

MATERNAL ATTACHMENT, EMOTION-REGULATION, AND COGNITIVE FUNCTIONING OF INSTITUTIONALIZED CHILDREN IN MALAYSIA

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Accepted date: 07 February 2018

Published Date: 11 July 2018

To cite this document: Mustafa, S. Z. S., Baharudin, R., & Mukhtar, F. (2018). Maternal Attachment, Emotion-Regulation, And Cognitive Functioning of Institutionalized Children in Malaysia. *International Journal of Education, Psychology and Counselling*, 3(15), 17-39.

Abstract: *The present study investigated the relationship between maternal attachment (i.e. trust, communication, and alienation) and cognitive functioning among the institutionalized children in Malaysia; and the mediating role of emotion-regulation on the relationships. A sample of 262 institutionalized children aged 7 to 12 was recruited via PPS sampling across Malaysia to answer the IPPA-R for Children, the Raven's CPM and the ERICA. Data were analysed using PLS-SEM in SmartPLS 3.0 software. Results revealed that alienation was positively correlated to cognitive functioning, whereas, insignificant relationship was found for trust and communication; and emotion-regulation was correlated to alienation and cognitive functioning. Findings suggested that alienation is a contributor of healthier cognitive functioning among the institutionalized children in Malaysia. Furthermore, the findings showed that a consequential role of emotion-regulation in influencing the association between alienation and cognitive functioning. In other word, children in the institutions are influenced through the efforts of modulate emotional arousal in order to aid better cognitive performance.*

Keywords: *Mother-Child Attachment, Cognitive Function, Emotion-Regulation, Maltreatment, Institutionalized Children*

Introduction

Four of ten Malaysians are facing mental health issue and the number continues to arise every year, which anticipates that at least 40% of the Malaysian will suffer from mental illness in their lifetime (D.Kanyakumari, 2017). Depression is a mental health issue that is common among adults and children including the institutionalized children. Mental health and depression are associated to cognitive functioning among youth and older people, in a way that higher cognitive functioning leads to better mental health. The youth were suffering from mental illness due to poor parenting and environmental factors. To date, prevalence of

depression among adolescents and children in institutional care was known but cognitive functioning of the children is not yet identified.

Cases of children abuse reported mother as the main perpetrator has increased alarmingly and has caused a major concern of the society. One of the reasons is incomplete formation of early attachment between mother and child that is vital for child's current and later functioning. Children in secure attachment excel in various developmental functioning when compared to those who are insecurely attached, who would experience lower cognitive functioning. Nonetheless, factors contribute to the institutionalized children's cognitive functioning, specifically, in the Malaysian context is less understood.

The purpose of this study is to investigate influence of maternal attachment in the institutionalized children's developmental aspects particularly emotion-regulation and cognitive functioning. Specifically, objectives of this study are to examine the differences in maternal attachment (i.e. trust, communication, and alienation), cognitive functioning, and emotion-regulation of the institutionalized children across selected child's personal characteristics (age, sex and number of children in family); to examine the relationships between maternal attachment and cognitive functioning in the institutionalized children; and to determine the influence of emotion-regulation on the relationships between maternal attachment and cognitive functioning.

Theoretical Background

The Piaget's (1960) cognitive theory and the Bowlby and Ainsworth's (1969) attachment theory build a useful model to study maternal attachment, children's emotion-regulation and cognitive functioning. Piaget held that cognitive functioning is a product of interaction between environmental influence and maturation of organism. The theory provides understanding that relations of environmental influence (i.e. maternal attachment) and biological maturation (i.e. children's emotion-regulation) lead to development of cognitive functioning.

Bowlby (1969) proposed that attachment formation between an infant and a primary caregiver occur during the infant's first year of life that remains as an important aspect across childhood and then lasting to adulthood. Infant has an innate tendency for proximity and emotional bond from their caregiver usually mothers, not only for oral needs, but also protection and reproductive attainment. Attachment influences various developmental aspects including cognitive development (i.e. cognitive functioning) and personality development (i.e. emotion-regulation).

Pattern of secure attachment encourages children to explore the environment and they tend to show better cognitive development. Other than cognitive development, the pattern of attachment also influences children's personality development such as self-concept. Children's self-concept (i.e. emotion-regulation) is influenced by the attachment relationship through the children's expectations of the parent's response behavior on children's emotion signals. Emotion-regulation then influences children's development in cognitive functioning.

Hypotheses

Hypotheses formulated were in accordance to the specific objectives (objectives 2, 3, 4 and 5) and hypothesis is not necessary for objective 1 as it is descriptive in nature. There are altogether 10 hypotheses formulated in the study that organized to four groups.

Objective 1: To examine the differences in maternal attachment, cognitive functioning, and emotion-regulation of institutionalized children across selected child's personal characteristics (age, sex and number of children in family).

Objective 2: To examine the relationships between maternal attachment (trust, communication, and alienation) and cognitive functioning in institutionalized children.

Hypothesis-Group 1:

- H1a: Children with trust attachment will more likely have higher cognitive functioning scores.
- H1b: Children with communication attachment will more likely demonstrate higher cognitive functioning scores.
- H1c: Children with alienation attachment will more likely demonstrate lower cognitive functioning scores.

Objective 3: To determine the relationships between maternal attachment (trust, communication, and alienation) and emotion-regulation in institutionalized children.

Hypothesis-Group 2:

- H2a: Children with trust attachment will more likely have higher emotion-regulation scores.
- H2b: Children with communication attachment will more likely demonstrate higher emotion-regulation scores.
- H2c: Children with alienation attachment will more likely demonstrate lower emotion-regulation scores.

Objective 4: To examine the relationship between emotion-regulation and cognitive functioning in institutionalized children.

Hypothesis-Group 3:

- H3: Children with higher emotion-regulation scores have higher cognitive functioning scores.

Objective 5: To determine the influence of emotion-regulation on the relationships between maternal attachment (trust, communication, and alienation) and cognitive functioning.

Hypothesis-Group 4:

- H4a: Maternal trust attachment is indirectly related to cognitive functioning of children via emotion-regulation.
- H4b: Maternal communication attachment is indirectly related to cognitive functioning of children via emotion-regulation.
- H4c: Maternal alienation attachment is indirectly related to cognitive functioning of children via emotion-regulation.

Literature Review

Institutionalizes Children Cognitive Functioning

In present study, cognitive functioning is defined as general ability, *g* (Raven, 2004) which was introduced by Spearman in 1927 to understand human intelligence. According to Spearman, *g* is a constellation of abilities needed by individuals to understand new situations, recall relevant

information, make judgement and store information (Raven, 2004). Raven added that amount of *g* is differ among children because it depends on children responses to experiences throughout their sensitive period (Raven, 2004). Experiences related to adverse care and lack of socio-emotional attachment impact neurocognitive development (Cardona, Manes, Escobar, López, & Ibáez, 2012).

