



## Parenting Behavior and Anxiety amongst Malaysian Adolescents

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### ABSTRACT

Structural equation modeling (SEM) was performed to test the hypothesized relationship between maternal and paternal parenting behavior and adolescents' anxiety. Probability proportional to size sampling (PPS) technique was used to identify 1,200 school-going adolescents (aged 12-17 years) from selected daily secondary schools in Malaysia. Data were collected using self-administered questionnaire that comprised questions on demographic information, Parenting Behavior scale, as well as Beck Anxiety Inventory-Malay (BAI-Malay). The structural modeling proposed that maternal and paternal hostility were found to be associated with higher levels of anxiety. Findings seem to indicate that low-quality of parenting behavior would put adolescent at an increased risk for subsequent anxiety problem. Implications are discussed in relation to efforts that would help to diminish internalizing problems in adolescents, particularly anxious symptoms.

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### Introduction

Children by entering into adolescence period face to challenges which may harm their coping skills and mental health. Accordingly, it is assumed that adolescents may be prone to confront ill-being in their development. In the case of Malaysia, it is reported that 13% of adolescents suffer from mental health problems (Malaysian Psychiatric Association, 2006). One of these health problems is anxiety that causes significant distress and interference and become a risk factor for the development of mental disorders in adulthood (Pine, Cohen, Gurley, Brook & Ma, 1998).

Anxiety is an affective disturbance and serious problem because it impact on self-esteem, social skills and occupational success. Adolescents possessing anxious symptoms often have negative beliefs about danger and uncontrollability situations as well as the fearful anticipation without a stimulus (Muris, Meesters, Schouten, Hoge, 2004). They are concerned excessively about their daily life events and future state (Wood, McLeod, Sigman, Hwang, Chu, 2003). The negative thoughts and beliefs make obsessive them in seeking approval and require reassurance about their performance and other worries. As a result, anxiety produces major disturbance in academic, social and interpersonal functioning of adolescents.

One of the critical factors that contribute in adolescents' anxiety is quality of parenting behavior (Baumrind, 1999; Maccoby & Martin, 1983; Bayer, Sanson & Hemphill, 2006). The research acknowledged that negative parenting behavior such as punitive disciplinary practices, less warmth, insecure attachment, parental rejection as well as parental control are the risk factors in developing children's anxiety (Barber, 1996; Bayer et al., 2006; McLeod, Wood, Weisz, 2007). Moreover, these dimensions of parenting are most often identified as the causal processes in children's anxiety symptoms expression (Steinberg, 2001; Rapee, 2004; Keller & Jensen, 2006). Therefore, this study proposes that the low-quality of parenting behavior is associated with high level of anxiety among adolescents.

Although, previous studies have looked at the direct associations between parenting behavior and adolescents' outcomes (Onatsu-Arvilommi et al., 1998; Muris, 2004), nevertheless; they have ignored the multidimensional nature of parental behavior. Therefore, contribution of this research is to examine the four dimensions of parenting behavior including parental warmth, hostility, consistent discipline and monitoring. In addition, it is necessary to examine the relationship between dimensions of parenting behavior and adolescents' anxiety in the collectivist cultural context of Malaysia.

### Methodology

#### Participants

The data for this study came from a larger data (Baharudin et al., 2010) on parenting and child outcomes. The current study utilizes data from selected schools in the state of Selangor including 1200 respondents between the ages of 12-17 (Mean = 14.25 years; SD = 1.271). A total of 640 respondents was from urban and 560 from the rural areas of Selangor. The sample consisted of 596 (49.7 %) were male and 604 (50.3%) were female. About 61.9% reported being Malay, followed by Chinese 20%, and India 18.2%. The participants were from intact families with moderate family size (Mean = 3.81 sibling, SD = 1.67). Table 1 illustrates the frequencies and percentages on the participants' demographic profile.

