

**A TEST OF COMPETING MODELS TO
PREDICT SUICIDALITY IN PATIENTS AND STUDENTS
IN TAIWAN**

YUNG-LI KU

**Thesis submitted in fulfilment of the requirements for the Degree of
Doctor of Philosophy**

**School of Psychology
Faculty of Health Sciences
The University of Adelaide
August, 2008**

Table of Contents

		<u>Page</u>
Chapter 1	Introduction	1
1.1	Suicide: a serious problem in Taiwan	1
1.2	Methodological issues in suicide research	2
1.3	Theoretical issues of suicidal behaviours	4
1.4	Overall objectives	8
1.5	Structure of this thesis	11
Chapter 2	Literature review	13
2.1	Introduction	13
2.2	Suicide	13
2.2.1	Classification and definition of suicidal behaviours	14
2.2.2	Measuring suicidal behaviours	17
2.2.3	Prevalence of suicidal behaviours	17
2.3	Suicidal behaviours and depression	18
2.3.1	Definition and diagnosis of depression	19
2.3.2	Measuring depression	20
2.3.3	Prevalence of depression	21
2.3.4	Prevalence of suicidal behaviours in depressed patients	22
2.4	Review of the literature: perspective, theories and models of suicidal behaviours	23
2.4.1	Diathesis-stress theory	25
2.4.2	Beck's cognitive diathesis-stress theory	27
(1)	Cognitive schemas	28
(2)	Cognitive distortions	28
(3)	Measuring cognitive distortions	30
(4)	Negative cognitive triad	31
(5)	Measuring the negative cognitive triad	34
(6)	Empirical studies of Beck's cognitive diathesis-stress theory	36
(7)	Summary of Beck's cognitive diathesis-stress theory	46
2.4.3	Abramson's cognitive diathesis-stress theory	47
(1)	The hopelessness theory of suicidality	48
(2)	Comparison to Beck's theory	49
2.4.4	Summary of the diathesis-stress theory	50
2.5	Review of the literature: factors implicated by previous research in the aetiology of suicidality	51

2.5.1	Life events	51
2.5.2	Social support	53
2.5.3	Demographic characteristics	54
	(1) Gender, age and suicidal behaviours	55
	(2) Gender, age and social support	56
	(3) Gender, age and life events	57
2.5.4	Compliance with medications	59
2.6	Summary of the literature review	60
2.7	Integrated models of suicide attempts	61
2.8	Research aims	68
Chapter 3	Pilot study: Translating and testing measures	71
3.1	Introduction	71
3.2	Stage I : Revision and translation of scales	71
3.2.1	Methods	71
	(1) Measures	71
	(2) Procedure of revision and translation of the measures	81
3.2.2	Results	82
3.3	Stage II: Study for Reliability and validity of the Chinese versions of the scales	83
3.3.1	Methods	83
	(1) Participants	83
	(2) Measures	84
	(3) Procedures	85
	(4) Statistical analyses	88
3.3.2	Results	89
	(1) Demographic characteristics	89
	(2) Psychometric properties of the Chinese versions of the scales	92
3.4	General discussion	106
Chapter 4	Main study: Testing the competing models in patients with major depressive disorder	114
4.1	Introduction	114
4.2	Stage I: Factor analytic study of the Chinese versions of the scales in MDD patients	115
4.2.1	Methods	115
	(1) Participants	115
	(2) Measures	115

	(3) Procedures	116
	(4) Statistical analyses	116
4.2.2	Results	117
	(1) Demographic characteristics	117
	(2) Factor analyses of the measures	119
4.2.3	Discussion	136
4.3	Stage II: Testing the competing models in MDD patients	139
4.3.1	Methods	139
	(1) Participants	139
	(2) Measures	140
	(3) Statistical analyses	142
4.3.2	Results	143
	(1) Statistical assumptions	143
	(2) Structural equation analyses of the competing models in MDD patients	147
	(3) Combination of the MM-A and the MM-B	158
	(4) Exploratory factor analyses of the combined items	158
	(5) Structural equation analyses of the combined mediational model in MDD patients	161
	(6) Structural equation analyses of the modified combined mediational model in MDD patients	165
4.3.3	Discussion	168
	(1) Comparisons between the competing models	168
	(2) Comparison of relative contributions of depressive cognitive and hopelessness to depression and suicidal ideation	174
	(3) Findings from the final modified combined mediational model	175
4.4	Practical implications	180
4.5	Limitations of the main study	182
4.6	Conclusion	183
Chapter 5	Follow-up study: Retesting the best-fitting model in patients with major depressive disorder six months later	184
5.1	Introduction	184
5.2	Methods	185
	(1) Participants	185
	(2) Measures	186
	(3) Procedures	186
	(4) Statistical analyses	187