Victimization experiences at early years of life cause negative changes to children's developing brain and disadvantages in various aspects of cognitive and school functioning. Children exposed to violence tend to perform poorly in mathematics, reading and perceptual reasoning (Perna & Kiefner, 2013). Coohy et al. (2011) reported that better cognitive functioning avoids children from school problems such as less attentive, higher suspensions and absenteeism, lower grades and poorer test scores. Bucker et al. (2012) reported lower intellectual functioning scores and attention impairment in children with history of childhood trauma. Further, Coohy et al., (2011) found the maltreated children had inferior daily living skills and lower intelligence. Hence, this indicates that cognitive functioning is complementing to school functioning and a vital ability to excel in school related tasks that victimization experiences such as abused and neglected weaken children's cognitive development.

Not only that, cognitive functioning is a vital ability to complete life related tasks. Tasks such as decision making about balanced food to consume, recall information about roads to reach a place, and remember important people's birthdays require cognitive functioning to be completed (Hamid et al., 2011). Unfortunately, cognitive functioning appears discrepancy in the maltreated children. The children tend to show low memory, deficits in language, response inhibition, attention deficits and emotion discrimination (Bücker et al., 2012; Hart & Rubia, 2012; Perna & Kiefner, 2013). The maltreated children also reported as having difficulties in behaviour and emotional functioning (Lowell, Renk, & Adgate, 2014). In summary, the maltreated children's dysfunction in many aspects including low cognitive functioning that constraint them to perform well in day-to-day activities.

In Malaysia, increasing of child maltreatment cases every year leading researcher to conduct studies for better understanding of the maltreated children. A series of children maltreatment research have been conducted to investigate the subject. Ahmed et al. (2015) stated that studies on child maltreatment are common in Western countries but not in Malaysia. The children need loving, peaceful and conducive environment for a positive and healthy development as children's development, brain and behaviour are shaped by life experiences during childhood. Tay et al., (2016) found that 5836 paediatric patients were admitted to hospitals emergency department due to trauma and of the cases 742 patients traumatised of brain injuries. Wan Salwina et al. (2014) found prevalence of depression among children and adolescents in residential home in Ulu Kinta, Perak was 9.8% and 43% of the residents had history of abuse that depression is common among adolescents living in the residential homes.

Child maltreatment contributes to negative outcomes to children. Filzah & Taib (2015) stated that child abuse could affect children's physiological and mental in long run, which leading to problems such as aggression, impulsivity, low self-esteem and anxiousness. Islam (2014) stated that child maltreatment impaired physical and mental health, and social and occupational outcomes that could weaken a country's economic and social development. Islam added that the maltreated children are more likely to have poorer physical and mental health outcomes; social difficulties. The social difficulties include insecure attachments with caregivers, cognitive dysfunction, and negative impact of excessive stress on brain development. This

means that child maltreatment leading to destructive children's cognitive, emotion, and behaviour.

Past studies have found that the reasons of abuse are related to financial and family factors. Choo et al. (2011) found that low-quality of parent-child relationships, poor school and neighbourhood environments were associated to victimization. Shaari, Sa'aban, Harun, & Halim (2015) found significant relationships between inflation rate, unemployment rate and child abuse rate in long term besides established that increasing in child abuse rate was due to increase in unemployment rate in short and long term. Shaari, et al. (2015) stated that factors of child abuse were family matters, poverty, pressure, homelessness, community and social violence, lack of quality parenting time, stress and unemployment. Hussein, Ahmad, Ibrahim, Yusoff, & Ahmad (2016) found that ethnicity and parental conflict were main factors of maltreatment. This means that financial difficulties and dysfunctional family that direct to stress and depression in the family trigger the act of abuse.

Maternal Attachment and Cognitive Functioning

Literatures documented that secure and insecure attachment are associated to cognitive functioning. West et al. (2013) found that avoidant attachment pattern was not related to school performance or IQ whereas securely attached children at early years had better school performance and higher IQ scores in middle childhood. Avoidant attachment is a type of insecure attachment. von der Lippe et al. (2010) conducted a study on the influence of maternal attachment, maternal tutoring and executive functioning skills revealed that maternal secure attachment was associated with child cognitive executive functioning, besides, there was a strong correlation between maternal tutoring and children's executive functioning. Another study, Wacha (2010) studied on attachment patterns, and intelligence and academic performance in school age children found a low positive correlation between attachment pattern and crystallized intelligence that secure attachment associated with higher crystallized intelligence score when compared to the group of insecure attachment children. These mean that secure and insecure attachment have different impact on cognitive functioning.

Previous studies have revealed that secure attachment is associated with higher cognitive functioning while insecure attachment has been found to relate with deteriorate cognitive functioning. For example, Busch & Lieberman (2010) studied on mother' Adult Attachment Interview ratings and their preschool children's IQ revealed that children with secure attachment mother scored higher in Performance IQ, Verbal IQ, and overall IQ, when compared to children with insecure attachment mothers. Another study, Wellisch et al. (2011) established a significant relationships between children with secure attachment and high IQ, besides added that children of mothers with maternal depression showed internalising problems and writing disability.

Past research has revealed that association of maternal attachment and cognitive functioning among the population of institutionalized children is under-explored. More focus has been paid to children living with families rather than non-living such as the non-institutionalized children. Specifically, Busch & Lieberman, (2010) conducted study on preschool children, West et al. (2013) studied on infant to middle childhood, von der Lippe, et al. (2010) studied on infant and children, and mother dyads, Wacha (2010) studied on urban and suburban children, Wellisch, et al. (2011) studied on middle age children and parents. Due to that reason, this study is investigated the association of maternal attachment and cognitive functioning among the institutionalized children in Malaysia.

Although studies on association of maternal attachment and cognitive functioning among the school children have been conducted but the association of maternal attachment and cognitive functioning among the institutionalized children in Malaysia is not clearly known. Does consistency in result exist? To recap, the institutionalized children are children below 18 years old being reared in protection homes in Malaysia as ordered by the Malaysia court typically due to maltreatment cases. Studies showed that mental health issue in Malaysia continue rising every year and parents were stated as the main perpetrators of abuse in the statistics by the Department of Social Welfare causing worries to the nations. Giving the pressing need to investigate on the association thus this study investigates the association of maternal attachment and cognitive functioning among the institutionalized children in Malaysia.