#### Procedures

In the current study, the sample under investigation included adolescents who are attending daily secondary schools in Selangor. The daily secondary schools were classified to rural and urban according to approvals obtained from Malaysian Ministry of Education (2007). The instruments were anonymous, and the students filled them out during the course of the normal school day. The adolescents were encouraged by a brief explanation concerning the purpose and the content of questionnaires. To ensure which the instruments were well understood and they were fully answered; members of the

research team stayed in their class. The instruments packet was contained from a Quality of Parenting Behavior scale, Beck Anxiety Inventory-Malay (BAI-Malay) as well as background information.

### Measures

#### Demographic

Students completed a demographic information form regarding to their age, gender and ethnicity. In addition, they provided information in the family profile including level of education and the income of their parents.

#### Parental Warmth/Support

Warmth/Support of maternal and paternal was measured by a child-report that assesses the extent to which the mother and father shows affection and concern for child. The measurement comprise of a four-item supportive which participants were asked to select one statement from each choices that best describe them during the preceding month when they had spent with their parent. According to previous studies the warmth/support scale had acceptable internal consistency (Simons & Conger, 2007). In the present study, Coefficient alpha was .81 for fathers and .77 for mothers.

#### Parental Hostility

Adolescent's report from hostile parenting assesses by a four-item scale in which adolescent identifies on the extent to which their mother and father displayed, hostility, anger, disapproving, and uninvolved behavior toward them. The Cronbach's alpha Coefficient was acceptable for the adolescents' reports about their mothers and fathers (Simons & Conger, 2007). In this study, also hostility scale had acceptable internal consistency, with a Cronbach's alpha Coefficient of .75 for fathers and .74 for mothers. The eight items of parental warmth and hostility were ranged on a 7-point rating scale consisted of 1(always), 2(almost always), 3(fairly often), 4(half of the time), 5(not too often), 6(almost never), and 7(never).

#### Parental Consistent Discipline

Participants used a four-item scale to represent rating the persistence of their mother's discipline (Magruder et al., 1992). The consistent discipline scale had acceptable internal consistency (Simons & Conger, 2007). In current study, Cronbach's alpha Coefficient was .68 for reports about fathers' and .70 for mothers.

#### Parental monitoring

Adolescents represented on mother's monitoring behavior using a four-item scale that assessed the maternal monitoring strategies and their knowledge, as well as the extent to which the mother pursued information concerning their children's activities (Magruder et al., 1992). According to studies of Magruder et al. (1992) the monitoring scale had acceptable internal consistency. In this research, the findings from reliability analysis also revealed an acceptable internal consistency including .71 for mothers and .72 for fathers (Table 2). The eight items of parental consistent discipline and monitoring were ranged on a 5-point rating scale consisted of 1(always), 2(almost always), 3(half of the time), 4(almost never), and 5(never).

#### Beck Anxiety Inventory-Malay (BAI-Malay)

The participants' symptoms of anxiety were assessed by Beck Anxiety Inventory-Malay (BAI-Malay) (Mukhtar & Zulkefly, 2011). The BAI-Malay is a self-report inventory that asked to rate the degree to which participant has been bothered by specific anxiety-related symptoms over the past week. The

items were measured on a scale of 1(not at all) to 4 (severely). Thirteen items describe physical or physiological symptoms (e.g. heart pounding), five represent cognitive aspects of anxiety (e.g. fear of the worst), and three have a physical as well as cognitive connection (e.g. terrified). The total score could range from 0 to 63 that would be categorized to low anxiety (<21), moderate anxiety (22 - 35) and potential cause for concern (36 - 63). In the present study  $\alpha$  reliability obtained is .90.

### Results

#### Descriptive Analyses and Correlations

Prior to analysis, means and standard deviations for all variables were performed. As illustrated in Table 3, the leading quality of parenting behavior was parental hostility of mothers and fathers. Furthermore, the results showed that adolescents in the current study possess relatively moderate anxiety symptoms.