5.3	Results	188
	(1) Demographic characteristics	188
	(2) Statistical assumptions	190
	(3) Structural equation analyses of the modified combined mediational model with the longitudinal data	192
5.4	Discussion	196
5.5	Limitations of the follow-up study	200
5.6	Conclusion	201
Chapter 6	Generalized study: Replicating the results of depressed patients in a sample of university students	203
6.1	Introduction	203
6.2	Stage I: Validating the Chinese versions of the scales in university students	204
6.2.1	Methods	204
	(1) Participants	204
	(2) Measures	205
	(3) Procedures	205
	(4) Statistical analyses	206
6.2.2	Results	206
	(1) Demographic characteristics	206
	(2) Internal consistency	207
	(3) Factor analyses	209
	(4) Reliability and other analyses	226
6.2.3	Discussion	227
6.3	Stage II: Replicating the previous results for depressed patients in a sample of university students	232
6.3.1	Methods	233
	(1) Participants	233
	(2) Measures	233
	(3) Procedures	234
	(4) Statistical analyses	235
6.3.2	Results	235
	(1) Demographic characteristics	235
	(2) Univariate statistical analyses and statistical Assumptions	236
	(3) Structural equation analyses of the final modified combined mediational model in university students	238

	(4) Structural equation analyses of the initial alternative models in university students	241
	(5) Structural equation analyses of the modified mediational model B in university students	248
6.3.3	Discussion	249
6.4	Practical implications	256
6.5	Limitations of the generalized study	257
6.6	Conclusion	258
Chapter 7	General discussion	259
7.1	Introduction	259
7.2	Rationale for the study	259
7.3	Major findings	262
7.3.1	Psychometric properties of the Chinese-language scales	262
7.3.2	Testing the competing models using cross-sectional data gathered from Taiwanese MDD patients	265
7.3.3	Findings from the most appropriate model for Taiwanese MDD patients	269
7.3.4	Retesting the most appropriate model for Taiwanese MDD patients six months later	272
7.3.5	Replicating the results derived from the MDD patients in a sample of university students	274
7.4	Practical implications	278
7.4.1	Implications for future research	278
7.4.2	Practical implications for suicide prevention and treatment in Taiwanese MDD patients	280
7.4.3	Practical implications for suicide prevention in universities	282
7.5	Limitations	283
7.6	Conclusion	285
	List of Appendices	288
	References	338

List of Tables

		<u>Page</u>
Table 3.1.	Demographic characteristics of the participants for the pilot study: nature and significance of between-group differences.	91
Table 3.2.	Demographic characteristics of the undergraduate students for the pilot study.	92
Table 3.3.	Internal consistency of the Chinese Version of the Multidimensional Support Scale (C-MDSS) for the 49 major depressive patients.	94
Table 3.4.	Internal consistency of the Chinese Version of the Dysfunctional Attitude Scale (C-DAS) for the 49 major depressive patients.	96
Table 3.5.	Internal consistency of the Chinese Version of the Cognitive Triad Inventory (C-CTI) for the 49 major depressive patients.	98
Table 3.6.	Internal consistency of the Chinese Version of the Hopelessness Scale (C-HS) for the 49 major depressive patients.	100
Table 3.7.	Internal consistency of the Chinese version of the Beck Depression Inventory—second edition (C-BDI-II) for the 49 major depressive patients.	102
Table 3.8.	Internal consistency of the Chinese version of the Beck Scale for Suicidal ideation (C-BSS) for the 49 major depressive patients.	104
Table 3.9.	Comparisons of mean scores for major depressive patients, neurotic depressive and adult students.	105
Table 3.10.	Tukey HSD Post Hoc analyses of the C-MDSS mean scores for major depressive patients, neurotic depressive patients and adult students.	105
Table 4.1.	Demographic characteristics of the patients with Major Depressive Disorder for the main study (N = 162).	118
Table 4.2.	Rotated factor loadings from the pattern matrix of the Chinese version of the Multidimensional Support Scale (C-MDSS) for major depressive patients (N = 162).	120
Table 4.3.	Items of the factor analysis of the C-MDSS loaded on the factors of Winefield et al. (1992) MDSS.	121