Maternal Attachment, Emotion-Regulation, and Cognitive Functioning

Literatures have established the association of maternal attachment and emotion-regulation. Brumariu, Kerns, & Seibert (2012) found significant relationship of maternal attachment to children's emotion-regulation. Specifically, securely attached children were associated to less difficulty in identifying emotions whereas insecurely attached children were associated to more catastrophizing interpretations and less coping. Riva Crugnola et al. (2011) found that differences in the emotion-regulation strategies adopted by children varies according to quality of attachment. In addition, Roque, Verissimo, Fernandes, & Rebelo (2013) found differences in emotion-regulation (i.e behavioural strategies and emotional expressiveness) exhibited by the secure and insecure children. This indicates that states of emotion-regulation depend on pattern of attachment.

Emotion-regulation is associated to children's cognitive functioning. Past studies have linked differences in children's emotion-regulation to cognitive development (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Davis & Levine, 2012; Matthews, Ponitz, & Morrison, 2009; Valiente, Swanson, & Eisenberg, 2012). Davis & Levine, (2012). Specifically, emotion-regulation was positively associated to teacher's reports of children's academic success, productivity in classroom, early literacy and math scores. Davis & Levine, (2012) stated that children who could regulate their feelings had intellectual advantages more than those who had emotions continue to seek attention that an effective emotion management deliberates a wide range of interpersonal, academic, and mental health that benefits children. This means that emotion-regulation skill has been associated with better academic achievement.

Literatures are suggested that emotion-regulation is associated with both maternal attachment and children's cognitive functioning. In spite of that, empirical data to support the role of emotion-regulation as a mediating mechanism to the associations between maternal attachment and cognitive functioning are very limited. For example, West et al. (2013) studied children's self-regulatory characteristics such as inhibitory control and delay of gratification as mediator variables on the relationship between mother-child attachment and cognitive performance of children. West et al. (2013) found support for the mediation role of children's self-regulatory characteristics. Furthermore, Brumariu et al. (2012) examined the mediating role of emotion-regulation on the relationship of mother-child attachment and children's outcome in aspect of anxiety symptoms and found support for emotion-regulation as mediating mechanism. Thus, there could be an association between emotion-regulation and maternal attachment, which is investigated in this study.

Method

The present study was funded by the UPM Geran Putra – Institut Pengajian Siswazah (GP-IPS). This study employed a quantitative approach to test contextual of the Bowlby's and

Piaget's theories in Malaysia setting; and examine relationships amongst the study variables. Besides that, a correlational design along with a cross-sectional survey were adopted to facilitate collection of data set at one point in time with intention to generalize the findings to the whole population (Olsen & George, 2004). The location of study was institutional care or *Rumah Kanak-kanak* in six different states across Malaysia.

Sample

A total of 262 children in institutional care across Malaysia aged 7 to 12 years that matched inclusion criteria were selected as sample. The inclusion criteria were children being reared in institutional care governed by the Social Welfare Department, aged between 7 and 12 years on the day of data collection, and reported as neglected or abused by their primary caregiver.

Instruments

This study used The Inventory of Parents and Peer Attachment – Revised (IPPA-R, Parents scale) for Children to measure maternal attachment, The Emotion-Regulation Inventory for Children and Adolescents (ERICA) to measure emotion-regulation and The Raven's Coloured Progressive Matrices (RCPM) to measure cognitive functioning.

The Inventory of Parents and Peer Attachment – Revised (IPPA-R) for Children measures maternal attachment as perceived by children. The scale consists of subscales assessed attachment patterns of peers and parents. In this study, 28 items of the parent scale was used. There are 10 items for trust subscale, 10 items for communication subscale, and eight items for alienation subscale. Higher score for each subscale indicated a stronger attachment pattern of that particular subscale. In order to create consistency among the items, all items in alienation subscale (i.e. 9, 11, 12, 18, 19, 22, 25, and 27) and items number 3, 5, 7, 10 and 15 were reverse scored. These items were administered through three-point Likert-scale that ranged from 1 (never true) to 3 (always true). Gullone & Robinson (2005) reported the internal reliability of the trust, communication, and alienation are 0.78, 0.82, and 0.79, respectively.

The Emotion-Regulation Inventory for Children and Adolescents (ERICA) measures level of emotion-regulation of the children. The ERICA scale included 16 items. The ERICA consists of three subscales, namely emotional control (EC), emotional self-awareness (ESA) and situational responsiveness (SR). The subscales have seven, five and four items, respectively. In order to create consistency among the items, 10 items such as 5, 7, 8, 9, 10, 11, 12, 13, 14, and 16 were reverse scored. The items were summed to yield a total score that ranged from 16 to 80, for children's level of emotion-regulation. Higher score indicated stronger emotion-regulation while lower score indicates otherwise. The ERICA was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) with internal consistency of 0.75.

The Raven's Coloured Progressive Matrices (RCPM) measures children's level of cognitive functioning in this study and described as a good measure of cognitive functioning (Raven, 1936). The RCPM is to measure general intelligence or fluid intelligence (Orylska, Brzezicka, Racicka-Pawlukiewicz, Albinski, & Sedek, 2016) that contains 36 items in three sets of 12 items in each, which are A, AB and B. Discontinue rules are not applied that participants were allowed to continue answering the test even after they were not successful to answer the first three questions consecutively. The total score ranged from 0 to 36. Higher scores indicated greater level of cognitive functioning in terms of intellectual processes. The internal reliability for subset scores and overall score were between 0.70 and 0.87 (Hamid et al., 2011).

Procedure

Permissions to utilize and translate instruments from English to Malay language were obtained from authors via email, except for the RCPM as the permission was obtained at the purchased of the test battery. The instruments then were assembled and designed to fit the understanding level of primary school students. A forward-backward procedure was used to translate the instruments with help from experts in the field of Family and Parenting Ecology. In the procedures, the first panel translated an English version to Malay and the second panel translated it back to English. Then, an application to conduct research was submitted via online to the Department of Social Welfare (DSW).

Once permission was granted, an application to conduct the study was later sent to the Ethics Committee of Universiti Putra Malaysia (JKEUPM). Upon approval, a pilot study was carried out on 26 children selected from an institutional care in Kuala Lumpur that had similar characteristics to the actual study sample but was excluded in actual study. The questionnaires were amended and revised following feedbacks obtained from the participants and person-in-charge on the day of pilot study. After completion of preparation for actual study, letters were sent to the principals of six institutional care to set dates and time for data collection.

