



# Biosocial Interaction and Juvenile Delinquency Behaviors of Thai Juvenile Delinquents

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## Abstract

*The purpose of this research was to investigate the relationship between the executive function and domestic violence that influence self-control, antisocial behavior, and juvenile's delinquency behaviors. Samples of this quantitative study were collected from January to March 2014 with 294 children and adolescents age 14-19 years with the history of committing crime-related activities involving; property, life, sex, social security, reputation, illegal drugs, and weapon robbery. The measurement tools were self-report questionnaires and neuropsychological assessments. The statistical analyses used in this study were descriptive statistical analysis, factor analysis, and structured equation modeling. The results showed that adjusted structured equation model was corresponded to the empirical finding and the consistency index was in acceptable criteria. It was also found that inhibitory control, working memory, domestic violence, self-control, and antisocial behavior literally influenced delinquency behavior in children and adolescents. It is therefore crucial to consider neuropsychological factors as well as domestic violence history to prevent juvenile delinquency more effectively.*

Keywords: Executive Functions, Domestic Violence, Self-Control, Antisocial Behavior, Juvenile Delinquency.

## Introduction

Juvenile delinquency has long been considered a critical social problem. In Thailand, it was reported that this group of young offenders has tendency intended to solve their problems with violent behaviors (Office of the National Economic and Social Development Board, 2009). It is crucial that adolescents' crime and deviant behaviors should be resolve because it may pervasively impact the children themselves, their family, as well as, other people around them. Previous adolescent crime and deviant behavior studies mainly focused on sociological factors like socialization, sub-culture, group influence and neighborhood, etc. (Beaver, 2009). Thereafter, there was a development of criminological concepts corresponding to social context which saw a shift from Positivism to Modern era; the age of integrated body of knowledge. These integrated theories of criminology which looks at the analysis of causal behavior of human are far more complicated than looking at just a single aspect.

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Juvenile delinquency is derived from multiple factors. However, there is no specific factor which helps to determine the cause of deviant behavior. This study calls attention to the integrated theories which emphasized the importance of factors in relation to biological, psychological and sociological factors and explain the reaction of each factor which may influence the criminal behaviors; such as, Multifactor theories. In the past two decades, there are several interests expressed upon the reactions between biological factors and social factors which leads to person's behavior and increased of behavioral disorders, there were several study made to that issues (Beaver, 2009); such as, in a study of risk factor in juvenile's deviant behavior, it was found that personal factor which is the risk factor; such as, anti-social behavior, factors in relation to emotional stimulants and difficulties in deterring their behavior, low cognitive development, low intellectual quotient, hyperactive behavior. Risk factors in terms of family; such as, parenting patterns, torture and family violence, divorce, family structure, pathology of parenthood, teenage parents. Peers factor; such as, relationship with deviant peers group and being rejected from a group, for social and community factor; such as, lacking of relationship with school, poor academic performance, living in a poor family, bad neighborhood and disorganization community; including easy accessible to weapons (Loeber & Farrington, 2001).

Self-control theory (Gottfredson & Hirschi, 1990), theorized in integrating biological, psychological and social schemes, became imperative in criminology. They explained that people were more likely to commit crime due to the level of their self-control. With low self-control, individual might express impatience, risk-taking, self-centered, hot-tempered and impulsive physical responses, desires, which is a temporary satisfaction rather than emotional gratification. Low self-control and opportunity of committing crime could eventually lead to deviant behaviors (Gottfredson & Hirschi, 1990). The theory considers the attribution, which allows an individual to commit crime, will attach to the person itself (Wright & Beaver, 2005). It is the biological factor that drives us to behave in the impulsive, insensitive, risk taking, imprudent, non-verbal, excitement appreciated, hyperactive, and egocentric ways, influencing all types of crime committing decision. In addition, social factor; such as, family factor, peer and school are considered to influence levels of self-control as well (Gottfredson & Hirschi, 1990; Turner, Piquero, & Pratt, 2005). Gottfredson and Hirschi (1990) noted that social factors that cause poor self-control were due to the deprivation of being trained and the absence of good parenting during childhood (Child-rearing practice). With the lack of a very good care from parents and guardians and no proper punishment after committing wrongdoings or misbehaving comes low self-control in young people. However, studies have also found that biological factor do play a crucial role in self-control and it is possible that this factor may be even more important than social factor (Wright & Beaver, 2005). The results from the study of brain images shows that the neural psychology and brain research called "Executive function" of the brain acting as behavioral inhibition, self-regulation and self-control are actually working in the prefrontal cortex (Goldberg, 2001; Ishikawa & Raine, 2003; Aron, Robbins, & Poldrack, 2004).