Table 4.4.	Rotated factor loadings from the pattern matrix of the Chinese version of the Dysfunctional Attitude Scale (C-DAS) for major depressive patients (N = 162).	124
Table 4.5.	Items of the factor analysis of the C-DAS loaded on the factors of Power et al. (1994) DAS-24 and Beck, Brown et al. (1991) DAS-100.	125
Table 4.6.	Rotated factor loadings from the pattern matrix of the Chinese version of the Cognitive Triad Inventory (C-CTI) for major depressive patients (N = 162).	127
Table 4.7.	Rotated factor loadings from the pattern matrix of the Chinese version of the Hopelessness Scale (C-HS) for major depressive patients (N = 162).	129
Table 4.8.	Items of the factor analysis of the C-HS loaded on the factors of Beck, Weissman et al. (1974) HS.	130
Table 4.9.	Rotated factor loadings from the pattern matrix of the Chinese version of the Beck Depression Inventory—Second Edition (C-BDI-II) for major depressive patients (N = 162).	132
Table 4.10.	Items of the factor analysis of the C-BDI-II loaded on the factors of Beck, Steer et al. (1996) BDI-II.	133
Table 4.11.	Rotated factor loadings from the pattern matrix of the Chinese version of the Beck Scale for Suicidal ideation (C-BSS) for major depressive Patients (N = 162).	135
Table 4.12.	Items of the factor analysis of the C-BSS loaded on the factors of the SSI by Holden, Mendonca and Mazmanian (1985).	136
Table 4.13A.	Means, standard deviations, skewness and kurtosis of the variables for MDD patients in the main study (N = 162).	144
Table 4.13B.	Frequencies and percentages of the variables for MDD patients in the main study (N = 162).	145
Table 4.14.	Correlations between all involved variables in the competing models for MDD patients in the main study (N = 162).	147
Table 4.15.	Legend of abbreviations used for variables in Table 4.14 and Table 4.20.	148
Table 4.16.	Results of the AMOS analyses of the competing models for MDD patients in the main study (N = 162).	149

Table 4.17.	Univariate ANOVAs for depressive cognition, hopelessness and depression.	153
Table 4.18.	Rotated factor loadings from the pattern matrix of the combined items from the C-HS and the C-CTI for MDD patients in the main study (N = 162).	160
Table 4.19.	Means, standard deviations, skewness and kurtosis of the parcels created by the C-CTI and the C-HS in the main study.	162
Table 4.20.	Correlations between all involved variables in the combined mediational model for MDD patients in the main study (N = 162).	162
Table 4.21.	Results of the AMOS analyses of the nested models for MDD patients in the main study (N = 162).	164
Table 5.1.	Demographic characteristics of MDD patients at Time 2 in the follow-up study (N = 142).	189
Table 5.2.	Demographic characteristics of MDD patients at Time 1 and Time 2 (N = 142).	190
Table 5.3.	Means, standard deviations, skewness and kurtosis of the observed variables for MDD patients at Time 1 and Time 2 (N = 142).	191
Table 5.4.	Correlations between all involved variables for MDD patients at Time 1 and Time 2, with a six-month interval (N = 142).	192
Table 5.5.	Legend of abbreviations used for variables in Table 5.4.	193
Table 5.6.	Results of the AMOS analyses of the nested models for MDD patients in the follow-up study (N = 142).	194
Table 6.1.	Demographic characteristics of university students in Stage 1 of the generalized study (N = 255).	207
Table 6.2.	Rotated factor loadings from the pattern matrix of the Chinese version of the Multidimensional Support Scale (C-MDSS) for university students in the generalized study (N = 255).	211
Table 6.3.	Rotated factor loadings from the pattern matrix of the Chinese version of the Dysfunctional Attitude Scale (C-DAS) for university students in the generalized study (N = 255).	213
Table 6.4.	Rotated factor loadings from the pattern matrix of the Chinese version of the Cognitive Triad Inventory (C-CTI) for university students in the generalized study (N = 255).	215