As for actual study, the data was collected using self-administered and researcher-administered questionnaires due to differences in literacy ability of the children. The participants from each institutional care were group into two, namely literate and non-literate groups, based on classifications given by counsellor in every institutional care. The self-administered questionnaires were given to the literate participants and they answered as soon after instructions were briefed out, whereas researcher-administered questionnaires were given to the illiterate groups, which the researcher read and simplified the questions and then filled in for them. Upon completion, all questionnaires were checked to minimize percentage of incomplete data. Finally, the participants were given tokens of appreciation.

Data Analysis

Data were analysed using two software, namely Statistical Package for the Social Sciences (SPSS) version 21.0 for Windows and SmartPLS version 3.0. The data analyses were conducted in four stages, namely data exploration and transformation, descriptive analyses, evaluation on measurement and structural models; and testing of mediation.

Data Exploration and Transformation

Missing data was minimal because the researcher had double checked all the returned questionnaires prior tokens were given out. Method of handling missing data was depending on the percentage of occurrence (5% threshold) and type of missing data. In the present study, the type of missing data was missing completely at random (MCAR) that is probability of missing data on dependent variable is unrelated to other independent variables as well as the dependent variable itself. Two methods are applicable in MCAR data, namely mean imputation method and listwise deletion. The mean imputation technique was applied on missing responses less than 5% that distributed evenly across the data. In the present study, total scores of responses per measure were divided by number of items of the particular measure for missing responses less than 5%. On the other hand, the listwise deletion was applied on missing responses more than 5% per measure or variable. An entire record or a case was deleted, which decreased results in sample size for further analysis. In this study, 35 cases deleted, which made the total number of cases for further analysis was 262 cases.

The data was evaluated for normality assumption based on two indicators, which were kurtosis and skewness; and bell-shape curve displays in histograms. According to Piaw (2013), a normally distributed data shows skewness and kurtosis values in the range of -1.96 to +1.96. Overall, the data distribution of measures (IPPA-R for Children and ERICA) used in this study were considered as normal except for the RCPM. Specifically, histograms of trust, communication, alienation and emotion-regulation show perfect bell-shaped curves, or data was normally distributed but the histogram of cognitive functioning shows a non-perfect normal distribution.

Descriptive Analyses

Descriptive statistics were used to investigate and describe variables distributional characteristics, such as personal (i.e. age, sex and race) and family (i.e. number of children in family), maternal attachment, emotion-regulation, and cognitive functioning. The statistics provides minimum, maximum, mean, standard deviation and variance values of all studied variables. Not only that, descriptive analyses were used for data screening and assumptions of normality and outliers. All reverse scored items were recoded into different variable using SPSS. Then, compute for total score for trust, communication, and alienation subscales; emotion-regulation and cognitive functioning. Since trust, communication, and alienation are from three different distributions, a standard score is needed to compare the three distributions directly to get the highest score. Thus, in this study, the three distributions were standardized into z-score then the highest score is the dominant attachment showed by the institutionalized children whereas the adjusted means is statistical average that have been corrected due to data imbalance, which would affect means of small population. The adjusted means were calculated using formulas as presented below and then the scores are reported in high, medium or low.

The independent samples t-test using SPSS software was used to examine differences in key measures (i.e. trust, communication, alienation, emotion-regulation, and cognitive functioning) among group of age (≤ 9 and ≥ 10), sex, and number of children (≤ 5 and ≥ 6). The test compares mean of two groups (i.e. age, sex and number of children) to identify significant differences in the means population. The Pearson correlation coefficient or zero-order correlation using SPSS was used to examine correlation between key measures (i.e. trust, communication, alienation, emotion-regulation, and cognitive functioning). The test was a preliminary analysis to provide information on relationships between key measures before further analysis.

Confirmatory Factor Analysis

This partial least square - structural equation modelling (PLS-SEM) method was employed as a non-normal data was detected for cognitive functioning variable. As for the constructs, the IPPA-R for children subscales (i.e. trust, communication and alienation) were measured separately and represent three constructs accordingly whereas the three subscales of the ERICA represent three indicators under emotion-regulation construct and three subscales of the RCPM represents three indicators under cognitive functioning construct. The present study utilized the terms, structural and measurement models to refer to the research model of the study tested in SmartPLS 3.0 software. Exploratory data analysis (EFA) was not conducted in this study because all scales used were established scales that not new scales (Azwadi Ali, 2010). Study by Zulkefily (2013), using Malaysian adolescents sample confirmed that based on the exploratory and confirmatory factor analysis, the three factors model had the best fit with the three dimensions of trust, communication and alienation, supporting Armsden and Greenberg's (1987) original finding.

Hair et al. (2014) illustrated that applying a PLS-SEM model involves six steps procedures. In a PLS-SEM model, there are two types of measurement models, namely reflective and formative models (Hair et al., 2014). The type of model to be drawn was determined by evaluation of measures items (i.e. IPPA-R, ERICA and RCPM). In the present study, all measurement models (i.e. trust, communication, alienation, ER and CF) were drawn as reflective models because this study is a social science study to test contextual setting of theories besides all indicators were found to not interchangeable among themselves. Thus, arrows in the measurement models were drawn as pointing to indicator variables (i.e. Total.Trust, Total.Comm, Total.Alien, Total.EC, Total.ESA, Total.SR, Total.A, Total.AB, and Total.B).

Additionally, in the reflective measurement model, reliability and validity were assessed to validate its consistency (Afthanorhan, 2013). There are two types of reliability, specifically internal consistency reliability and indicator reliability, and three types of validity, which are convergent, discriminant and construct validity. Once confirmed that the measures were reliable and valid, the next step was to assess the structural model. Assessment of the structural model was to determine suitability of empirical data to support the theory and decide if the theory selected for the study has empirically confirmed. The assessment involved examining the model's capabilities as predictor and the relationships between the constructs. The PLS algorithm was executed using a trial version of SmartPLS 3.0 developed by Ringle, Wende, & Becker (2015) on the structural model to estimate loadings of the indicators. Then, strength of the structural model was evaluated using a bootstrapping procedure running in the same software. Procedure for evaluating the structural model as illustrated by Hair et al. (2014) are as following: 1) check for collinearity issues, 2) assess significance and relevance of the relationships, 3) measure level of R^2 , 4) estimate effect sizes, f^2 and 5) evaluate predictive relevance, Q^2 , and q^2 effect sizes.