Executive function could be viewed upon 3 core sides of prefrontal cortex; such as, Inhibitory control which refers to the ability to ignore any interference or the ability to control reckless behavior; working memory which refers to the ability to remember all sorts of things in order to build any task from their initiative ideas and the Cognitive flexibility refers to the ability to adapt, adjust their needs at any situation. Those elements

are advanced brain functions that served as a basis of the ability to plan, deal with problem and being reasonable (Randall & Thomas, 2009). While Moffitt, (Moffitt, 1990) explained that the Executive function will associate with the frontal lobes of daily routine management which may consist of sustaining and concentration, use of abstract reasoning and concept formation, goal formulation, anticipation and planning, effective self-monitoring of behavior and self-awareness and the inhibition of unsuccessful, inappropriate or impulsive behaviors by turning their behavior to something else. It could be seen that the concept of Executive function and self-control are crucial to the control of impulsiveness and the ability to control and maintain their intentions including anticipation in relations to behavior's outcome, emotional control and the inhibition of inappropriate behavior. The key concept is the view that if there would be a defect in terms of Executive functions and self-regulation, it may lead to deviant and violent behavior (Damasio & Damasio, 1994; Goldberg, 2001; Gottfredson, & Hirschi, 1990; Moffitt, 1990). The research also found that the failure of Executive function makes adolescent more vulnerable to behavior deviations, take part in unruly peers group, with low self-control, bad interpretation of society and bad social relationship (Roussy, & Toupin, 2000).

Many studies have reported on the relationship between the Executive function and anti-social behavior which may be associated with committing crime, deviant and aggressive behavior, unruly behavior disorders in children and anti-social personality disorder and the risk is relatively greater when the ability to inhibit behavior is minimal with impaired ability to predict the consequences of such behavior; including the shortcomings in the assessment of probable punishment or reward from such behavior (Seguin, 2008). The study found that the antisocial personality increase more chances in having criminal behavior and it provides a clear prediction towards aggressive and violent behavior (Samuels, Bienvenu, Cullen, Costa Jr., Eaton & Nestadt, 2004). It is mentioned in the textbooks of psychiatry that the antisocial personality do have important characters in that, the antisocial behavior, committing crime, no moral, ethics or conscience, no guilt and no responsibility mostly came from a negative relationship between parent and the child, child abuse, and the brain functioning. It was found that both biological and social factor was highly correlated with anti-social personality. In regard to biological factor; genetics, brain function and neuropsychological performance are crucial factors. In terms of social factor, wrong parenthood, social status and education are the key factors associated with antisocial behavior.

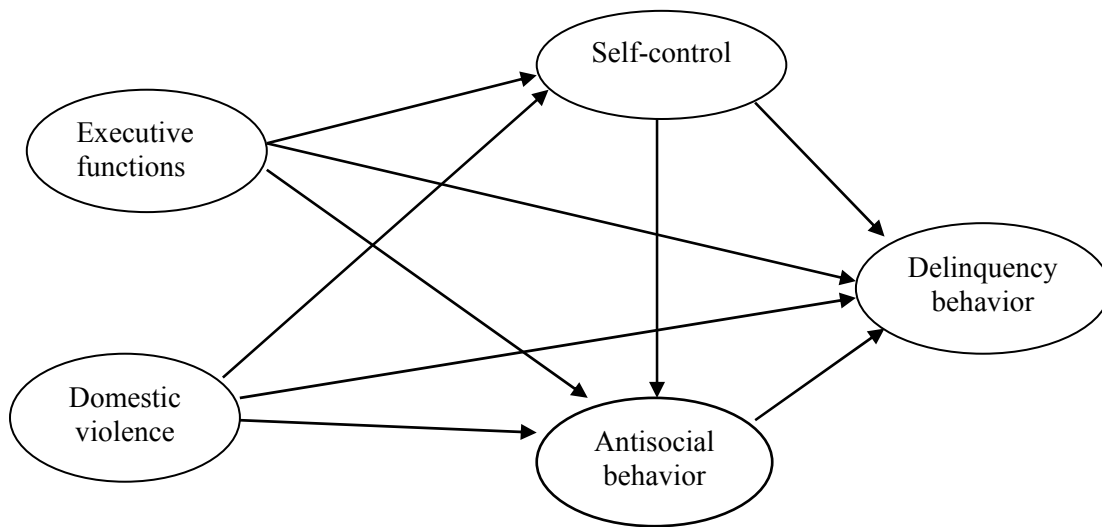
Executive function can be seen as a neuropsychological factor which is crucial to self-control and antisocial behavior of young offenders. Meanwhile, if we consider the social risk factor, we found that both self-control and antisocial behavior are correlated with domestic violence and maltreatment to a child. Owing to regular domestic violence such as, physical abuse, sexual harassment and psychological damage between members of the same family either to the children themselves or they are just a silent witness could be considered as a phenomenon that affects the behavior of the child and juvenile. This is because domestic violence allows the children to perceive that aggressive behavior is valid and can be used to solved the problem. There are several researches which found that juvenile offenders who later turn into criminal have often been physically, emotionally and sexually abuse or they have been neglect before and found that the children who have

