional support from family members, which can promote and empower them by enhancing self-confidence to overcome the psychological barriers to success. Considering social support from family influencing affecting perceived benefits, perceived susceptibility, perceived severity, and provider-patient communication, it could be explained that older adults with hypertension who received greater support from their family members usually are provided with information support which is a significant method in order to give clear information regarding hypertension treatment and its complications to patients. Given information, suggestions, and advice from family members may lead to a better understanding of the risk of hypertensive complications, severity of complications mainly, heart disease, stroke and kidney disease, and the advantages of appropriate hypertensive treatments and performing recommend behaviors. Moreover, social support from family may influence provider-

patient communication. It is possible that when older adults with hypertension have to see health care providers for follow-up visits, they may have less understanding during communication with health care providers regarding suggestions for recommended hypertension treatment. Thus, giving clarified information from their family members can help them clearly understand and decide to perform recommended behaviors.

Therefore, social support from family had a direct effect and indirect effect on adherence to therapeutic regimens through perceived self-efficacy to adherence, provider-patient communication, perceived susceptibility, and perceived severity. Providing information support from family member can help the hypertensive older patients to make decisions enabling them to perform adherence to therapeutic regimens. Essentially, enhancing older adults with hypertension to perform adherent behaviors, health care provider should continuously evaluate social support from family which older persons with hypertension perceived and received from their family members and also should enhance greater provider-patient communication, perceived susceptibility, perceived severity, and perceived self-efficacy to adherence. From these ways may improve better adherence to therapeutic regimens among older adults with hypertension Essentially, to promote adherence to therapeutic regimens among older adults with hypertension, nurses should be aware of social support from family affecting adherence to therapeutic regimens to achieve better adherence to therapeutic regimens and lead to optimal blood pressure control.

Perceived Benefits

The finding showed that perceived benefits had a low positive relationship with adherence to therapeutic regimens. Also, it had a low positive relationship with mastery of new behaviors and perceived ability to meet optimal blood pressure. Furthermore, there was a moderate positive relationship between perceived benefits and alignment of patients' behaviors and recommendations, whereas there was no significant relationship between perceived benefits and ongoing collaboration.

However, when the hypothesized model was tested, the final model found that perceived benefits had no direct and indirect effect on adherence to therapeutic regimens. While, it was positively directly influenced by social support from family and

provider-patient communication. Considering perceived benefits, it is a person's perception of the advantage of a new behavior in decreasing progression of their diseases. Perceived benefits are also conceptualized as a person's tendency to adopt healthier behaviors for decreasing impacts of disease (Janz et al., 2002). Although, the previous study indicated that the hypertensive persons who have perceived benefits of performing adherence to therapeutic regimens were more likely to modify their behavior to achieve the optimal blood pressure (Gellad et al., 2011; Tepsuriyanont, 2010), in this study, it was not enough effect on adherence to therapeutic regimens. A plausible explanation may be that in this study most of subjects had a positive heath outcome regarding having good controlling blood pressure under 140/90 mmHg, the mean duration of diagnosed hypertension of the samples was found 7.75 years and had no complications from high blood pressure which did not affect their lifestyles. This finding demonstrated that most participants had no a negative heath outcome from hypertension treatment. They were able to effectively take their role for prevention developing complications from uncontrolled blood pressure by themselves. Thus, they may inadequately concern with the advantage of performing healthy behaviors, although, in this study the overall mean score of perceived benefit was at high level. It was concordance with Janz and Becker (1984) indicated that perceived benefits are a stronger predictor of treatment behavior rather than prevention behavior. Therefore, perceived benefits had no effect on adherence to therapeutic regimens among older adults with hypertension.

While, perceived benefits was positively directly influenced by social support from family and provider-patient communication. A possible explanation may be that older adults with hypertension who received greater support from their family members and have a good communication with health care provider usually are provided information support which is a significant method to give clearly information regarding to hypertension treatment and its complications to patients. Also, giving information, suggestions, and advice from family members may lead to a better understanding of the advantages of performing recommended behavior for controlling blood pressure and exactly decide to continue performing adherence to therapeutic regimens. Thus, social support from family and provider-patient communication directly affected perceived benefits in older adults with hypertension