Table 6.5.	Rotated factor loadings from the pattern matrix of the Chinese version of the Hopelessness Scale (C-HS) for university students in the generalized study (N = 255).	217
Table 6.6.	Rotated factor loadings from the pattern matrix of the Chinese version of the Beck Depression Inventory—Second Edition (C-BDI-II) for university students in the generalized study (N = 255).	219
Table 6.7.	Items of the factor analysis of the C-BDI-II loaded on the factors of Beck, Steer et al. (1996) BDI-II and Shek (1990) C-BDI.	220
Table 6.8.	Rotated factor loadings from the pattern matrix of the Chinese version of the Beck Scale for Suicidal ideation (C-BSS) for university students in the generalized study (N = 255).	222
Table 6.9.	Rotated factor loadings from the pattern matrix of the combined items from the C-HS and the C-CTI for university students in the generalized study (N = 255).	225
Table 6.10.	Demographic characteristics of university students in Stage 2 of the generalized study (N = 324).	236
Table 6.11A.	Means, standard deviations, skewness and kurtosis of the variables for university students in the generalized study (N = 342).	237
Table 6.11B.	Frequencies and percentage of negative life events for university students in the generalized study (N = 342).	238
Table 6.12.	Correlations between the variables in the final modified combined mediational model for university students in the generalized study (N = 324).	239
Table 6.13.	Legend of abbreviations used for variables in table 6.12 and table 6.14.	239
Table 6.14.	Correlations between all involved variables in the initial alternative models for university students in the generalized Study (N = 324).	242
Table 6.15.	Result of the AMOS analyses of the competing models for university students in the generalized study (N = 324).	244

List of Figures

	<u>Page</u>
Figure 2.1. Moderator model.	26
Figure 2.2. Mediation model.	26
Figure 2.3. The model of suicidal behaviours derived from Beck's diathesis-stress theory	33
Figure 2.4. Theoretical framework of the interactional model of suicide attempts.	62
Figure 2.5. Integrated models of suicide attempts: (1) the interactional model A and (2) the interactional model B.	64
Figure 2.6. Theoretical framework of the mediation model of suicide attempts.	66
Figure 2.7. Integrated models of suicide attempts: (1) the mediation model A and (2) the mediation model B.	67
Figure 4.1. Standardized parameter estimates for the integrated interactional models in MDD patients: (1) interactional model A, and (2) interactional model B.	151
Figure 4.2. Non-significant interaction effects.	154
Figure 4.3. Standardized parameter estimates for the integrated mediation models in MDD patients (1) mediation model A, and (2) mediation model B.	156
Figure 4.4. Standardized parameter estimates for the Model 1: initial combined mediation model, Model 2: modified combined mediation model and Model 3: final modified combined mediation model.	167
Figure 5.1. Standardized parameter estimates for the final modified combined mediation model with two-wave panel data obtained from 142 respondents.	196
Figure 6.1. Standardized parameter estimates for the final modified combined mediation model in university students.	241
Figure 6.2. Standardized parameter estimates for the interactional models in university students: (1) the interactional model A, and (2) the interactional model B.	246

Figure 6.3.	Standardized parameter estimates for the mediational models in university students: (1) the mediational model A, and (2) the mediational model B.	247
Figure 6.4.	Standardized parameter estimates for the final modified mediational model B in university students.	249

Abstract

The aim of this research was to test a series of theoretical models based on Beck (1967) cognitive diathesis-stress and Kwon and Oei (1994) linear mediational models as well as earlier research findings to determine the best-fitting model to explain the aetiological processes of suicide attempts in Taiwanese people. The participants were patients diagnosed with Major Depressive Disorders (MDD) recruited from three hospitals in Taiwan. They were used for data analyses in both cross-sectional (main) study and longitudinal (follow-up) study. In addition, a sample of students recruited from three universities in Taiwan was used for data analyses in the generalized study to examine the generalization of the results from clinical depressed patients to nonclinical university students.