been abuse have turned into juvenile with violent behavior than those who have never been abuse (Lewis, 2000).

International research has studied the interaction of neurological factor with social factors. It was found that there are interactions between impaired neuropsychological and social risk factors in predicting anti-social behavior specifically in youth and juvenile, for instance children and juvenile with high intellectual quotient may not increase the antisocial behavior even in high-risk situation (Vanderbilt-Adriance & Shaw, 2008). However, it was found that the social factor that may impede the ability of intellectual quotient of children is that the violence within the neighborhood (Sharkey, 2010) which is considered as important factor in significantly predicting anti-social behavior. Additional studies found that watching violence media and malfunctioning of Executive function is strongly associated with inappropriate behavior in children and the personality of the parents also relates to the performance of Executive function. Moreover, in the study of Lewis et al, (Lewis, Lovely, Yeager, & Della Femina, 1989) also predicts that the adult perpetrators also use the neuropsychological factor and the history of being abused in predicting tendency to commit crime significantly (Kronenberger, Mathews, Dunn, Yang, Wood, Larsen, et al., 2005).

In Thailand, there are still not many studies with regard to the interaction between neuropsychological factor and social factor. Therefore, this study aimed at analyzing the performance of Executive function and domestic violence which may influence self-control and anti-social behavior; including the severity of the deviant behavior of the juvenile. The aim of this study was to study the model of relationship between the performance of executive function and domestic violence which influence self-control, antisocial behavior and the seriousness of juvenile's delinquency behaviors. It was hoped that the findings would increase an understanding on the causes of youth crime in the issues related to neuropsychological factor; including reactions of factors in relation to neuropsychological factor and social factor which relates to juvenile offender and if applied such data may prevent crime which are committed by juvenile at-risk; including to comprehensive and efficient application with the planning in the rehabilitation of juvenile offenders.

**Figure 1. Hypothesis model**



The figure 1 presents the hypothesis model of those factors that are in relation to the performance of executive function and being exposed to domestic violence that correlates with self-control and antisocial behavior; along with juvenile delinquent behavior. The structural equation model was estimated to test the hypotheses on the full model fit.

## **Method**

### ***a. Participants***

The participants were children and adolescents, aged ranging from 14-19 in Juvenile Remand Home and Center of Juvenile Delinquency Probation under the authorization of Department of Juvenile Observation and Protection. Simple Random Sampling was applied in this study, from 52 juvenile observation and protection centers. Three centers sites were randomly selected. The inclusive criteria were literacy and volunteering to be part of the current study. After permission from the probations and remand centers, the data were then collected from January to March 2014 with 294 participants (196 males and 98 females).

### ***b. Research Tools and Procedure***

Self-rating questionnaires were handed out by a group of administration. The assessment of domestic violence, which the researcher developed, was in accordance to the Children Evaluation Guidelines exposing to domestic violence (Edleson, Ellerton, Seagren, Kirchberg, Schmidt, & Ambrose, 2007). The questionnaire consisted of 33 questions in 5 domains; the level of domestic violence (10 items), the level of exposure domestic violence (7 items), the level of violence involvement (4 items), the level of exposure other violence in community (8 items) and the level of victimization (4 items). The questions were Likert-type scale ranging from often (3) to never (1).