Additional part in the study other than assessing the significant relationships of the structural model, was testing of mediating effects. The mediating effects analysis procedure as illustrated by Preacher and Hayes (2008; 2004) emphasizes on bootstrapping the sampling distribution of the indirect effect. The bootstrapping was suited for PLS-SEM method because it makes no assumptions about the shape of the variables' distribution or sampling distribution of the statistics and can be applied to small sample sizes. Besides that, the approach demonstrates higher level of statistical power when compared with the Sobel test. Following Preacher and Hayes (2004), the mediation analysis procedure were illustrated in Figure 1:

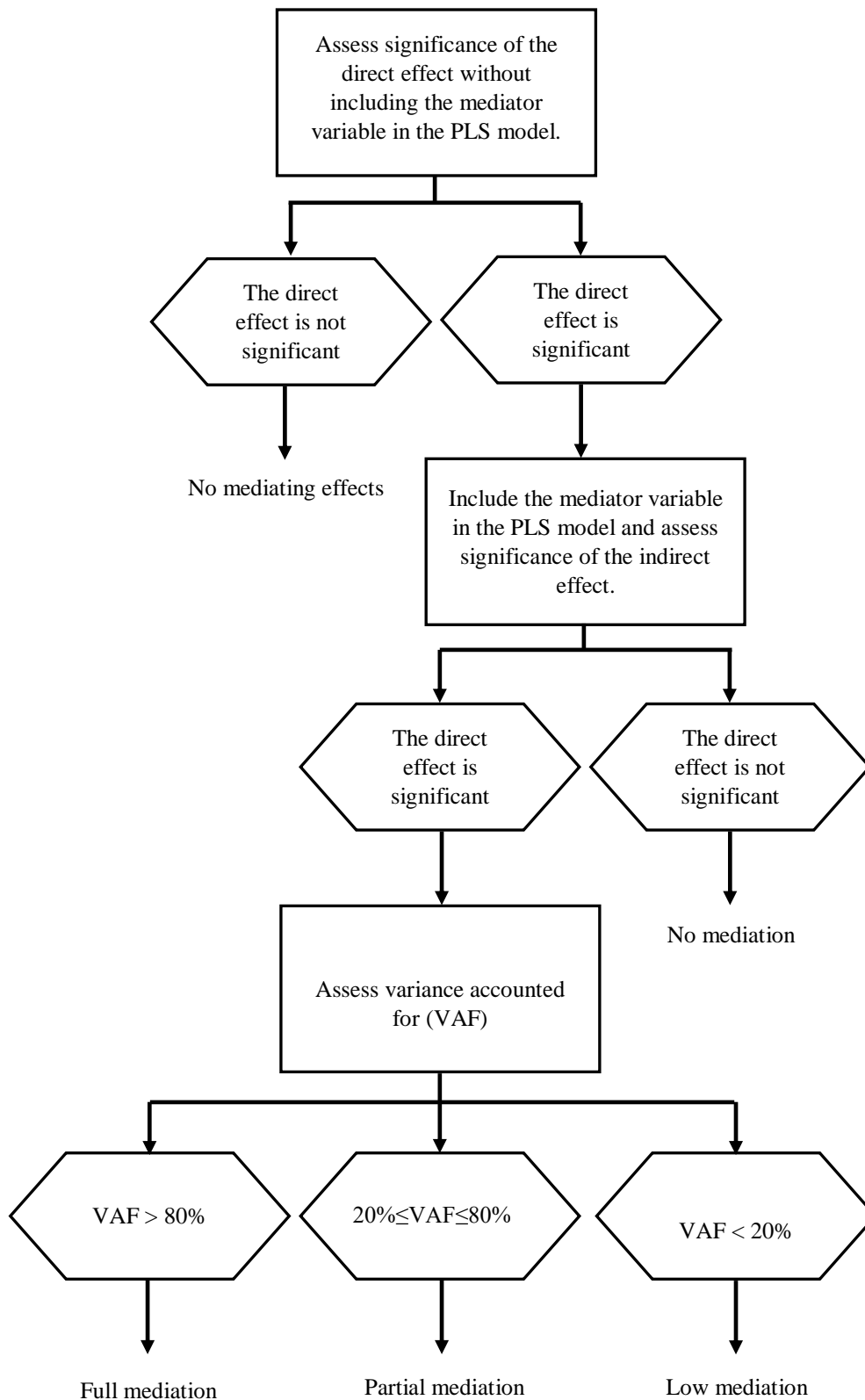


Figure 1. Procedure for Mediation Analysis

Results

Group differences in Maternal Attachment, Emotion-Regulation, and Cognitive Functioning

Age

Results of independent sample t-test indicated that there was a significant difference in alienation ($t = -2.045$, $p > 0.05$) in between younger and older institutionalized children. Specifically, mean of the older children is considerably higher than the younger, which suggested that alienation is more prevalence in older children aged 10 to 12 years rather than the younger aged seven to nine years. The finding concluded that maternal attachment exhibited by the older children is alienation, defined as feelings of isolation and separation between the institutionalized children and their mother. In other words, the older children feel more isolation and separation towards their mother as a result of being maltreated. In terms of cognitive functioning, there was a significant difference ($t = -6.16$, $p > 0.05$) across age of the institutionalized children that mean of the older children is higher than the younger. This finding indicated that cognitive functioning scores was higher among the older children as compared to the younger.

Sex

There was a significant difference in trust ($t = -2.52$, $p > 0.05$) between male and female institutionalized children, which means of the female children is slightly higher than the male children. This finding indicated that trust is more prevalence in female than male institutionalized children. The finding concluded that maternal attachment showed by the female children is trust, defined as understanding and respect between the institutionalized children and their mother that female children have understanding and respect towards their mother despite of being maltreated.

Number of Siblings

There was a significant difference in cognitive functioning ($t = 3.301$, $p > 0.05$) between few and many number of children in family of the institutionalized children that mean of the few number of children in family is higher than the many number of children. This finding suggested that the institutionalized children from family of few children tended to show higher cognitive functioning as compared to their counterpart.

Relationship between Maternal Attachment and Cognitive Functioning

As part of the preliminary analyses, the present study examined zero-order correlations amongst the key measures (trust, communication, alienation, emotion-regulation and cognitive functioning). Results from Pearson correlation analysis revealed that maternal attachment variables (trust, communication, and alienation) had moderate correlations with each other. Other than that, trust and alienation were found to have low correlations with emotion-regulation and cognitive functioning with magnitude of the correlations ranged from 0.154 to 0.237. Communication was found to correlate with emotion-regulation with magnitude of the correlations 0.135 but failed to have any correlation with cognitive functioning. The finding indicated that trust, a form of secure attachment leads to better emotion-regulation in children and contributing to cognitive functioning in the children. Previous studies found that a secure form of attachment contributes to positive development of emotion-regulation (Calkins & Johnson, 1998; Calkins & Hill, 2007; Smith et al., 2006) and cognitive functioning (Busch &

Lieberman, 2010; von der Lippe et al., 2010; West et al., 2013). Thus, this finding is consistent with past studies.