Lastly, patient's cognition consisting of cognitive function and knowledge of hypertension was also significantly related to adherence to therapeutic regimens. Most of older persons with hypertension were more likely to have some deficits from their cognitive function and also may limit knowledge of hypertension. In this study, cognitive function had a positive direct effect on knowledge of hypertension and negative indirect effect on adherence to therapeutic regimens via perceived self-efficacy to adherence, knowledge of hypertension, and perceived barriers. From these factors can be described in more detail as follows:

Cognitive Function

The finding in the current study found that cognitive function had a low negative relationship with adherence to therapeutic regimens. Also, it had a low negative relationship with four attributes of adherence to therapeutic regimens including alignment of patients' behaviors and recommendations, mastery of new behaviors, ongoing collaboration, and perceived ability to meet optimal blood pressure. This relationship indicated that older adults with hypertension who had a high level of cognitive function may be more likely to have poor adherence to therapeutic regimens. On the contrary, older adults with hypertension who had a lower level of cognitive function may be more likely to have better adherence to therapeutic regimens. This finding was consistent with a previous study which focused on chronic illness patients. Dickerson, Lee, and Riegel (2011) who studied factors affecting self-care in the heart failure patients and found that there was statistically negative significant correlation between cognitive function and self-care maintenance and self-care management. This study also indicated that better cognitive function was associated with worse self-care management.

When the hypothesized model was tested, the final model showed cognitive function did not influence adherence to therapeutic regimens among older adults with hypertension, whereas it had a positive direct effect on knowledge of hypertension (ß = 0.51, $p < .01$) and a negative indirect effect on adherence to therapeutic regimens (ß = -0.84, $p < .01$) via perceived self-efficacy to adherence, knowledge of hypertension, and perceived barriers. This finding could indicate that older adults with hypertension who had good cognitive function might not have necessarily performed adherence to

therapeutic regimens unless perceived self-efficacy to adherence and knowledge of hypertension were high except perceived barriers which depended on its direction. However, this study was not consistent with a previous study in the older adults with hypertension, but it was compared with other studies related chronic diseases. The finding was consistent with a previous study conducted by Cameron, Warrall-Carter, Riegel, Lo, and Stewart (2009) who found that cognitive function measured by the Mini Mental State Examination (MMSE) score was not significant predictor of self-care in chronic heart failure patients which compared other factors. Similar to a prior study of Sritarapipat et al. (2012) who examined the causal factors affecting self-management in the older adults with pre-dialysis chronic kidney disease and found that cognitive function did not significantly directly affect self-management but it affected self-management through self-efficacy.

On the contrary, this finding was not congruent with several studies which revealed that cognitive function significantly affected adherence to therapeutic regimens in persons with hypertension. The finding of this study is contrary to the study of Tepsuriyanont (2010) who examined factors affecting medication adherence in Thai older adults with hypertension and showed that cognitive function had a positive direct effect on medication adherence behavior and concluded that the greater cognitive function, the better the adherence to antihypertensive medication. Moreover, Hawkins et al. (2012) found that the elderly patients with heart failure who had cognitive impairment had a statistically significant association with poor medication adherence. Similarly, Park et al. (2012) who studied factors affecting medication adherence in older patients with hypertension and found that better memory function was a significant predictor of better adherence to medication. Also, hypertensive patients with cognitive impairment were significantly related to poor compliance with antihypertensive treatment (Vinyoles et al., 2008).

However, the finding showed that cognitive function did not have a direct effect on adherence to therapeutic regimens which was different from several previous studies. It could be explained that only cognitive function did not have sufficient power to adjust adherent behaviors. It might have other factors directly affecting adherence than cognitive function, mainly having greater support from family. Considering the

characteristics of the older participants in this study, nearly one hundred percent (99.94%) of the participants had a normal level of cognitive function and they did not have a different level of cognitive function. Thus, the level of adherence to therapeutic regimens among older adults with hypertension might not be different, as well. Most of participant's characteristics, they took their drugs once per day which was a simple regimen. So, the participants may comprehend that they were in a current state of good health status which did not necessarily require more learning, thinking, remembering with hypertension treatments and performing adherence behaviors. Hence, this characteristic may have not been engaged in a high impact on their daily life.