Self-control was assessed by the Self-control Assessment (Grasmick, Arneklev, & Bursik, Jr., 1999 cited in Wongupparaj & Suriyamane, 2011). The Thai edition was developed by Wongupparaj and Suriyamane (2011); its overall reliability was 0.871 comprising of 6 domains (24 questions) such as, Impulsive, Simple Tasks Preference, Risk-Taking Behavior, Physical Activities, Self-centered and Temper. The four-level of rating scale were, strongly agree (4), agree (3), disagree (2) and strongly disagree (1). The higher the score indicated the high level of low self-control.

Antisocial behavior was assessed by the Conduct problem questionnaire from a structured interview to assess the risk and need of the Department of juvenile protection and observation (2013) in the behavior problems of the 15 questions, full score for the assessment is 30 points. Never = 0, ever since 10 years old = 1 and ever before 10 years old = 2. High score referred high level of antisocial behavior.

The delinquent behavior questionnaire used to assess delinquent behavior by the researcher was developed upon the concept of the Carroll et al, (Carroll, A., Durkin, K., Houghton, S., & Hattie, J., 1996) which have divided the offenses into 7 areas: theft and burglary, motor vehicle offenses, drug-related offense, assault, vandalism, school-related offense and public disorder. The assessment consists of 38 questions which has 6 level of rating scales; asking the respondents in regard to various behavior they have and the severity of the offense. More than once per week = 5, more than once per month = 4, 1 times per month = 3, 4-6 times = 2, 1-3 times = 1, never = 0.

After the research tools were translated to English, the content validity assessment was done by a clinical psychologist, a child psychiatrist, and a linguistic expert. The tools then have been modified and improved. The reliability of the research tool was modified and examined for the Cronbach's alpha coefficient high score indicating that it was a very good measurement, it should be 0.60 - 1.00 (Rangsoongnern, 2011). The modified version was tried out with 30 juveniles that were not in actual sample group to improve reliability by examining internal consistency by considering Cronbach's alpha coefficients, and the results were 0.7-0.91 .

Three psychological assessments were exploited to the participants individually. The Stroop Color-Word Test (Stroop, 1935) was applied to assess the performance of the executive function, the inhibitory control. The A4 size paper test consists of three parts, each part contains one page and 100 stimulators a page. The first part was about to read the word in relation to colors (such as red, blue, green), which were printed in black and randomly arranged. Part 2 required those who took the test to inform the color that was printed in the piece of paper. Part 3 required the reader to read out the color that were printed (such as; the word "green" but printed in red, the reader must say that it is "red" color or the word "blue" but printed out in green color, the reader must say that it is "green"). The reader must complete each task as soon as possible; timing for each part was 45 seconds, scores added up from the number of correct word read out loud. The reliability of the test equivalent was 0.89, 0.84 and 0.73, respectively (Golden, 1978). The present study used only part 3 to assessing the inhibitory control, and the norm of the test was 25-31.

The digit span sub-test of WAIS-IV (Wechsler, 2008) was used to assess the performance of the executive function in terms of working memory. The test consists of three parts; Digit Span Forward: an individual who intends to test would speak out the numbers and ask the person who took the test to repeat after from number of 2-digit to 8-digit number, each digit shall be repeat 2 times, the number said correctly will be counted, Digit Span Backward: a person who intends to test was asked for taking the test to repeat the numbers from the last to the first number, starting from number of 2 digits to 8 digits, each digit must be repeated twice, the number said correctly would be counted and Digit Span Sequencing: an examinee needed to say the number first and was asked for repeating the numbers in sequence from the least number to the most number, starting from number of 2 digits to 8 digits, each digit shall be repeat 2 times, the number said correctly will be counted. Added up the scores of three parts together, the reliability of the test was equivalent to 0.89 (Nunnally, & Bernstein, 1994). All the three parts had been summed and compared with the age norm (0-20). The average was 10.

Wisconsin Card Sorting Test-64 (WCST; Susan, Laetitia, Grant, & Robert, 2000) was used to assess the performance of the executive function in term of cognitive flexibility. The pattern of the test was a 3x3 inch sheets, with 64 sheets needed to be used, each sheet was a symbol decorated with different colors and numbers. Symbols included stars, triangle and circle, number from 1 to 4, and colors (red, green, blue and yellow). Persons who took the test will be asked to pair the image sheet with the original image (Stimulus card), the answer would be given whether it was correct or not. The test would stop after the image sheets have all been tested or until it is correctly paired as in the criteria. The test would take around 20-25 minutes, both correct and incorrect answers were counted, and repeated answers. The score would be added up as required by the test manual. The reliability of the test was 0.74 (Susan, Laetitia, Grant, & Robert, 2000). Perseveration error

score was selected to measure cognitive flexibility, which could be done by comparing the raw score to the age norm. The normal score was 90-109.