In contrast, alienation was found to have positive correlation with emotion-regulation ($r=0.235$, $p<0.01$) and cognitive functioning ($r=0.237$, $p<0.01$). This means that alienation between mothers and their children lead to better emotion-regulation and cognitive functioning. This correlational finding was consistent with past studies, which indicated that maternal attachment, specifically insecure attachment is related to emotion-regulation (Calkins & Hill, 2007; Calkins & Johnson, 1998; Smith et al., 2006), and cognitive functioning (Pechtel & Pizzagalli, 2011; Torres et al., 2012; Zaccagnino et al., 2015). This is because mothers of children in the institutional care were characterized as abusive mothers that separation from the mothers brought positive effects to the children. Further, result also found a correlational relationship between emotion-regulation and cognitive functioning ($r=0.148$, $p<0.05$), which suggested that a strong emotion-regulation fosters a high cognitive functioning. This correlational finding was consistent with past studies that positive emotion-regulation was related to better cognitive functioning (Bridgett et al., 2013; Davis & Levine, 2012; Matthews et al., 2009; Valiente et al., 2012).

Relationship between Maternal Attachment, Emotion-Regulation, and Cognitive Functioning

Relationship between Maternal Attachment and Cognitive Functioning

Path of alien. \rightarrow CF is statistically significant at $t>1.964$ (coefficient= 0.187 , $t=3.131$; $R^2=0.114$ $t=2.955$). This study found that alienation had relationship with the children's cognitive functioning. The alien. \rightarrow CF path had a R^2 of small-to-medium (Cohen, 1988) and a significant path coefficient. Although the path coefficient ($r=0.187$) shows a weak hypothesized relationship linking the constructs, the positive relationship is clear that the institutionalized children with alienation attachment obtained higher cognitive functioning scores. Thus, H1c was supported.

Literatures documented that secure and insecure attachment are associated to cognitive functioning. However, this study found no significant relationship of secure attachment (i.e. trust and communication) instead a significant relationship of insecure attachment (i.e. alienation) to cognitive functioning. This means that the finding for secure attachment is inconsistent with past studies while consistency was found for insecure attachment. Previous studies have revealed that insecure attachment has been found to relate with deteriorate cognitive functioning. Still, this study found inconsistency from previous studies as in this study, alienation is an insecure attachment lead to higher cognitive functioning scores. Besides that, finding of this study was inconsistent with West, Mathews, & Kerns (2013) that found avoidant attachment had no significant relationship with cognitive performance of middle-age children.

Relationship between Maternal Attachment and Emotion-Regulation

Examination on the structural model (see Figure 2) shown that trust (coefficient= 0.138 , $t=1.652$; $R^2=0.103$ $t=2.272$) was statistically not significant at $p<0.05$, $t<1.964$. The path of trust \rightarrow ER had a R^2 of small-to-medium (Cohen, 1988) and a not significant path coefficient. Therefore, H2a was not supported.

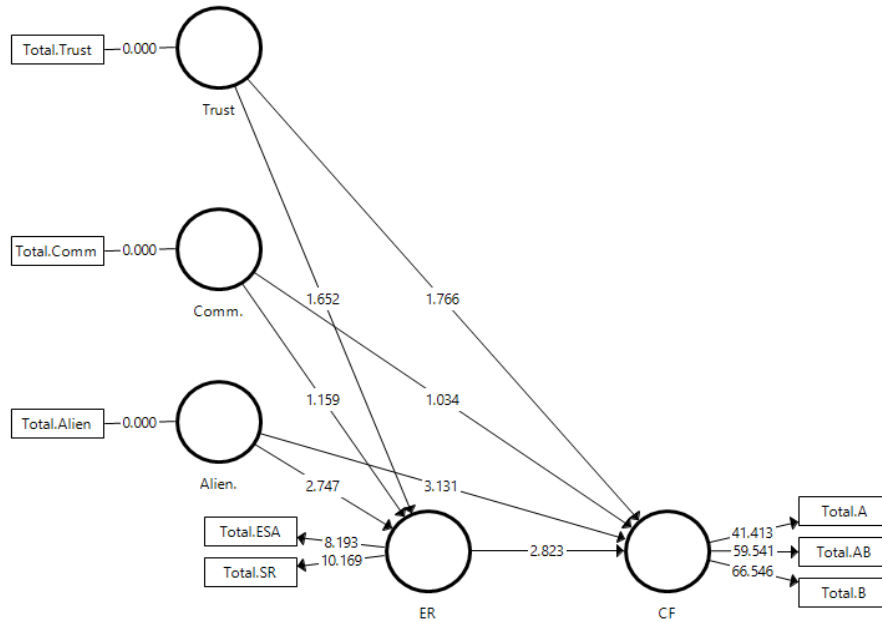


Figure 2. Structural Model with Bootstrapping Algorithm

The construct of communication (coefficient=0.083, $t=1.159$; $R^2=0.103$ $t=2.272$) were observed not statistically significant at $p<0.05$. The path of comm. \rightarrow CF had a R^2 of small-to-medium (Cohen, 1988) and a not significant path coefficient. Therefore, H2b was not supported.

This study found that alienation (coefficient= 0.184, $t= 2.747$; $R^2=0.103$, $t=2.272$) had significant relationship with the children’s emotion-regulation at $p<0.05$. The path of alien. \rightarrow ER had a R^2 of small-to-medium (Cohen, 1988) and a significant path coefficient. Although the path coefficient ($r=0.184$) shows a weak hypothesized relationship linking the constructs, the positive relationship is clear that institutionalized children in alienation attachment tended to obtain higher cognitive functioning scores. Thus, H2c was supported.

Relationship between Emotion-Regulation and Cognitive Functioning

This study found that emotion-regulation had a significant relationship with the institutionalized children’s cognitive functioning at $t<1.964$ (coefficient=0.180, $t=2.823$; $R^2=0.114$ $t=2.955$). The path of ER \rightarrow CF had a R^2 of small-to-medium (Cohen, 1988) and a significant path coefficient. Although the path coefficient ($r=0.180$) shows a weak hypothesized relationship linking the constructs, the positive relationship is clear that the institutionalized children obtained higher emotion-regulation scores attained higher cognitive functioning scores. Thus, H3 was supported.