In the main study, by the application of structural equation modeling (SEM) techniques, four initial models were compared using the MDD patients ($N = 162$). The SEM analyses showed that two interactional models failed to provide an adequate fit to the given data, suggesting that the hypothesis of interaction between dysfunctional attitudes and negative life events in predicting the psychopathology of Taiwanese MDD patients was not supported. The SEM analyses supported two mediational models in terms of goodness-of-fit. Because the two mediational models were very similar, they were combined to form a combined mediational model. The SEM analyses indicated that the combined model provided an adequate fit to the given data. After modifying the model to improve its goodness-of-fit, the final modified combined mediational model was selected as the most appropriate in representing the data of Taiwanese MDD patients.

The final model revealed that dysfunctional attitudes mediated the relationship between negative life events and depressive hopelessness, which in turn increased depression, which then precipitated suicidal ideation, which finally resulted in suicide attempts. In addition, it was found that negative life events exerted direct influences on depressive hopelessness and suicide attempts; sex and age exerted direct influences on negative life events. However, social support

buffered the impact of negative life stress on dysfunctional attitudes and compliance with medications prevented the development of depression.

In the follow-up study, the final modified combined mediational model was validated and reexamined with two-wave panel data gathered from the same population of Taiwanese MDD patients who participated in assessments twice, separated by a six-month interval ($N = 142$). The SEM analyses showed that the model provided an adequate fit to the two-wave panel data, suggesting that the model can be applied for predicting suicide attempts over six months in Taiwanese MDD patients.

In the generalized study, the findings obtained from the MDD patients were replicated in a sample of Taiwanese university students ($N = 324$). Results revealed that the final modified combined mediational model failed to fit the given data. The result suggests that the most appropriate model for Taiwanese MDD patients can not be generalized to Taiwanese students.

Some cautions and limitations should be noted. First, the models obtained from clinical and nonclinical people in Taiwan should not be directly generalized to people outside Taiwan. Further research using clinical and nonclinical samples from other countries to cross-validate the models was suggested. In addition, the researcher's interventions during the follow-up period may disturb the relationship between predictor variables and subsequent suicide attempts. However, the problems appear to be unavoidable because of the research ethics of protecting participants from suicidal risk.

Statement

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying.

Signed

Acknowledgements

I want to thank those who gave me support in the preparation of my thesis. My gratitude first goes to my supervisor, Dr. Helen Winefield. She is the most important person in my academic career. Without her help, I would not have the chance to come to Australia for study. In the duration of my research, her patient guidance and encouragement enabled me to overcome the difficulties I encountered again and again. I want to extend my gratitude to another supervisor, Dr. Nick Burns. He clarified many statistical concepts for me, and revised my article word by word patiently. Without his invaluable suggestions and assistance, I would not have been able to finish this thesis. I also learned the spirit of independent researching from these two supervisors.

I also want to express my gratitude to another supervisor, Dr. Yong-Yuan Chang, Kaohsiung Medical University, Taiwan, R.O.C. Without his absolute support and administrative assistance, I would not have gathered the data of depressed patients smoothly. My gratitude also goes to Dr. Hawjeng Chiou, National Central University, Taiwan, and Dr. Fur-Hsing Wen, Soochow University, Taiwan. They gave me many helpful suggestions on research method.

I also want to pay appreciation to Dr. For-Wey Lung, Military Kaohsiung General Hospital, Taiwan, Dr. Tze-Chun Tang, Chung-Ho Memorial Hospital, Kaohsiung Medical University, Taiwan, and Dr. Neng-Ching Chen, Provence Psychiatric Clinic, Taiwan. Without their assistance, I would not have been able to enter the hospitals to gather the data of depressed patients. Besides, for those hospital staff who assisted me gathering data, and those patients who agreed to participate in this research, their cooperation is highly appreciated.

Lastly, I want to thank my family, including my parents and my wife. During the long journey of my doctoral study, they shared my stress, took care of my two children, gave me financial support, and encouraged me to go straight ahead. Without their support, I would not have persisted and finished my thesis.