Descriptive statistics were used to describe the general characteristics of the sample; including, gender, age, level of education. Structural equation modeling was used to study the relationship of the performance of the executive function, domestic violence, self-control and anti-social behavior which influences the severity of juvenile delinquency.

## **Results**

### ***i. Background characteristics***

The sample in this study was 196 males (66.7%) as the majority. 130 were in the age group of 14-17 (44.2%), while, 164 were in 18-19 age group (55.8%). For the educational history, 125 graduated primary school level (42.5%), 169 achieved high school education (57.5%).

### ***ii. Analysis of the Exploratory Factor Analysis (EFA) of latent factors***

#### *Domestic violence factors*

The Exploratory Factor Analysis (EFA) was examined. KMO and Barlett's Test was 0.761 ( $>0.60$ ), Chi-Square was 412.425 ( $p$ -value = .000,  $df = 10$ ). Cumulative Percentage and Factor loading presented the Eigenvalue of five domestic violence factors was 2.674, which could explain 42.816%. The Factor loading of 4 domestic violence factors; level of domestic violence, level of exposure domestic violence, level of involvement and level of victimization were more than 0.05. The other community violence factor as a result was eliminated (0.433). The reliability became 0.86.

#### *Self-control factors*

The Exploratory Factor Analysis (EFA) of self-control factor was examined. KMO and Barlett's Test was 0.761 ( $>0.60$ ), Chi-Square was 352.62 ( $p$ -value = .000,  $df = 15$ ). Cumulative Percentage and Factor loading presented the Eigenvalue of six self-control factors was 2.680, which could explain 44.671%. The Factor loading of 4 self-control factors; impulsivity, risk-taking behavior, physical activity and temper were more than 0.05. The simple task preference and self-centered factor as a result were eliminated (0.457, 0.450). The reliability became 0.83.

#### *Delinquent behavior factors*

The Exploratory Factor Analysis (EFA) of delinquent behavior factors was examined. KMO and Barlett's Test was 0.741 ( $>0.60$ ), Chi-Square was 586.25 ( $p$ -value = .000,  $df = 21$ ). Cumulative Percentage and Factor loading presented 2 Eigenvalues of delinquent behavior factor; 2.680, which could explain 44.671% and 1.407, which could explain 20.107%, with the total explanation power = 62.808%. The Factor loading of almost delinquent behavior factors was more than 0.05. The school-related offences as a result were eliminated because it was not in any factors and its factor loading was below 0.05. Accordingly, there were 2 factors of juvenile delinquency; 1) deviant behavior (motor vehicle offence, drug-related offence, and public disorder), and 2) criminal behavior (theft/ burglary, assault, and vandalism). The reliability became 0.86.

**Table 1. The Examination of the correlation between the variables**

Factors	1	2	3	4	5	6	7	8
1. Deviant behavior	1.00							
2. Criminal behavior	0.31**	1.00						
3. Domestic violence	0.30**	0.31**	1.00					
4. Self-control	0.18**	0.39**	0.35**	1.00				
5. Antisocial behavior	0.36**	0.26**	0.35**	0.27**	1.00			
6. Inhibitory control	-0.04	-0.13*	-0.05	-0.10	-0.17**	1.00		
7. Working memory	-0.09	0.11	0.12*	0.05	-0.16*	0.29**	1.00	
8. Cognitive flexibility	0.03	0.13*	0.09	0.05	0.01	0.06	0.06	1.00

\* $p < .05$  \*\*  $p < 0.01$

The table 1 demonstrated that low self-control and high antisocial were positively correlated with deviant behavior and criminal behavior with the statistical significance level at .01. This could identify that children with high domestic violence would possess deviant and criminal behavior. Moreover, domestic violence was found the positive correlation with low self-control and high antisocial behavior with the statistical significance level at .01, simply put; children with domestic violence would display low self-control and high antisocial behavior.

In executive functions performance, inhibitory control was negatively correlated with antisocial behavior, but positively associated with working memory ( $p > .01$ ). These meant children with high self-control would have better working memory and those with low inhibitory control would have high antisocial behavior.

