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The Mediating and Moderating Roles of the Cognitive Triad
on Adolescent Suicidal Ideation

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Abstract

Background. Adolescent suicide has been a major concern in Taiwan and continues to be an important research issue for mental health workers. The cognitive triad was previously found to be related to both depressive symptoms and suicidal ideation. However, researchers have paid less attention to exploring the roles of mediation and moderation which the cognitive triad plays in the relationship between depressive symptoms and suicidal ideation. **Objectives.** The purpose of this study was to test the mediating and moderating effects of the cognitive triad on the relationship between depressive symptoms and suicidal ideation in a sample of school-aged adolescents. **Methods.** A cross-sectional, non-experimental, correlational design was used in this study. Instruments were anonymously administered to a sample of 1245 school-aged adolescents that were recruited from 6 middle and high schools from Taipei City. Instruments used included the Children's Depression Inventory (CDI), the Cognitive Triad Inventory for Children (CTIC), and the Positive and Negative Suicide Ideation (PANSI). **Results.** Regression analysis revealed that the cognitive triad significantly mediated and moderated the relationship between depressive symptoms and suicidal ideation. **Discussions.** These findings have implications for theoretical development and health policies related to suicidal prevention in schools.

Key words: cognitive triad, depressive symptoms, suicidal ideation

Introduction

Adolescent Suicidal Ideation

Adolescent suicide has long been a serious problem in Taiwan. Not only are increasing numbers of adolescents ending their lives, but also these victims' significant others experience a tragic life after the youth's death (Wagner & Calhoun, 1992). Suicide was ranked as the second leading cause of death among youths aged 15 to 24 years, being only lower than malignant tumors in Taiwan (Department of Health, 2004). Similarly, suicide is the third leading cause of death among youths aged 10 to 24 years in the US (Anderson, 2002). Schmidtre et al. (1996) found that the age group of 15 to 24 years was the highest risk group for attempted suicide. Child and adolescent suicides also account for approximately 12% of all fatalities (Kann et al., 2000).

De Wilde (2000) conceptually formulated relationships among suicidal ideation, attempted suicide, and completed suicide. He proposed that these three behaviors are hierarchically related to each other. That is, suicidal ideations preceded attempted suicide, and people who attempt suicide may achieve that outcome. Empirical study found that for community-based adolescents with depressed mood who reported "having ever had suicidal thoughts", the risk of suicide attempts increased 2.5 times in the following year (De Wilde & Kienhorst, 1998). A report of "suicidal thoughts during the previous month" increased the risk of suicide attempts 3.3 times (De Wilde & Kienhorst, 1998). The great numbers of

adolescents who appear to have suicidal ideation have not attracted attention of mental-health professionals. Also, most adolescents who perform any kind of suicide behavior do not usually seek help from clinical settings (De Wilde, 2000).

According to O'Carroll et al. (1996), suicide ideation has been defined as wishes, thoughts, or desires reported by people to take their own life. The prevalence of suicide ideation in adolescents varies widely depending on different study design. Previous community-based and epidemiological studies estimated that the prevalence of suicidal ideation ranged from 2% to 60% (Garrison, Addy, Jackson, McKeown, & Waller, 1991). The suicide idea rate in adolescents ranged from 10% to 36% in Taiwan. Osman et al. (2003) noted that the rates of suicidal ideation may be even higher than those reported, since mental-health professionals might not pay attention to those subjects with suicidal ideation, even for those subjects with very serious suicidal thoughts, until they actually make a suicidal attempt. Hence, it is very important to detect groups of adolescents at high risk for suicide from the general population and those adolescents with suicidal ideations at an early time in order to effectively prevent further suicide actions.

The Mediating and Moderating Roles of the Cognitive Triad

Many adolescents with suicidal ideation are depressed. However, not all depressed adolescents are suicidal (Rao, Weissman, Martin, & Hammond, 1993). Why are some adolescents more resilient than others and do not suffer from suicidal ideation? The majority

of studies have investigated risk factors related to suicidal ideation. However, few studies have focused on examining the mediating and moderating effects of those risk factors.