Pearson correlations were calculated among all the variables of the study in order to assess patterns of associations among variables and are presented in Table 4. In line with Table 4, maternal warmth/ support were negatively correlated with adolescents' anxiety ( $r = -0.27$ ,  $p < 0.001$ ), which suggested that as mothers' warmth increased, levels of anxiety symptoms tended to decrease. In comparison, fathers' warmth did not have any significant relationship with adolescents' anxiety. Moreover, maternal hostility and consistent discipline had significantly association with anxiety, respectively ( $r = 0.13$ ,  $p < 0.05$ ) ( $r = -0.10$ ,  $p < 0.05$ ). The findings of this study also revealed that there was negative and significant relationship between paternal monitoring, anxiety ( $r = -.48$ ,  $p < 0.001$ ). In addition, paternal hostility has a positive correlation with adolescents' anxiety.

#### Structural Equation Analyses

Structural Equation Modeling was carried out with maximum likelihood estimation using AMOS 18 (Arbuckle, 2008) to test hypothesized model (maternal and paternal) of this study (Figure 1&2).

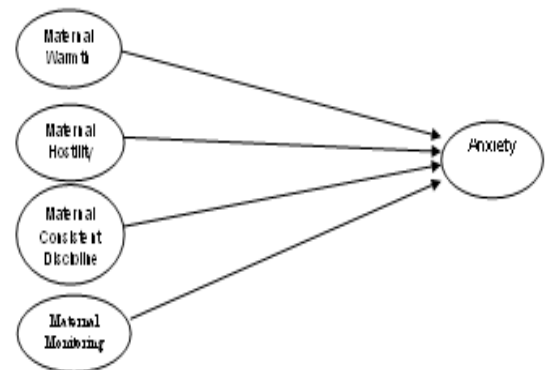


Figure1: The Hypothesized Model of Quality of Maternal Parenting Behavior, and Adolescents' Anxiety

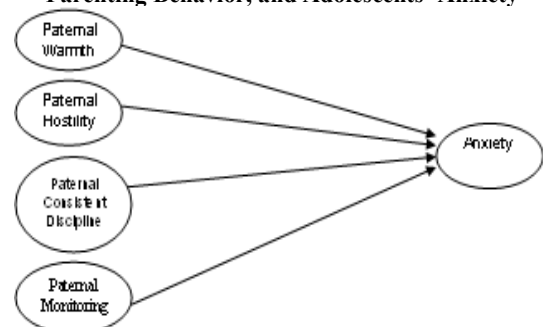
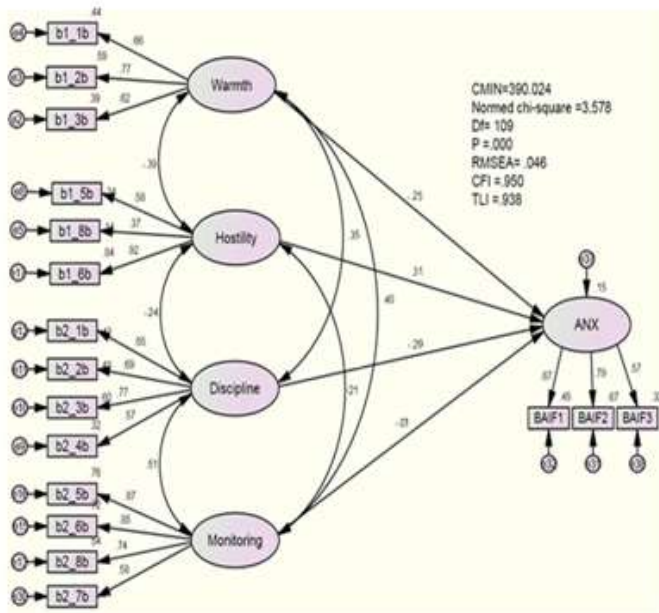


Figure2: The Hypothesized Model of Quality of Paternal Parenting Behavior, Adolescents' Anxiety

### Structural Model of Maternal Parenting Behavior and adolescents' anxiety

As it has been shown in Table 5, the proposed model of the study was consistent with the data. Using multiple fit indices (relative Chi-squared value = 3.578; RMSEA = .046; CFI = .950; TLI = .938), the model fit was adequate (Table 5). The results of all these goodness of fit criteria satisfied their critical cut scores and indicated a fitting structural modeling of maternal parenting and anxiety.