**iii. Examination of the goodness of fit of the model**

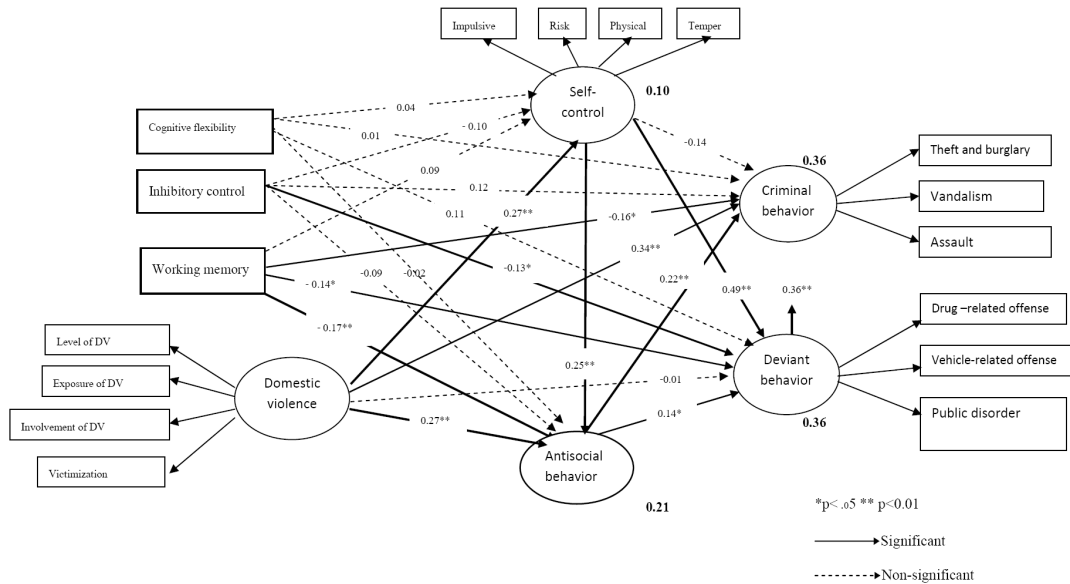
The result of hypothesis model showed that there was no congruence with the empirical data ( $\chi^2 = 262.384$ ,  $df = 112$ ,  $p$ -value = 0.00, GFI=0.91, CFI =0.89, RMSEA = 0.07,  $\chi^2 / df = 2.34$ )

Accordingly, the model has been adjusted by the Modification Indices (M.I.). The result showed that deviant behavior could lead to criminal behavior. Together with structural Equation Model adjusting to explain causal relationship of Executive function, domestic violence, self-control, antisocial behavior, and juvenile delinquency, correlation path from deviant behavior to criminal behavior has been added.

The adjusted model was presented in figure 2 displaying acceptable ( $\chi^2 / df = 2.24$ , RMSEA = 0.06, GFI=0.92, CFI =0.90).



Figure 2. Adjusted model



The result of the causal relationship and executive functions, domestic violence, self-control, antisocial behavior, and juvenile delinquency revealed that inhibitory control, working memory, domestic violence, self-control, antisocial behavior, co-explained 36% of the variance of deviant behavior as well as criminal behavior. Moreover working memory, domestic violence, and self-control co-explained 21% of the variance of antisocial behavior, while; domestic violence explained 10% of the variance of self-control.

The relationship structure demonstrated that low inhibitory control caused high deviant behavior and criminal behavior, while; poor working memory could lead to antisocial behavior, deviant behavior, and criminal behavior. High domestic violence caused low self-control, high antisocial behavior. Low self-control accompanied high antisocial influenced deviant behavior and criminal behavior.