The cognitive theory of suicide (Alford & Beck, 1997) asserts that cognition is the central component for suicidality. Suicidal individuals tend to have dysfunctional views of the self, the future, and the world. This negative pattern is termed the "negative triad".

Weishaar (2000) indicated that a negative cognitive triad might initiate a suicide attempt, especially one developed early in life, in some cases. According to the Alford and Beck (1997), the nature of this model is mediating, and the relationship between the cognitive triad of suicide and other psychological and biological systems is interactive. Cognitive behavior therapies emphasize the mediating role played by cognitive processes in psychopathology (Silverman & DiGiuseppe, 2001). They believe that using a dysfunctional cognitive style hinders effective adjustment and may produce distress symptoms (Glendening, 1996). The cognitive triad may also have a moderating effect on an adolescent's mental health (Reinmann & Ellison, 2004). However, few empirical studies have tested the mediated and moderated role of cognitive triad played in the relationship between depressive symptoms and suicidal ideation.

A mediator or moderator serves as a third variable that alters the relationship between an independent variable and a dependent variable (Baron & Kenny, 1986). According to Bennett (2000), a mediator is a variable which is predicted by the independent variable, and

which explains how the relationship between the independent and dependent variables occurs. A moderator is a separate independent variable that affects the strength and direction of the relationship between other independent variables and dependent variables. Inclusion of a mediator or moderator in research allows researchers to more-precisely consider the explanations of the relationship between independent and dependent variables (Bennett, 2000).

Figure 1a presents the mediating model of the cognitive triad. As suggested by Baron and Kenny (1986), three requirements must be met to show a mediational effect: (1) the independent variable is a significant predictor of the mediator, (2) the independent variable is a significant predictor of the outcome variable, and (3) the mediator is a significant predictor of the outcome variable. Studies have indicated that children's cognitive triad is associated with depression (e.g., Stark, Schmidt, & Joiner, 1996). Depressed youth are more likely to present a negative self-schema (Zupan, Hammen, & Jaenicke, 1987), a negative view of the world (Kaslow, Stark, Printz, Livingston, & Tsai, 1992), and a negative view of the future (e.g., Kazdin, Rodger, & Colbus, 1986). The above literature supports the first premise. The second requirement is supported by empirical studies, which have found a strong relationship between depression and suicidal behaviors in adolescents (Lewinsohn, Rohde, & Seeley, 1993; Olvera, 2001). The third requirement is supported by studies in which cognitive errors, such as selective abstraction and overgeneralization, were related to

suicidal ideation (Neuringer & Lettieri, 1971). Abramson et al. (1998) also found that college students with high cognitive risk were more likely to report suicidal ideation than students with low cognitive risk.

To our knowledge, to date there has been no study examining the mediating role which the cognitive triad plays in the relationship between depressive symptoms and suicidal ideation. Studies using related concepts have found that hopelessness mediates the relationship of attributional bias and a dysfunctional attitude with suicidal ideation (Abramson et al., 1998). Children's cognitive triad mediates the relationship between parental messages and depressive symptoms (Stark et al. 1996). In high school students, the relationship between dysfunctional attitudes and a depressed mood is mediated by negative views of the self. The relationship between stressful life events and depressive symptoms is mediated by the cognitive triad in middle school students (Reinemann & Ellison, 2004).

No studies have examined the moderating effect of the cognitive triad on the relationship between depressive symptoms and suicidal ideation. Research using cognitive triad-related concepts found that negative cognitive errors moderate the relationship between stressful divorce events and children's adjustment (Mazur, Wolchik, Virdin, Sandler, & West, 1999). The relationship between stressful life events and negative self-esteem is moderated by the cognitive triad in middle school students (Reinemann & Ellison, 2004). Similarly, college students' hopelessness moderates the relationship between stress and depressive

symptoms (Dixon, Heppner, Burnett, & Lips, 1993). The proposed moderating model is shown in Figure 1b.