Mediation Effect of Emotion-Regulation

Emotion-regulation was found to mediate the relationship between alienation and cognitive functioning. Earlier, the direct paths of Alien \rightarrow CF, Alien \rightarrow ER, and ER \rightarrow CF and indirect path of Alien \rightarrow ER \rightarrow CF were found significant (see Figure 3). Then, strength of the indirect effect was calculated using variance accounted for (VAF), which found that the value was 84%. As illustrated in Figure 1 (see Subsection 3.9.3), a VAF value more than 80% indicates a full mediation of the indirect path. Thus, the indirect path of Alien \rightarrow ER \rightarrow CF achieved a full mediation. The indirect effect implies that alienation causes emotion-regulation, which, in turn causes the cognitive functioning. Therefore, H4c was supported.

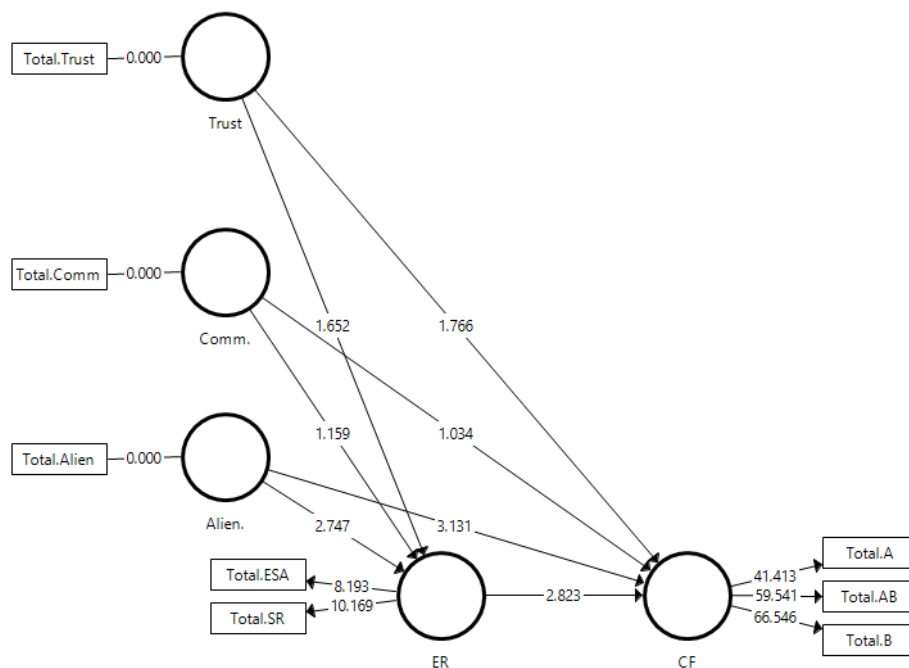


Figure 3. Mediator Model

Findings

The significant variable to test the relationship between maternal attachment (i.e. trust, communication, and alienation) and cognitive functioning was alienation. Literatures documented that secure and insecure attachment are associated to cognitive functioning (). In contrast, this study found no significant relationship of secure attachment (i.e. trust and communication) instead a significant relationship of insecure attachment (i.e. alienation) to cognitive functioning. This means that the finding for secure attachment is inconsistent with past studies (Milica, Aleksandar, & Tatjana; 2013) while consistency was found for insecure attachment (Lionetti et al., 2015; Zaccagnino et al., 2015). Previous studies have revealed that insecure attachment has been found to relate with deteriorate cognitive functioning. Still, this study found inconsistency from previous studies as in this study, alienation is an insecure attachment lead to higher cognitive functioning scores. Besides that, finding of this study was inconsistent with West, Mathews, & Kerns (2013) that found avoidant attachment had no significant relationship with cognitive performance of middle-age children. Nevertheless, this finding was consistent with Lionetti et al. (2015) and Zaccagnino et al. (2015) indicated the dominant pattern of attachment among the institutionalized children as insecure. This could possibly explain the non-significant relationship between communication attachment and cognitive functioning. This finding was inconsistent with previous studies by Milica et al. (2013) that secure attachment, which is developed in relation with a trusted caregiver, results in many advantages in children's cognitive development. Realizing that the children were taken out from their home and reared in institutional care due to negative relationship with their mothers, so attachment security is nearly impossible to be formed.

Alienation was a significant variable for maternal attachment (i.e. trust, communication, and alienation) and emotion-regulation relationship testing though the finding was not in expected direction. Previous studies found that insecurely attached children tend to demonstrate deficiency in their emotion-regulation. Conversely, in the case of children in institutional care, alienation leads to stronger emotion-regulation in the children. Thus, findings in this study

supported findings of previous studies (Stanojević et al., 2015), which found a direct and significant correlation between insecure attachment pattern and emotional competences of children. Secure attachment that leads to stronger emotion-regulation of the children are difficult to be formed among the institutionalized children due to disruption in formation of secure attachment with their mothers, which inhibited the development process of emotion-regulation.

Relationship between emotion-regulation and cognitive functioning. Past studies found that emotion-regulation is associated to children's cognitive functioning. The positive relationship between the institutionalized children's emotion-regulation and cognitive functioning was consistent with past studies (Bridgett et al., 2013; Davis & Levine, 2012; Stanojević et al., 2015; and Valiente et al., 2012). This finding implies that the institutionalized children's ability to control emotions arousal could promote them towards higher cognitive functioning.

The significant variable to test mediating effect of emotion-regulation on the relationship between maternal attachment (i.e. trust, communication, and alienation) and cognitive functioning was alienation. The finding was consistent with several past studies that found a significant indirect relationship of emotional aspect in between maternal variable and children's cognitive functioning (Alink et al., 2009; Brumariu et al., 2012 & West et al., 2013). This means that the role of emotion-regulation as a mediator on the relationship between maternal attachment and cognitive functioning was established.

Discussion

Attachment theory stated that a high quality of maternal attachment (i.e. secure attachment) tends to support child's ability to involve further in higher order cognitive processes, however among the institutionalized children, an insecure form of attachment (i.e. alienation) was evidenced to support the children's involvement in the cognitive processes. It is expected that the institutionalized children with alienation attachment show lower cognitive functioning scores because alienation is a type of insecure attachment. The Bowlby's attachment theory and previous study documented that children with insecure attachment show weaken cognitive functioning. In contrast, this study found that the children had alienation attachment and cognitive functioning scores were high. An explanation to this state is that the institutionalized children were maltreated by their mothers and separation from the negative source gave a positive impact to the children. Thus, among the institutionalized children, children with alienation attachment tended to show higher cognitive functioning scores. Wacha (2010) found that attachment patterns were not associated with fluid intelligence and not consistent with finding of this study. Fluid intelligence has same definition with general intelligence, and this study defined cognitive functioning as general intelligence. This means that fluid intelligence is cognitive functioning.