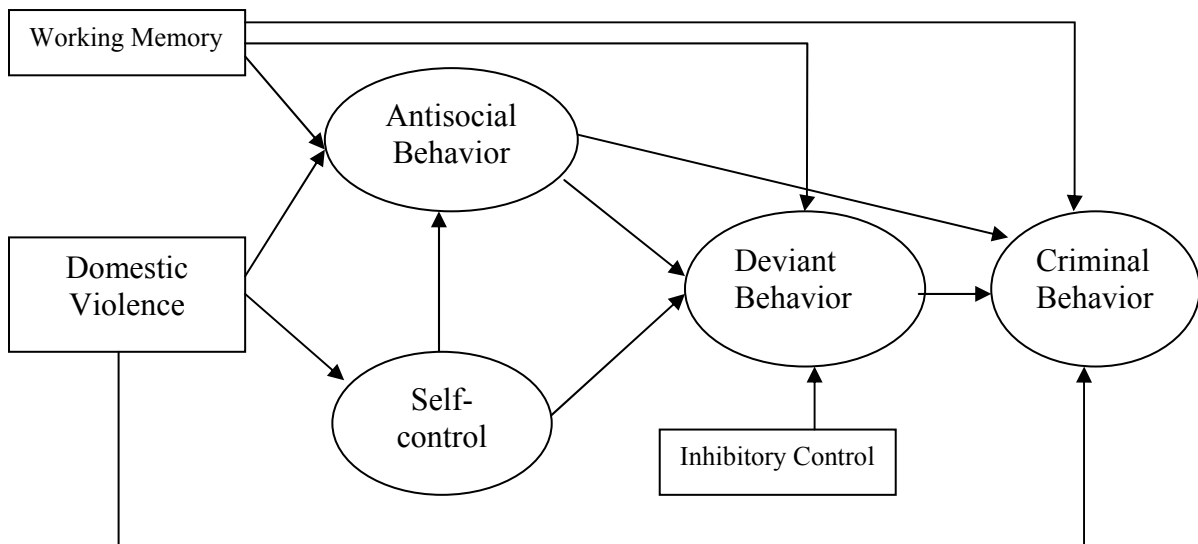
**Discussion and Conclusion**

The factor analysis in this research indicated that youth offending could be divided into two groups; 1) offence against illegal drug, motor vehicle, and public disorder, 2) theft/ burglary, vandalism, and assault. The researcher identified the first group as “deviant behavior”, behavior against tradition, culture, belief, and social norm, while; the second was “criminal behavior”, illegal behavior. The present study showed that deviant behavior has caused criminal behavior corresponding to the finding of Kanchanawong et al. (2006). Kanchanawong and colleagues noted that most young criminals committed theft/burglary offences in cooperating with peers. One-third of them had school refusal history; school boredom or hopelessness. Wage and amusement preference were likely to be found among these young people.

The present study displayed that the criminal behavior of the juvenile was influenced by firstly, domestic violence; secondly, deviant behavior; thirdly, low working memory. It could be explained that poor working memory in cooperating with domestic violence could lead to criminal behavior affecting antisocial and deviant behavior. However, youths

experiencing domestic violence or poor working memory without antisocial behavior or deviant behavior could display criminal behavior. These risk factors; domestic violence and poor working memory induced antisocial behavior, influencing criminal behavior. The study of 370 male Russian juvenile delinquents declared that 42% had post-traumatic stress disorder; most of these adolescent offenders had experienced violence and been abused. Besides, they had high novelty seeking as well as increased behavior activation, causing risk-taking behavior and violence preference (Ruchkin et al., 2002). The results was corresponding with the study of Kalayachit (2012), the route of criminal involvement in male juvenile delinquency was due to family factor. To illustrate this, the deprivation of domestic teachings as well as quality family time could drive young people to join the juvenile gangs, resulting in, misbehaviors; night agitating and alcohol using for instances. Apart from that, emotional, moody, irritability, hot temper and violence preference, in male offenders could trigger juvenile delinquency. Sriboonlue et al. (1997) noted that young criminals were brought up in a broken family or experienced domestic violence, they therefore have learned that committing violation was acceptable, resulting in, being captured.

**Figure 3. Factors influencing juvenile delinquent behavior**



The most influential factor causing deviant behavior in youths was self-control, inhibitory control, working memory, and antisocial behavior, respectively. It could be implied that the severity of deviant behavior was influenced by background characteristics; self-control, poor executive function (inhibitory control and working memory), and antisocial behavior. It was consistent to Loeber and Farrington (2000), there were several personal factors considered as risk factors; antisocial behavior, emotional sensibility, poor inhibitory control, poor cognitive development, low intelligence, and hyperactivity. Likewise, it has been reported that deviant behavior could transform to criminal behavior. According to Fischer, Barkley, Fletcher and Smallish (1993) and Frick (1998), adolescents with hyperactivity demonstrating conduct behavior could commit violence in adult. Consequently, early intervention could prevent forthcoming bigger crimes.