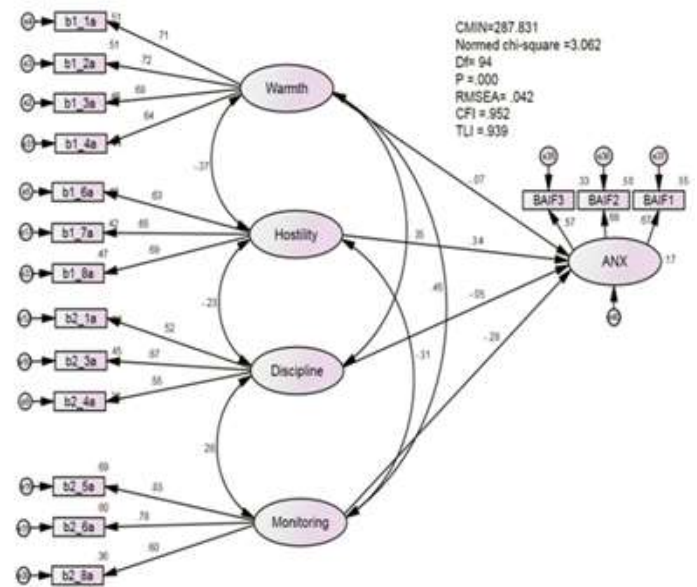
Based on the Figure 3, it is worth nothing that three path coefficients of the structural modeling were found to be statistically significant at .05 and .001 levels: 1) maternal warmth to adolescents' anxiety levels, 2) maternal hostility to adolescents' anxiety levels as well as 3) maternal consistent discipline to adolescents' anxiety levels. Moreover, the squared multiple correlation coefficients in the model indicated that 15% of the variance in adolescents' anxiety is accounted for by maternal behavior. Therefore, the findings of the study supported the significant role of maternal parenting behavior on the development of anxiety in Malaysian adolescents (Figure 3).



**Figure3: Standardized Coefficients of the hypothesized Model**  
**Structural Model of Paternal Parenting Behavior and adolescents' anxiety**

The Table6 presents the fit indices for structural model. Baseline comparisons fit indices (Chi-squared value = 3.062; RMSEA = .042; CFI = .952; TLI = .939), the confirmatory modeling produced consistency of the hypothesized model with the data.

The results of Figure 4 had showed that hypothesized model was consistent with the data. In other words, paternal parenting behavior directly and significantly influenced anxiety in adolescents. Two path coefficients of the structural modeling were explored to be statistically significant at .05 and .001 levels: first, paternal hostility to adolescents' anxiety levels and second paternal monitoring to adolescents' anxiety levels. In addition, the squared multiple correlation coefficients in the structural model indicated that 17% of the variance in anxiety is accounted for by paternal parenting behavior (Figure 4). However, the findings of the study supported the significant role of paternal parenting behavior on the development of anxiety.



**Figure4: Standardized Coefficients of the hypothesized Model**  
**Discussion**

The current study was acknowledged for a model whereby perceived maternal and paternal parenting behavior significantly predicted anxious symptoms during adolescence. These data support theories of the role of parental behavior on the development, maintenance, and amelioration of adolescence anxiety (Manassis & Bradley, 1994; Craske, 1999; Vasey & Dadds, 2001; Hudson & Rapee, 2004) and are coincide with some longitudinal examinations in early adolescence (Pedersen, 1994; Rubin et al., 1991). In fact, negative parenting behaviors including parental hostility, less warmth as well as parental rejection are related to increase susceptibility to anxiety amongst adolescents (Clark & Ladd, 2000; Wood et al., 2002; Reitz et al., 2006). Therefore, parental hostility is acknowledged to put adolescents at an increased risk for developing anxiety symptoms.

In addition, the findings of this study showed that paternal monitoring can reduce adolescents' vulnerability to anxiety, since parent effort to solicit information from adolescents and supervise adolescents' activities. This result is consistent with the last studies (Crouter et al., 1990; DeVore & Ginsburg, 2005; Bean et al., 2006) that demonstrated parental monitoring is related to better adjustment and a positive self- concept in adolescents' development, a period accompanied by heightened conflict in the parent-adolescent interaction (Crouter et al., 1990; Conner et al., 2009). This study also showed that neither the direct effect of paternal warmth nor consistent discipline predicted anxiety in adolescents.