(Insert figure 1 here)

Objectives

Few studies have examined the mediation and moderation of the cognitive triad between depressive symptoms and suicidal ideation. Based on Beck's cognitive theory of suicide and previous studies, cognitive triad may play mediator and moderator in the relationship between depressive symptoms and suicidal ideation in school-aged adolescents. The purpose of this study was therefore to test the mediation and moderation roles the cognitive triad plays in the relationship between depressive symptoms and suicidal ideation in a sample of school-aged adolescents.

Methods

Research Design

A cross-sectional, non-experimental, correlational design was used in this study. Data were collected between January and December 2005.

Participants

A community-based sample of adolescents (aged 12~19 years) was recruited from middle and high schools in Taipei, Taiwan for this study. A random sampling method was used to select middle and high schools from four districts in Taipei City. Therefore, six

schools, including two middle schools and four high schools were selected. A random sampling method was then used to select two classes in each grade from these six schools. The inclusion criteria in this study were: 1) being 12~19 years old and 2) being able to read, write, and speak Mandarin Chinese. Questionnaires were administered anonymously to the 1639 community-based normal adolescents. Although 1349 students (82.3%) returned the questionnaires, only 1245 of them completed all questions. The actual response rate was 76%.

The sample included 710 (57%) male students and 535 (43%) female students. Their ages ranged from 12 to 19 years, with a mean of 15.5 ($SD = 1.6$) years. Approximately 43% ($N=536$) and 57% ($N=709$) of the students were in middle and high school, respectively. The majority of these students had an intact family (84.4%), while 15.6% of them lived in a family in which the parents were separated or divorced, or one or both had died. Most of the students reported that their parents had graduated from high school. Most of the students (53.7%) reported that there were two children in the family.

Data Collection

Institutional Review Board (IRB) approval for the study was obtained from the Human Subject Committee of University. Anonymous instruments were only distributed to those students with valid, signed consent forms. A small gift was given to the students upon completion of the instruments. Confidentiality and anonymity were assured for participants

in this study.

Instruments

The Children's Depression Inventory (CDI). The CDI (Kovacs, 1981) is a self-reported questionnaire designed for 7~17 year olds, which measures the severity of adolescent depressive symptoms. The CDI consists of 27 items, each item comprised of three statements describing a symptom at three different levels of severity from "not a problem" to "severe". These items cover symptoms of adolescent depression such as sadness, anhedonia, and suicidal ideation, as well as sleep and appetite disturbances. Items in the CDI refer to the two weeks immediately preceding completion of the scale. The student responds by selecting the statement that best describes his or her feelings and behavior over the past two weeks. The total scores of CDI range from 0 to 54, with higher scores reflecting more-severe depression.

The test-retest reliability coefficients range from .38 to .87 (Reynolds, 1994). The internal consistency estimate of the coefficient alpha was reported to be .86, and the item-total score correlations are all statistically significant (.31 to .54.) (Kovacs, 1981). Kovacs (1981) found that the CDI significantly discriminated between psychiatric (e.g., child guidance group) and medical (e.g., pediatric outpatient group) samples. The child guidance group had significantly higher CDI scores ($p < .002$). Thus, the CDI possesses adequate reliability and validity. The Chinese version of the CDI has shown satisfactory

internal consistency (with a Cronbach's alpha of .88) (Chao, Chen, Wang, Wu, & Yeh, 2003). The test-retest reliability was .85 (Chao et al. 2003). In this study, the internal consistency coefficient for the Chinese version was .89. Significant correlations with suicidal ideation (.38) and the cognitive triad (-.43) demonstrated evidence of construct validity. All correlations were significant at the $p < .01$ level.