The second explanation for the high cognitive functioning among the children with alienation attachment is tendency of children to have multiple attachment. According to Commodari (2013), infants and young children usually have more than one selective attachment that effects their cognitive and social development. In this study, the children could have a secure attachment with the caregiver in the institutional care when the child were separated from their biological mothers. Kerns, Schlegelmilch, Morgan, and Abraham (2005) established that securely attached children had better academic achievement in school or higher IQ because they explore the environment willingly, experience with a sensitive and approachable caregiver, receive support from friends or teachers and optimistic about themselves. In this

study, the institutionalized children had higher IQ could be explained as caregivers in the institutional care are sensitive and approachable.

Considering population of the institutionalized children, Zaccagnino et al. (2015) found that child attachment is a predictor of short- and long-term psychosocial adaptation and cognitive functioning. Muris and Maas (2004) found that the children in institutional care exhibited insecure attachment and displayed higher levels of difficulties and lower levels of strength than their counterparts. This study found otherwise that was not consistent with findings by Muris and Maas (2004). Zeanah, Smyke, Koga, & Carlson, (2005) found that the children in institutional care showed serious attachment disorders as assessed by several methods while this study found the children had alienation attachment.

Literatures have established the association of maternal attachment to emotion-regulation (Brumariu, et al., 2012; Riva Crugnola, et al., 2011; and Roque, et al., 2013) that was consistent with finding of this study. In addition, past studies found that secure attachment is associated to strong and positive emotion-regulation (Calkins & Keane, 2006; Cassidy, 1994) whereas insecure attachment is associated to weak and negative emotion-regulation (Calkins & Hill, 2007; Calkins et al., 1998). This study found inconsistency from the past studies that alienation was associated to strong and positive emotion-regulation. Besides that, the past studies found that emotion-regulation is associated to children's cognitive functioning (Bridgett et al., 2013; Davis & Levine, 2012; Matthews et al., 2009; Valiente et al. 2012) that was consistent with finding of this study.

As for the indirect relationship, literatures are suggested that emotion-regulation is associated with both maternal attachment and children's cognitive functioning (West et al., 2013; Alink et al., 2009; Brumariu et al. (2012). Specifically, West et al. (2013) found support for the mediation role of children's self-regulatory characteristics on the relationship between mother-child attachment and cognitive performance of children. Alink et al. (2009) established the role of emotion-regulation as a mediator variable on the relationships of maltreatment effects and children's outcomes in terms of internalizing and externalizing problems. Brumariu et al. (2012) found support for the mediating role of emotion-regulation on the relationship of mother-child attachment and children's outcome in aspect of anxiety symptoms. Thus, past studies findings were consistent with this study's finding.

The significant link of indirect effect alien→ER→CF means that emotion-regulation could be the main component for developing interventions and treatment for the institutionalized children (MacKinnon et al., 2007; MacKinnon, & Dwyer, 1993) that focuses on a narrow range of emotion regulation processes, such as reappraisal. Currently, the most obvious type of emotion regulation intervention involves teaching more healthy patterns of emotion regulation (Gross, 2015). In this study, development of intervention with critical component on emotion-regulation would modify cognitive dysfunction of the institutionalized children due to interrupted maternal attachment. Not only that, alienation attachment that is separation for the abusive mother, promotes strong emotional control among institutionalized children and would be a protective factor towards the development of cognitive competences. Among the institutionalized children, alienation or separation from their mother would improve the children's emotion-regulation, then increased the children's cognitive functioning. According to Gross (2015), individual differences in emotion regulation are linked to a wide range of consequential outcomes. Gross (1998) introduced process model of emotion regulation that positive emotions can be increased both in the short- and longer-term through five families of

emotion regulation strategies (i.e., situation selection, situation modification, attentional deployment, cognitive change, and response modulation).

Interventions for developing cognitive functioning of the institutionalized children through emotion-regulation are child–parent psychotherapy (CPP) and psychoeducational parenting intervention (PPI) (Stronach, Toth, Rogosch, & Cicchetti, 2013). Stronach, et al. (2013) found that the CPP and the PPI groups demonstrated substantial increases in secure attachment at post intervention, whereas this change was not found in the community standard (CS) and the non-clinical (NC) groups. At follow-up, children in the CPP group showed higher rates of secure and lower rates of disorganized attachment than the children in the PPI or the CS group. Another intervention developed by Kovacs and colleagues (2006) was the Contextual Emotion Regulation Therapy (CERT) for emotion-regulation among children in depression. The intervention targeted cognitions as one of several emotion regulation domains, and cognitive skills (Compas, et al., 2014).

Conclusion

The purpose of this study is to explore associations between institutionalized children's maternal attachment (trust, communication, and alienation) and cognitive functioning, and mediation role of emotion-regulation on the associations. The examination of maternal attachment (i.e. trust, communication, and alienation), emotion-regulation and cognitive functioning in Malaysia revealed that alienation leads to higher cognitive functioning among older children with six and more siblings. Alienation also leads to stronger emotion-regulation and better cognitive functioning that evidenced the mediation role of emotion-regulation on the associations.

The significant maternal attachment variable in this study was alienation. Research finding was a significant relationship between alienation and cognitive functioning of the institutionalized children. The alienation is one of the maternal attachment variables. The finding indicates that separation between mother and child leads to higher cognitive functioning among the children. This finding is inconsistent with previous literatures. In contrast, absence of alienation between the children and their mother will lead to lower cognitive functioning in the children. Alienation is feelings of isolation and separation in the children of being apart from their mothers (Armsden & Greenberg, 1987). As alienation is a dimension of maternal attachment that two forms of attachment commonly identified, namely secure and insecure attachment. Due to classification by (Armsden & Greenberg, 1987), alienation is characterized as insecure attachment. The children who were maltreated by their mothers feel more secure after admitted to the institution. The feeling of secure towards new caregiver in the institution and close teacher-student relationship improvise cognitive development of the children. Unexpectedly, relationships between trust and communication with cognitive functioning of the institutionalized children failed to be evident in the present study.

The present research also found a significant indirect relationship between alienation, emotion-regulation and cognitive functioning. Emotion-regulation was tested as a mediator in the relationship of alienation and cognitive functioning. This finding indicates that alienation between the children will lead to stronger emotion-regulation, which in turn higher their cognitive functioning. In contrast, absence of alienation will worsen emotion-regulation yet shorten cognitive functioning of the children. As predicted, this finding is consistent with previous study. The finding provided empirical support to the notion that maternal attachment led to the development of emotion-regulation in children, which in turn served as a predictor to children's cognitive development. In the case of institutionalized children, alienation

categorized as insecure attachment improves children's ability to control reactions, which boosts better cognitive development when the self-view is positive.

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