Furthermore, in general, older participants may rely on their family members, especially having some health problems interfering in their life such as cognitive impairment. Congruent with a previous study of Dickson et al. (2011) who studied self-care in heart failure patients and found that stable patients with few heart failure symptoms who have less cognitive impairment needed support from their families or others for self-care. Also, consistent with Riegel et al. (2010), who found that the elderly with severe heart failure more often receive support from family members or friends in caring daily self-care activities. In this study, most participants lived with their family members (85.63%), so they may be provided with care preparation of some food, reminding and help to take antihypertensive drugs, and taking them to follow-up visits. When older adults with hypertension who have mild cognitive function such as usually forgetfulness about perform taking medication and lifestyle modification, they may need special care in daily adherence activities from their families in order to lead to perform the recommended behaviors. Thus, in this study, older adults with hypertension who have a lower level of cognitive function are more likely to have better adherence to therapeutic regimens. This finding indicated that the elderly with hypertension, having good cognitive function, did not necessarily perform adherence to therapeutic regimens.

Interestingly, the finding showed that cognitive function had a positive direct effect on knowledge of hypertension. Older adults with hypertension who had higher level of cognitive function, were more likely to have a higher level of knowledge of hypertension. This finding was consistent with previous studies which revealed a significant relationship between cognitive function and knowledge. These studies

claimed that cognitive function is established as known to strongly influence the achievement of knowledge (Dickson, Tkacs, & Riegel, 2007; Karlsson et al., 2005). Karlsson et al. (2005) who conducted a study with heart failure patients and found that patients with cognitive impairment were more likely to have lower level of knowledge than whose cognitive function were normal. Similarly Dickson et al. (2011) found that cognitive function was statistically significantly associated with knowledge in patients with heart failure. Also, declining cognitive function such as poor concentration, memory deficits, and dementia are more likely to inhibit knowledge about diseases and treatments topics in older adults with chronic illness (Schutzer & Graves, 2004). A possible explanation may be that in older adults with hypertension who have adequate cognitive function especially including the ability to learn, remember, recall and executive thinking are more likely to understand their given information about hypertension and treatment from health care providers, have the ability to learn and remember what can lead to rapidly improving their knowledge of hypertension.

Considering the effect of cognitive function on perceived self-efficacy to adherence, cognitive function had a negative direct effect on perceived self-efficacy to adherence and indirect effect on adherence to therapeutic regimens via perceived self-efficacy to adherence. It could be explained that older hypertensive patients who had a lower level of cognitive function were more likely to have a high level of perceived self-efficacy to adherence and adherence to therapeutic regimens. This finding meant that older adults with hypertension did not perform well adherence to therapeutic regimens unless their perceived self-efficacy to adherence was high and their cognitive function was low. It could be explained that persons who have a low level of cognitive function may be able to have easier decision making in their situations and believe in their ability to deal with those situations or difficult tasks. While, persons who have higher cognitive function may tend to have more thinking and analyzing regarding various environmental factors affecting themselves, especially the several methods which may affect their decision making. In this situation, the older adults with hypertension who have a low level of cognitive function may be able to have easier decision making in their situations and believe in their ability to deal with those situations or difficult tasks. Thus, older adults with hypertension who have a mild level of cognitive function may have a high level of perceived self-efficacy to adherence and

may eventually lead to enhance adherence to therapeutic regimens. Moreover, considering their families support, older adults with hypertension with low cognitive function tend to have much support from their families or other people. So, they may be empowered and motivated regarding enhancing efficacy expectations such as verbal persuasions leading to improve individuals' perceptions regarding their ability to handle some difficult tasks by themselves. Therefore, it clearly confirmed the notion that older adults with hypertension, who have a low level of cognitive function, are more likely to have a high level of perceived self-efficacy to adherence that may lead them to perform adherence to therapeutic regimens. Therefore, perceived self-efficacy to adherence is a significant mediated factor between cognitive function and adherence to therapeutic regimens among older adults with hypertension.

Another pathway of cognitive function affecting adherence to therapeutic regimens had an indirect effect on adherence to therapeutic regimens via knowledge of hypertension, perceived barriers and perceived self-efficacy to adherence. This finding was not consistent with any previous study, but it could be described that when older adults patients who have a lower level of cognitive function are more likely to have a lower level of knowledge of hypertension. Moreover, they do not have a high level of adherence to therapeutic regimens unless they have a high level of perceived barriers. The hypertensive older adults who have a higher level of knowledge may have a higher perception about their various obstacles affecting belief in the ability to perform recommended behaviors such as difficulty of perform a new behaviors, cost of treatments, support from other people, and unbelief in their capacity to deal with a specific task. Because, they may have more information about disease and treatment and also have many ways for making decisions about performing adherence behaviors. However, when older adults with hypertension are engaged in difficult situations reflecting the higher belief in their barriers, they may change their thought patterns into positive thinking due to the challenged task and make their determination to overcome their obstacles. Consistent with Aljasem et al. (2001) who indicated that when individuals have to face more difficult tasks, self-efficacy is especially important to take on a challenge and overcome the obstacles to access accomplishment in provision of therapeutic regimens. Also, Bell and Kozlowski (2002) demonstrated that persons who have high learning orientation are more likely to pursue challenging and difficult task