The Cognitive Triad for Children (CTI-C). The 36 item CTI-C (Kaslow et al. 1992) is used to measure an adolescent's cognitive triad, which reflect their views of the self, the world, and the future. These beliefs are thought to be related to depression (Beck, 1967). Each subscale includes 12 items. Each item describes a specific belief about the self, the world, or the future. The students were asked to give three possible response alternatives (yes, maybe, or no) for each item to specify whether he or she is or is not presently thinking each of these thoughts. Half the items are worded in a positive way and half are phrased in a negative way. The possible range of the total CTI-C scale is 72 points. Higher scores represent more-positive thought patterns.

The internal consistency of the CTI-C was estimated in 132 children grades 4 through 7. The coefficient alpha was reported to be .92 (Kaslow et al.). Significant correlations with the Coopersmith Self-Esteem Inventory for Children (Coopersmith, 1967) and the Hopelessness Scale for Children (Kazdin, et al., 1986) were found to demonstrate concurrent validity. The CTI-C was translated into a Chinese version and used in this study.

In this study, the internal consistency coefficient for the Chinese version was .89.

Significant correlations with depressive symptoms (-.69) and learned resourcefulness (.42) demonstrated evidence of construct validity. All correlations were significant at the $p < .01$ level.

The Positive and Negative Suicide Ideation (PANSI). Osman, Gutierrez, Kopper, Barrios, and Chiros (1998) designed a 14-item self-reported instrument to measure suicidal ideation, which incorporates both protective and negative risk dimensions. The PANSI was developed for the purpose of assessing the frequency of suicide ideation. The PANSI is composed of two factors: Positive Ideation (PANSI-PI; 6 items) and Negative Suicide Ideation (PANSI-NSI; 8 items). Subjects are asked about the frequency of suicide ideation over a two-week time frame. Each item consists of five self-evaluative statements scored 1 (none of the time) to 5 (most of the time). Higher scores on the PANSI-PI and PANSI-NSI represent more-positive ideation and negative suicide ideation, respectively.

The internal consistency coefficients for the PANSI-PI and PANSI-NSI were .81 and .94, respectively (Osman et al., 2002). Confirmatory factor analyses (CFA) supported the 2-factor structure, which indicated good evidence of construct validity (Osman et al., 2002). Osman et al. (2002) found that scores on the PANSI significantly differed between suicide attempters and the control group, indicating evidence of criterion validity. The PANSI was translated into a Chinese version and used in this study. In this study, the

internal consistency coefficient for the Chinese version was .89. Consistent with Osman et al.'s finding, a 2-factor structure was also found based on factor analysis. Significant correlations with depression symptoms (.68) and learned resourcefulness (-.37) demonstrated evidence of construct validity. All correlations were significant at the $p < .01$ level.

Data Analysis

Preliminary analysis. SPSS/PC for Windows version 13.0 was used for this study's statistical analysis. Descriptive statistics were used to describe the demographic characteristics. Pearson's correlation was used to examine the interrelationships among the study variables.

Statistical tests for a mediator effect. Three regression equations were used to test for a mediating effect of the adolescent's cognitive triad (Baron & Kenny, 1986). The first equation tests if the independent variable (depressive symptoms) significantly predicts the mediator (cognitive triad). The second equation tests if the independent variable (depressive symptoms) significantly predicts the outcome variable (suicidal ideation). In the third equation, both the independent variable and mediator are entered simultaneously and used to predict the outcome variable. In order to determine a mediating effect, the first and the second equations must be shown to be significant. In addition, two conditions must to be met in the third equation: (a) the mediator significantly predicts the outcome variable and (b) the direct

relationship between the independent variable and the outcome variable must be less than it is in the second equation.

Statistical Tests for a Moderator Effect. The two-step hierarchical multiple regression approach was used to test for the moderating effects. Specifically, depressive symptoms and the cognitive triad were computed into interaction terms. This interaction term was included in the regression analysis as additional predictors of scores on the PANSI. In the first step, the predictor (depressive symptoms) and the moderator (cognitive triad) were simultaneously entered to predict the dependent variable (suicidal ideation). In the second step, the interaction term (depressive symptoms \times cognitive triad) was entered separately. In order to determine a moderating effect, the independent variables in the first step did not have to significantly predict the outcome variable. However, the interaction term had to explain a statistically significant amount of variance of the outcome variable (Bennett, 2000).