A number of limitations of the study merit attention that should be considered in the future study. First, this study is limited by its cross-sectional research design with the purpose of examining the relationship between parenting behavior and anxiety and this design does not be able to extract causal associations from the results. Longitudinal studies need to be performed to further identify the relationships amongst parenting behavior and adolescents' outcomes. In addition, the data obtained about parenting behavior were assessed by perceptions of adolescents who may be reluctant to express their experiences. Therefore, it has been suggested that the data obtain



by using multi-informant (parent report and direct observations) will provide a valid measure of actual childrearing behaviors. Meanwhile, determining the role of actual paternal behavior is greater importance than perceived paternal behavior for clinical and preventive purposes (Garber, 2005).

Some contributions and strengths of this study provide confidence to the results presented herein. The main contribution of this study was a mixture sample by socio-economic compositions of secondary school students. Besides, this study simultaneously analyzed a compound of different constructs: dimensions of parenting behavior and anxiety. This combination of different constructs relates to introduce stronger knowledge for both parenting behavior and psychological health of school-going adolescents. These constructs have usually been interrogated individually in the previous researches (Qian, 2001; Steinberg, 2001; Operario & Bridges, 2006).

## References

- Arbuckle, J. L. (2008). *AmosTM 16 user's guide*. Chicago: SPSS.
- Baharudin, R., Tan, J. P., & Zulkefly, S. (2010). *Benchmarking the quality of parenting behavior and its correlates to adolescents well-being: Implications for enhancing human capital development*. Unpublished research report. Selangor, Malaysia, University Putra Malaysia.
- Barber, B. K. (1996). Parental psychological control: Revisiting a neglected construct. *Child Development*, 67(6), 3296-3319.
- Baumrind, D. (1991). *Effective parenting styles during early the early adolescent transition*. In P. A. Cowan & M. E. Hetherington (Eds.), *Family transitions: Advances in family research* (Vol.2, pp. 111-164). Hillsdale, NJ: Erlbaum.
- Bayer, J. K., Sanson, A. V., & Hemphill, S. A. (2006). Parent influences on early childhood internalizing difficulties. *Journal of Applied Developmental Psychology*, 65, 156-170.
- Bean, R. A., Barber, B. K., & Crane, D. R. (2006). Parental Support, Behavioral Control, and Psychological Control among African American Youth: The Relationships to Academic Grades, Delinquency, and Depression. *Journal of Family Issues*, 27, 10 1335-1355.
- Clark, K. E., & Ladd, G. W. (2000). Connectedness and autonomy support in parent-child relationships: Links to children's socioemotional orientation and peer relationships. *Developmental Psychology*, 36, 485-498.
- Conner, B. T., Stein, J. A., & Longshore, D. (2009). Examining self-control as a multidimensional predictor of crime and drug use in adolescents with criminal histories. *Journal of Behavioral Health Services and Research*, 36, 137-149. doi: 10.1007/s11414-008-9121-7.
- Craske, M. G. (1999). *Anxiety disorders: Psychological approaches to theory and treatment*. Boulder, CO: West view Press.
- Crouter, A. C., MacDermid, S. M., McHale, S. M., & Perry-Jenkins, M. (1990). Parental monitoring and perceptions of children's school performance and conduct in dual- and single-earner families. *Developmental Psychology*, 26, 649-657.
- DeVore, E. R., & Ginsburg, K. R. (2005). The protective effects of good parenting on adolescents. *Current Opinion in Pediatrics*, 17(4), 460-465.
- Hudson, J. L., & Rapee, R. M. (2004). *From anxious temperament to disorder: An etiological model of generalized anxiety disorder*. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (pp. 51-76). New York: Guilford.