content. When they perceived in their ability to do well on the difficult aspects of tasks, therefore they may believe in expected efficacy and lead to enhance higher levels of self-efficacy to adherence. Consequently, therefore, older adults with hypertension who have a higher level of perceived self-efficacy to adherence tend to have better adherence to therapeutic regimens.

Knowledge of Hypertension

The result of this study found that knowledge of hypertension was not significantly related to adherence to therapeutic regimens. The relationship indicated that older adults with hypertension who had more knowledge of hypertension may not necessarily have better adherence to therapeutic regimens. It is possible that although knowledge is the one of important factors related to adherence behavior, it may not have sufficient power to change new behavior in older adults with hypertension. Many studies showed that knowledge alone was not adequate to ensure adherence to medication regimes (Dickson et al., 2011, Gonzales et al., 2004).

Similarly, when the hypothesized model was tested, the final model showed knowledge of hypertension did not affect the adherence to therapeutic regimens among older adults with hypertension. This result was congruent with a prior study by Pinprapapan et al. (2013) who examined a causal factor affecting adherence to therapeutic regimens among person with hypertension and found that knowledge of hypertension had no statistically significant effect on adherence to therapeutic regimens. Also, Park et al. (2012), who studied predictors of adherence to medication in older adults Korean with hypertension, found that knowledge of high blood pressure was not significantly associated with adherence to antihypertensive medication. Similarly, Lee et al. (2010) who studied correlation factors of self-care behaviors in Korean American hypertensive persons and showed that hypertension knowledge had no statistically significant effect on self-care behaviors, including medication-taking, healthy diet, weight control, and exercise. Moreover, several previous studies in other chronic illnesses found that knowledge did not significantly affect health behaviors. Consistent with Dickson et al. (2011) who conducted mixed method research on self-care in patients with heart failure and found that knowledge was not a strong predictor of self-

care management (identifying symptom, recognizing the need to take action, acting on that need, and evaluating the effectiveness of treatment).

However, this study showed knowledge of hypertension had no effect on adherence to therapeutic regimens. It could be explained that most of the participants had completed elementary school (72.73%) whereas the knowledge of hypertension score of participants ranged from 11 to 22 with a mean of 16.77 which was an inadequate level. This finding showed that the participants had a relatively small difference in their level of knowledge of hypertension. So, knowledge of hypertension may not sufficiently affect adherence to therapeutic regimens. Also, this study examined several psychological factors affecting adherence to therapeutic regimens, some factors such as perceived self-efficacy to adherence, physical function, perceived severity, may have a more powerful effect on adherence to therapeutic regimens than knowledge of hypertension. Consistently, a previous study indicated that hypertension knowledge had no significantly effect on self-care behavior, since it was presented with other more potent variables such as self-efficacy (Lee et al., 2010). The requisite of adherence to therapeutic regimens included persons undertaken as an active role and to play a responsibility in their treatment. Moreover, the older adults with hypertension need to perform more than one behavior to meet the optimal goal, including taking antihypertensive medication, hypertension dietary requirement, physical activity, smoking cessation, limiting alcohol consumption, and stress management. In addition, they need to collaborate with their health care providers for mutual agreement with a treatment plan and maintain their recommended behavior to meet the optimal goal for controlling blood pressure. In conclusion, older adults with hypertension who have only knowledge of hypertension may not be sufficient accomplishment for performing adherence to therapeutic regimens. As a result, knowledge of hypertension alone had no significant effect adherence to therapeutic regimens among older adults with hypertension.