Results

Descriptive statistics and intercorrelations for the major study variables are described in Table 1. As seen in Table 1, significant correlations were present among the three major study variables. The cognitive triad was negatively related to depressive symptoms ($r = -.79$, $p < .01$), and suicidal ideation ($r = -.69$, $p < .01$). Depressive symptoms were positively related to suicidal ideation ($r = .68$, $p < .01$). These results indicated that students with a

more-negative cognitive triad had more suicidal ideation and depressive symptoms.

Students with more depressive symptoms tended to be more suicidal.

(Insert Table 1 here)

The Cognitive Triad as a Mediator

All four requirements were met by the following results (Table 2): (1) depressive symptoms significantly predicted the cognitive triad ($\beta = -.79$, $R^2 = .62$, $p < .001$). (2) depressive symptoms significantly predicted suicidal ideation ($\beta = .68$, $R^2 = .47$, $p < .001$); (3) the cognitive triad significantly predicted suicidal ideation ($\beta = -.39$, $p < .001$) and (4) when the cognitive triad was included in the equation, there was a significant reduction ($\Delta R^2 = .30$) in the relationship between depressive symptoms and suicidal ideation ($\beta = .38$, $p < .001$). Because the last coefficient ($\beta = .38$) was still significant, partial mediation rather than full mediation was preferred.

(Insert Table 2 here)

The Cognitive Triad as a Moderator

Table 3 shows the results of the hierarchical regression analysis for testing the main and interaction terms on suicidal ideation. In step 1, the main effects of depressive symptoms and the cognitive triad were significant ($p < .001$). In the second step, the main effects of depressive symptoms and the cognitive triad were significant ($p < .001$). Specifically, the significant effect of the interaction term on suicide ideation ($p < .01$)

supported the moderated model.

(Insert table 3 here)

Discussion

As predicted, this study found that an adolescent's cognitive triad mediated and moderated the relationship between depressive symptoms and suicidal ideation.

An adolescent's depressive symptoms indirectly influenced suicidal ideation through the cognitive triad. Higher levels of depressive symptoms and a negative cognitive triad were uniquely related to negative suicidal ideation. When the cognitive triad was included as a mediator, the correlation between depressive symptoms and suicidal ideation significantly decreased, indicating that the effect of depressive symptoms on suicidal ideation was partially manifested through the cognitive triad. Another study similarly found that cognitive styles partially mediated the relationship between childhood emotional maltreatment and suicidality (Gibb et al., 2001). This result implies that future interventions should focus on teaching cognitive skills to assist school-aged adolescents in coping with depressive symptoms to reduce the risk of suicide.

The cognitive triad significantly and negatively moderated the relationship between depressive symptoms and suicidal ideation. In this study, a higher total score of the cognitive triad indicated a more-positive cognitive triad. Adolescents who had a lower level of depressive symptoms and a more-positive cognitive triad showed less suicidal ideation.

According to Beck's cognitive theory of suicide, cognitive distortion, such as hopelessness, plays a key role in driving suicidal ideation (Weishaar & Beck, 1992). Minkoff et al. (1973) indicated that suicide may be considered when "a pessimistic or hopeless individual expects or believes that nothing will turn out right for him, nothing he does will succeed, his important goals are unattainable, and his worst problems will never be solved". The suicidal individuals possess a unique cognitive dysfunction in solving their interpersonal difficulties (Beck, Rush, Shaw, & Emery, 1979). When their habitual cognitive strategies fail, they become paralyzed and view suicide as a desirable solution (Beck, Rush, Shaw, & Emery). Beck (1967) indicated that a negative cognitive triad is the central feature of depressive symptoms. Individuals with depressive symptoms tend to present a systematically negative cognitive bias, which results in a negative view of themselves, the world, and the future (Kaslow et al. 1992). For adolescents with higher levels of depressive symptom, interventions should be carried out to reduce cognition related to risk for suicide and to develop more-adaptive cognitive patterns (Maris, Canetto, McIntosh, & Silverman, 2000).