- Garber, J. (2005). Depression and the family. In J. L. Hudson & R. M. Rapee (Eds.), *Psychopathology and the family* (pp. 225-280). Oxford: Elsevier.
- Keller, B. Lamm, M. Abels, R. Yovsi, J. Borke H. (2006). Cultural models, socialization goals, and parenting ethno theories: A multicultural analysis. *Journal of Cross-Cultural Psychology* 37 (2) (2006), pp. 155-172.
- Maccoby, E. E., Martin, J. (1983). *Socialization in the context of the family: parent- child interaction*. In P.H. Mussen (Series Ed.) & E.M. Hetherington (vol. Ed.), *Handbook of child psychology: vol.4. Socialization, Personality, and social development* (4th ed., pp. 1- 101). New York: Wiley.
- Magruder, B., Lorenz, F., Hoyt, D., Montague, R. (1992). *Dimensions of parenting: A technical report*. Ames, IA: Iowa State University, Institute for Social and Behavioral Research.
- Malaysia Psychiatric Association (M.P.A), (2006). A healthy mind in a healthy body, from [http:// www.psychiatryMalaysia.org /article. Aid =67](http://www.psychiatryMalaysia.org/article.Aid=67).
- Ministry of Education Malaysia. (2007). Secondary subjects. Ministry of Education Malaysia, (In Malay).
- Manassis, K., & Bradley, S. J. (1994). The development of childhood anxiety disorders: Toward an integrated model. *Journal of Applied Developmental Psychology*, 15, 345-366.
- McLeod, B. D., Wood, J., Weisz, J. R. (2007). Examining the association between parenting and childhood anxiety: a metaanalysis. *Clinical Psychology Review*, 27, 155-172.
- Mukhtar, F., Zulkefly, SH. (2011). The Beck Anxiety Inventory for Malays (BAI-Malays): A Preliminary study on psychometric properties. *Malaysian Journal of Medicine and Health Science*, Vol (7), 1, January, 73-79.
- Muris, P., Meesters, C., Schouten, E., Hoge, E. (2004). Effects of perceived control on the relationship between perceived parental rearing behaviors and symptoms of anxiety and depression in nonclinical preadolescents. *Journal of Youth and Adolescence*, 33, 51-58.
- Onatsu-Arvilommi T, Nurmi JE, Aunola K (1998) Mothers' and fathers' well-being, parenting styles, and their children's cognitive and behavioral strategies at primary school. *Eur J Psychol Educ* 13:543-556.
- Operario, D., Tschann, J., Flores, E., Bridges, M. (2006). Brief reports: associations of parental warmth, peer support, and gender with adolescent emotional distress. *Journal of Adolescence*, 29, 299-305.
- Pedersen, W. (1994). Parental relations, mental health, and delinquency in adolescents. *Adolescence*, 29, 975-990.
- Pine, D. S., Cohen, P., Gurley, D., Brook, J., & Ma, Y. (1998). The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *Archives of General Psychiatry*, 55, 56-64.
- Qian, M., Xia, G. (2001). The Relationship of Parenting Style to Self-Reported Mental Health among two subcultures of Chinese. *Journal of Adolescence*, 24, 251-260.
- Rapee, R. M. (2004). Potential role of child rearing practices in the development of anxiety and depression. *Clinical Psychology Review*, 17, 47-67.
- Reitz, E., Dekovic, M., Meiher, A. M., & Engels, R. C. M. E. (2006). Longitudinal relations among parenting, best friends, and early adolescent problem behavior: Testing bidirectional effects. *Journal of Early Adolescence*, 26, 272-295.
- Rubin, K. H., Nelson, L. J., Hastings, P. D., & Asendorpf, J. (1999). The transaction between parents' perceptions of their

children's shyness and their parenting styles. *International Journal of Behavioral Development*, 23, 937–957.

Simons, L. G., Conger, R. D. (2007). Linking mother-father differences in parenting to a typology of family parenting styles and adolescent outcome. *Journal of Family Issues*, 28, 212-240.

Steinberg, L. (2001). We know some things: Parent-adolescent relationships in retrospect and prospect. *Journal of Research on Adolescence*, 11, 1-19.

Vasey, M.W., & Dadds, M. R. (2001). An introduction to the developmental psychopathology of anxiety. In M.W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 3–26). Oxford: Oxford University Press.