Interestingly, the final model showed that knowledge of hypertension positively directly affected perceived barriers and indirectly affected adherence to therapeutic regimens via perceived barriers and perceived self-efficacy to adherence. The finding indicated that older adults with hypertension who had a higher level of knowledge of

hypertension were more likely to have a higher level of perceived barriers. It could be explained that the older adults with hypertension who have higher level of knowledge may have more information derived from their learning experiences. When, they know more about complications from the disease and treatments which may affect their daily life, so having more information may increase their perceived barriers, especially difficulty of performing new behaviors, costs of treatment, complexity of regimens, support from other people, and anxiety with their capacity to deal with the specific task. Consequently, when they have a higher level of perceived barriers, this may produce a lower level of adherence to therapeutic regimens. While, when older adults with hypertension have a lower level of perceived barriers, they may have more perception in their ability to handle several obstacles by themselves. Having higher perceived barriers may improve perceived self-efficacy to adherence in older adults with hypertension by making decision to engage in difficult situations, changing their thought patterns into positive thinking with the challenged task and making the ambition to overcome their obstacles. From these ways may lead to have a better adherence to therapeutic regimens among older adults with hypertension.

Another dimension derived from WHO (2003) is the health care team related-factors consisting of provider-patient communication which is a crucial factor affecting adherence to therapeutic regimens among older adults with hypertension, especially, giving clear explanation, active listening and taking responsibility for patients' problem. They should necessarily be given correct and adequate information regarding older adults with hypertension because of its complex behaviors. Having paramount good communication styles between providers and patients can cause increased understanding of disease and its treatments, patients' satisfaction and may lead to be better older adults with hypertension. This factor can be described in more detail as follow:

Provider-Patient Communication

The finding showed that provider-patient communication had a low positive relationship with adherence to therapeutic regimens of the four attributes of adherence to therapeutic regimens. It was found that provider-patient communication had a low positive relationship with alignment of patients' behaviors and recommendations,

mastery of new behaviors, ongoing collaboration and perceived ability to meet optimal blood pressure. These relationships indicated that hypertensive older patients who had good communication with their health care providers were less likely to improve adherence to therapeutic regimens with alignment of patients' behaviors and recommendations, mastery of new behaviors, ongoing collaboration and perceived ability to meet optimal blood pressure. This finding could be explained that older adults with hypertension who had better communication with their health care provider during treatments, were more likely to deeply understand of the disease and its treatments, improve satisfaction with treatment services, able to apply the recommended treatments into their daily activities which adapted to their new behaviors and lead to improve their ability to meet the positive health outcome of controlling blood pressure. This finding is consistent with several studies which found that provider-patient communication had a significant relationship with adherence to therapeutic regimens (Hatrley & Repede, 2011; Phillips et al., 2011; Pinprapan et al., 2013; Schoenthaler, Chaplin, et al., 2009; Turner et al., 2009).

When the hypothesized model was tested, the final model showed that provider-patient communication positively directly influenced adherence to therapeutic regimens (ß = .34, $p < .05$). This result was consistent with a prior study which found that provider-patient communication had a positively significant association with self-management (diet, exercise, taking medications, glucose/urine monitoring, foot care (Xu, 2005). This result was similar to another study on patient-provider relationships involving two way communications about illness effecting on adherence to regimens among type 2 diabetes patients (Roh, 2005). Also, Pinprapapan (2013) who studied a causal model of adherence in hypertensive persons found that provider-patient communication positively directly influenced adherence to therapeutic regimens.

Considering provider-patient communication, it is well established as a crucial factor in clinical therapy which addresses patient-centered encounters (Ha et al., 2010). Having better provider-patient communication is essential for health care systems in order to achieve optimal health outcomes, mainly including better patient's health and medical care, and patient satisfaction (Brinkman et al., 2007; Herndon & Pollick, 2002). Communication may directly improve the ability of patient's perception to agree with

their recommended treatments and adherence to treatment (Phillips et al., 2011). Moreover, the multiple processes of communication can enhance adherence to treatment resulting from patients' understanding of their illness and the risks and benefits of treatment, having support, empathy and understanding from their provider, collaborative partnership, and involving patient-centered interviewing (Ha et al., 2010; Zolnierek & DiMatteo, 2009). Effects of physician-patient communication, has been reported in several studies, including patients' satisfaction, health status, recall of information, and enhance patients' adherence to therapeutic regimens (Bennett et al., 2011; Matthews et al., 2009; Schoenthaler, Chaplin, et al., 2009; Zolnierek & DiMatteo, 2009). Moreover, health care providers should help patients by working in a collaborative manner and more effective communication. These tasks are the most powerful predictors of adherence to therapeutic regimens and self-care behavior (Rubin, 2005). Also, patients should be allowed to frequently share in their decision making regarding their health status or health problems, since this could lead to the better clinical outcomes (Hakim, 2011). Whereas, having insufficient provider-patient communication during treatment may significantly affect adherence to therapeutic regimens and overall clinical care (Grover et al., 2013). In addition, having miscommunication regarding a patient's therapy can cause misunderstanding of patients in terms of their disease such as prognosis, aim of treatment, expectations, decision making in treatment and involvement in all treatment (Ha et al., 2010).