Including the mediator and moderator of the cognitive triad is crucial for developing a cognitive intervention that reduces suicidal ideation in school-aged adolescents. The study results may have implications for developing health policies related to the development of educational programs within the schools that go beyond the basic curriculum and include cognitive strategies for suicide prevention. However, this study was limited by our use of a

cross-sectional design. The influence of the cognitive triad in the relationship implies that the causality needs to be further explored using longitudinal and prospective designs.

Variables not included in the present study need to be included in future studies, such as suicidal attitudes, hopelessness, and self-esteem.

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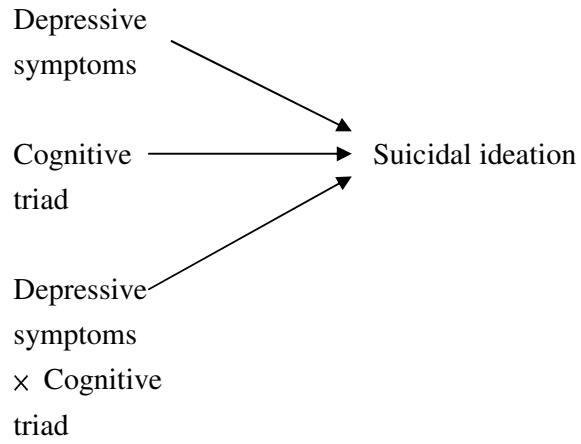
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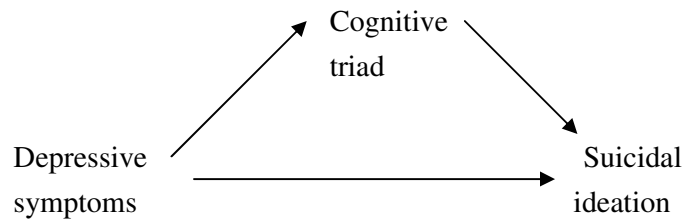
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(a) Moderated model



(b) Mediated model

Figure 1: Mediated and moderated models of components of the cognitive triad on the relationship between depressive symptoms and suicidal ideation.

Table 1
 Descriptive Statistics and Intercorrelations for the Study Variables ($N=1245$)

Variable	Depressive symptoms	Cognitive triad	Suicidal ideation	Mean (SD)	Alpha
Depressive symptoms	1.00			13.92(7.62)	.89
Cognitive triad	-.79**	1.00		46.11(10.66)	.89
Suicidal ideation	.68**	-.69**	1.00	28.00(8.99)	.89

** $p < .01$.

Table 2

Mediating Model		(N=1245)		
Predictor	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²
Dependent variable = Cognitive triad				
Depressive symptoms	-1.1	.02	-.79***	.62
Dependent variable = Suicidal ideation				
Step 1				
Depressive symptoms	.81	.02	.68***	.47
Step 2				
Depressive symptoms	.45	.04	.38***	.53
Cognitive triad	-.33	.03	-.39***	
Indirect			.30	

*** $p < .001$.

Table 3
 Moderating Model: Hierarchical Regression Analysis Testing the Depressive Symptoms \times
 Cognitive Triad Interaction in the Prediction of Suicidal Ideation ($N=1245$)

Predictor	<i>B</i>	<i>SE B</i>	β	R^2
Step 1				.53
Depressive symptoms	.45	.04	.38***	
Cognitive triad	-.33	.03	-.39***	
Step 2				.53
Depressive symptoms	.65	.08	.56***	
Cognitive triad	-.26	.04	-.30***	
Depressive symptoms X Cognitive triad	-.01	.00	-.14**	

** $p < .01$; *** $p < .001$.