The result showed that domestic violence had no influence on deviant behavior; in a closer inspection, however, domestic violence might have some indirect impact through antisocial behavior and low self-control as shown in figure 3. Figure 3 showed that youth's deviant behavior was influenced by background characteristics; inhibitory control, working memory, self-control, and antisocial behavior. However, deviant behavior together with domestic violence experiences could induce severe criminal and illegal acts. This was coherent with theories of multifactor describing that the criminal behavior was on the multifactor basis, to identify the actual cause of committing crimes was complicated. The theory of biosocial criminology (Kevin, John & Matt, 2007) was applied to explain juvenile delinquency in this study, focusing on the integration of biological and sociological factors (Rudo-Hutt et al., 2011). It has been noted that these two major factors could provoke deviant and criminal behavior in the different levels (Rutter, 2006).

The present study was consistent to Ruengtrakul (1999), identifying the cause of conduct disorder; the integration of both nature and nurture dynamics. The factors were elaborated in three aspects; 1) biological (neurological impairment), 2) psychological factor (insufficient parenting style or a history of being abused), 3) social factor (seeking acceptance by joining a criminal gang). Hirschi and Hindelang indicated that young criminal with early onset denied any kind of relationship with others, while; self-centered behavior was increasing. Besides, low self-control was influenced by domestic violence. However, Moffitt (1990) cast the opposing view; self-control was driven by executive function in the frontal lobe. Recently, Cauffman, Steinberg and Piquero (2005) demonstrated that the brain function could predict the level of self-control. Displaying in a neuropsychological study of 3,000 children, it was furthermore exhibited that neuropsychological deprivation was associated with self-control (Kevin, John & Matt, 2007). The research confirmed the statistical significance relationship between executive function and self-control, and unlike the present results, emphasizing that only domestic violence influencing self-control, while; executive functions (cognitive flexibility, inhibitory control, and working memory) distributed no impact at all. This might be because one's self could be formed by cultural background especially among Asian countries.

Markus and Kitayama (1991) studied the interdependence of non-Western culture and revealed that surrounded people; parents, siblings, relatives, and friends all created one's self. Hence, domestic violence was considered as the most powerful factor towards self-centered personality. It was crucial to conduct the cross-cultural study regarding self-centered scheme. There were several social factors mediating the relationship between executive function and self-centered trait. This has been verified in the study of Vanderbilt-Adriance and Shaw (2008), high intelligent adolescents displayed low antisocial behavior in high-risk situation; high intelligence was the protective factor. It could be implied from this research that there were some mediate variables intervening the relationship between executive function and self-control in young people, for example; intelligence, educational background, and family attachment. However, Gottfredson and Hirschi (1990) mentioned that low self-centeredness was not the result of socialization or learning process, but, attachment, supervision, and discipline. Developmental studies reported that child neglect could affect low emotional control (Maughan & Cicchetti, 2002), antisocial behavior (Raskin & Spatz, 2003), and impulsivity (Hildyard & Wolfe, 2002). According to a general theory of crime of Gottfredson and Hirschi (1990), self-

control varied by individual differences, adolescents with low self-control were likely to display impulsivity, insensitivity, risk-taking preference, shortsighted, non-verbal, and criminal tendency. Moreover, low self-control children could not manage their emotion, as well as, abused adolescents, lack of interpersonal relationship, caused deviant behavior.

In conclusion, executive function and domestic violence mutually influenced juvenile delinquency. Criminal behavior was influenced by domestic violence, while; deviant behavior were predisposed by low self-control only. It could be implied that domestic violence was an essentially powerful feature. Accordingly, it was important to recognize that family factor was considered as one of the protective factors to prevent juvenile delinquency. In the executive function, poor inhibitory control and insufficient working memory directly influenced both criminal and deviant behavior, no matter, those young people had domestic violence, low self-control, and antisocial behavior or not. It would be greatly beneficial to have early detection and intervention preventing juvenile delinquency.

### Directions of Future Research

It was recommended to study in a larger group of children and adolescents, equally with more male and female samples to see sex differences more clearly. Future studies should take more personal background characteristics into account, for example; age of starting committing crime, age of going through domestic violence, intelligence, and child development co-morbidity (Learning disability, attention deficit, other mental health problems related to the performance of executive functions (depression, anxiety, and PTSD, etc.) It should take a serious look on psychosocial factors that might relate to neuropsychological factors.

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