Essentially, older adults with hypertension might be more recognized rather than other age groups, because of the limitation of physical health and cognitive function resulting from advanced age. Provider-patient communication concerning specific tasks among older adult patients during treatment encounters is a necessary strategy for enhancing adherence to therapeutic regimens (Ishikawa et al., 2005; Robinson et al., 2006). When older adults with hypertension have more information, clearly understand their disease and treatment plan, have satisfaction and trust in health care personnel, they may focus on their methods regarding control their blood pressure to an ultimate goal. Thus, older adults with hypertension who were given good communication with their health care providers were more likely to perform recommended behaviors.

Provider-patient communication was a predicting variable of perceived benefits (ß = .17, $p < .01$). Consistent with a previous study of Xu (2005) which found that provider-patient communication had a positive direct effect on beliefs of treatment effectiveness among type 2 diabetes patients. A plausible explanation may be that in this study the provider-patients communication focused on the three aspects of communication regarding hypertension and its treatment from providers, including talking clearly, explaining medical care and responding to patient's concerns. These ways might lead to effectively improve understanding and perception the usefulness of recommended behaviors and the optimal goal to control blood pressure. Persons who perceived in the benefits of recommended treatments are more likely to integrate these recommendations into their daily activities. Communication between health care providers and patients is a significant method that can improve patients' perception regarding understanding of disease diagnosis and treatment and the benefits of recommended behaviors which consequently leading to keep follow-up visits, filling prescriptions and taking medication (Hakim, 2011). Therefore older adults with hypertension who are given the effective communication from health care providers are more likely to have perceived benefits of recommended behaviors.

In addition, provider-patient communication positively indirectly affected adherence to therapeutic regimens (ß = .35, $p < .01$) through perceived susceptibility, perceived self-efficacy to adherence, perceived severity, perceived barriers and knowledge of hypertension. This finding is consistent with a previous study of Xu (2005) who examined factors influencing diabetes self-management in diabetes patients and found that provider-patient communication had a direct effect on beliefs of treatment effectiveness, knowledge about disease and self-efficacy and an indirect effect on diabetes self-management through beliefs of treatment effectiveness, knowledge about disease and self-efficacy. A possible explanation may be that in this study, provider-patient communication were participants' perception of provider's communication, general clarity, explanation related medical care and carefully listening to and responsiveness to patients' problem and concern (Xu, 2005). These aspects of communication might build up patients' knowledge about their illness and treatments through given clear explanations, a good relationship between provider and patients, active listening and concern from health care provider during treatment. Also, older

participants were more likely to need a clear explanation about hypertension knowledge regarding disease and complications, medication treatment, lifestyle modification in order to integrate the regimes into their daily lives.

Considering perceived susceptibility, perceived severity, perceived barriers, these mediators are derived from health belief which are important psychosocial factors used to explain and predicted health-related behavior in individuals (Janz et al., 2002). Provider-patient communication is a significant way to effectively provide information related to the disease, treatments and other contents regarding patients' health. Older adults with hypertension who received better communication with health care providers tend to have more perception with their illness especially, perceived risk in uncontrolled blood pressure, perceived seriousness of disease and also perceived obstacles related to hypertension and its treatments. These situations may influence their thought patterns regarding their ability to perform recommended behaviors and lead them to evaluate their abilities to perform desired behaviors. When older adults with hypertension have belief in their potential abilities to overcome various obstacles affecting their daily activities, they may decide to perform adherence behavior. Older adults with hypertension who have perceived susceptibility to illness, perceived barriers given treatments, and also perceived self-efficacy to adherence, may initially inspire themselves to perform adherent behavior and may lead to the desired outcome.

In brief, having paramount good communication styles of physicians influencing patients lead to an increase in understanding of the disease and its treatment and also improving patients' satisfaction and adherence to therapeutic regimens. In promoting adherence to therapeutic regimens among older adults with hypertension to achieve the optimal goal, the intervention should be designed to improve greater provider-patient communication, adequate level of knowledge of hypertension, good perceived susceptibility, limitation of perceived barriers and enhance perceived self-efficacy to adherence.