Wood, J. J., McLeod, B. D., Sigman, M., Hwang, W. C., Chu, B. C. (2003). Parenting and childhood anxiety: Theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry*, 44(1), 134-151.

**Table 1: Respondents' Demographic Profile (n=1,200)**

Variables	N (%)	Mean	S.D	Min	Max
Adolescent's Age		14.31	1.21	12	17
Race					
Malay	742(61.8)				
Chinese	240(20)				
Indian	218(18.2)				
Adolescent's Gender					
Male	596(49.7)				
Female	604(50.3)				

Note: Min=Minimum, Max= Maximum, SD= standard deviation

**Table 2: Reliability and Validity Coefficients for study instruments**

Scale	Number of items	Alpha	CR	AVE
Quality of Parenting Behavior	16			
Maternal Warmth	4	.77	.79	.53
Maternal Hostility	4	.73	.71	.50
Maternal Consistent Discipline	4	.70	.77	.50
Maternal Monitoring	4	.71	.78	.51
Paternal Warmth	4	.81	.75	.52
Paternal Hostility	4	.69	.79	.56
Paternal Consistent Discipline	4	.68	.72	.50
Paternal Monitoring	4	.72	.77	.54
Beck Anxiety Inventory-Malay (BAI-Malay)	21	.90	.70	.52

Note: CR denotes Construct/Composite Reliability; AVE denotes Average Variance Extracted

**Table 3: Means, Standard Deviations, Min/Max of Scores for Main Variables (n=1,200)**

Scale	Mean	SD	Min	Max
Paternal Parenting Behavior				
Paternal Warmth	13.47	4.26	4	28
Paternal Hostility	18.66	4.78	4	28
Paternal Consistent Discipline	9.67	3.28	4	19
Paternal Monitoring	12.40	4.12	4	20
Maternal Parenting Behavior				
Maternal Warmth	14.67	4.74	4	28
Maternal Hostility	20.14	4.44	4	28
Maternal Consistent Discipline	12.76	3.94	4	20
Maternal Monitoring	10.95	4.80	4	20
Anxiety	37.04	11.44	21	82

Note: Min=Minimum, Max= Maximum

**Table 4: Cross Correlation Matrix among Indicator Variables (n=1,200)**

Variables	1	2	3	4	5	6	7	8
1. Paternal Warmth	-							
2. Paternal Hostility	-0.03	-						
3. paternal Discipline	0.05	-0.15*	-					
4. Paternal Monitoring	-0.06	0.01	-0.05	-				
5. Maternal Warmth	0.76**	-0.02	-0.04	-0.01	-			
6. Maternal Hostility	-0.17*	0.65**	0.15*	0.02	-0.18*	-		
7. Maternal Discipline	0.29**	-0.03	0.04	-0.25**	-0.13*	0.03	-	
8. Maternal Monitoring	0.16*	0.05	0.02	0.54**	0.05	0.02	-0.45**	-
9. Anxiety	-0.02	0.21**	-0.04	-0.48**	-0.27**	0.13*	-0.10*	-0.04

Note: \*  $p < 0.05$ ; \*\*  $p < 0.01$

**Table 5: Model Fit Indices for Hypothesized Model**

Direct Model	$\chi^2$	df	p	$\chi^2/df$	TLI	CFI	RMSEA
Quality of Maternal Parenting Behavior	390.024	109	.000	3.578	.938	.950	.046

Note:  $\chi^2$  = Chi-square; df = degrees of freedom; p = probability value; CFI = comparative fit index; RMSEA = root mean square errors of approximation; TLI = Tucker Lewis index.

**Table 6: Model Fit Indices for Hypothesized Model**

Direct Model	$\chi^2$	df	p	$\chi^2/df$	TLI	CFI	RMSEA
Quality of Paternal Parenting Behavior	287.831	94	.000	3.062	.939	.952	.042

Note:  $\chi^2$  = Chi-square; df = degrees of freedom; p = probability value; CFI = comparative fit index; RMSEA = root mean square errors of approximation; TLI = Tucker Lewis index.