THE INFLUENCES OF MUSIC TRAINING ON DECISION MAKING IN THAI ADOLESCENCE

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THE INFLUENCES OF MUSIC TRAINING ON DECISION MAKING IN THAI ADOLESCENCE

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ABSTRACT

Adolescent period is an important development phase in the human life span. During this period the reward and emotional brain becomes fully development, but the prefrontal cortex remains not fully developed. The prefrontal cortex becomes fully mature at 25 years old, therefore, the decision-making in adolescence is mostly lead by risk behavior. Several studies have found the advantage of music training in the promotion of the executive function that regulate the reward and emotional brain. This study is aimed at examining the influence of music training on decision making in adolescent by comparing the decision-making performance of the adolescent in musician and non-musician groups.

Ex post facto research design was applied to compare the mean of decision-making score between continuous musician training and non-music training group by using independent sample t-test statistic. A questionnaire was applied to collect data to analyze the difference in backgrounds regarding general information, family, health, and extra curriculum. Sample population of this study was composed of the total number of 76 students; 33 boys and 43 girls, in the 11^{th} grade. The target group refers to musician with four years or more training, which included 16 boys and 22 girls. The control group refers to non-music training which included 17 Boys and 21 girls. Iowa Gambling Task (IGT), a standardized test for decision-making evaluation was applied to calculate decision making score. The Independent sample t-test was performed to evaluate the mean differences of the dependent variables (IGT score) between the target and control groups.

This research found that continuous music training group showed higher means score of cool decision making than non music training group. The impact of this study suggests that extra curriculum activated in music training in school is advantage when promoting cool decision making in adolescence.

KEY WORDS: MUSIC TRAINING / DECISION MAKING /
IOWA GAMBLING TASK / ADOLESCENCE

71 pages

อิทธิพลของการฝึกดนตรี ต่อทักษะการตัดสินใจในเด็กวัยรุ่นไทย

THE INFLUENCES OF MUSIC TRAINING ON DECISION MAKING IN THAI ADOLESCENCE

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บทคัดย่อ

ในการศึกษาด้านพัฒนาการมนุษย์นั้น หนึ่งในช่วงวัยที่มีความสำคัญ นั่นคือ ช่วงวัยรุ่น เนื่องจากช่วงวัยรุ่นจะมีการเจริญเติบโตของสมองส่วนอารมณ์ที่รวดเร็วกว่าการพัฒนาในสมองส่วนหน้า (สมองส่วนกระบวนการรู้คิด) ซึ่งจะเจริญเติบโตเต็มที่เมื่ออายุ 25 ปี ซึ่งจะส่งผลต่อทักษะการตัดสินใจหรือการกระทำพฤติกรรมเสี่ยงในด้านต่างๆ การฝึกดนตรีอาจจะมีผลช่วยเพิ่มทักษะกระบวนการรู้คิดขั้นสูงให้มากกว่าสมองส่วนอารมณ์ ดังนั้นการศึกษาครั้งนี้จึงมีวัตถุประสงค์เพื่อศึกษาถึงอิทธิพลของการฝึกดนตรีต่อทักษะการตัดสินใจในช่วงวัยรุ่นโดยการเปรียบเทียบทักษะการตัดสินใจในวัยรุ่นที่ได้รับการฝึกดนตรีอย่างต่อเนื่องกับวัยรุ่นที่ไม่ได้รับการฝึกดนตรี

การศึกษาครั้งนี้เป็นการศึกษาเชิงย้อนรอยแบบติดตามผลกลุ่มเป้าหมาย และมีกลุ่มเปรียบเทียบซึ่งถูกนำมาใช้เพื่อเปรียบเทียบค่าเฉลี่ยคะแนนการตัดสินใจระหว่างกลุ่มวัยรุ่นที่ได้รับการฝึกดนตรีอย่างต่อเนื่องกับวัยรุ่นที่ไม่ได้รับการฝึกดนตรีโดยใช้แบบสอบถามเพื่อคัดผู้เข้าร่วมงานวิจัยโดยการสอบถามข้อมูลพื้นฐานภูมิหลังทางด้าน ข้อมูลทั่วไป, ข้อมูลด้านครอบครัว, ข้อมูลด้านสุขภาพ, ข้อมูลด้านกิจกรรมยามว่างอื่นๆ มีผู้เข้าร่วมงานวิจัยทั้งสิ้น 76 คน ซึ่งเป็นนักเรียนในชั้นมัธยมศึกษาปีที่ 5; สำหรับกลุ่มตัวอย่างเป็นนักเรียนที่เรียนอยู่ในโรงเรียนที่มีหลักสูตรการเรียนการสอนด้านดนตรีมีจำนวนทั้งสิ้น 38 คนเป็นเพศชาย 33 คนเพศหญิง 43 คน ในกลุ่มควบคุมเป็นนักเรียนที่เรียนอยู่ในโรงเรียนที่มีหลักสูตรการเรียนการสอนตามหลักสูตรของกระทรวงศึกษาธิการ จำนวนทั้งสิ้น 38 คน เป็นเพศชาย 16 คน และเป็นเพศหญิง 22 คน ได้ใช้เครื่องมือ Iowa Gambling Task (IGT) ในการวัดทักษะการตัดสินใจ และใช้สถิติ Independent Sample t-test ในการวิเคราะห์ค่าเฉลี่ยคะแนนการตัดสินใจ ระหว่างกลุ่มวัยรุ่นที่ได้รับการฝึกดนตรีอย่างต่อเนื่องกับวัยรุ่นที่ไม่ได้รับการฝึกดนตรี

ผลของงานวิจัยนี้พบว่าผู้ที่ได้รับการฝึกดนตรีอย่างต่อเนื่องจะมีคะแนนเฉลี่ยของการตัดสินใจที่ดีมากกว่าผู้ที่ไม่ได้รับการฝึกดนตรี และหลักสูตรการเรียนดนตรีนี้ส่งผลเพิ่มทักษะการตัดสินใจที่ดีในวัยรุ่น

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LIST OF ABBREVIATIONS

EF	The Executive Function
IGT	The IOWA GAMBLING TASK

CHAPTER I
INTRODUCTION

1.1 Background and Rational

In human development theory, there is a different development in throughout age periods. In each of age period is influence to quality of their lifespan. The development in each period is a milestone. Thus, we will be promoting the important factor about development for their complete maturation. One of the sensitive periods is adolescent that is changing in several systems that related to physical, emotional, social and cognitive. This change has been affected by physiology such as brain development effect to hormone change etc. The important of adolescent brain development is located on Pre-frontal Cortex and Limbic region. The limbic region was developing faster than Pre-frontal Cortex. Subsequently to influence decision making of risk behavior in adolescence such as drug abuse, unprotected sex and vice versa.(1). Pre-frontal Cortex, the latest maturation brain is most important region to up regulated executive function and reduce risk behavior in adolescence. The executive function is higher cognitive function. The executive function is composed of many skills that used for achieve goal in several situations such as Planning and organization, Inhibition, Attention, Working memory and Decision making.

Decision making is a process of higher cognitive function which works by means of to choose to do behavior or play a role in action in appropriate manner in each condition of situation (2). It is regarded to continuous process and it always come out with outcome. It is also regards to the problem solving with they are becomes all set by satisfy outcome (3). The decision making pathway is controlled by many brain regions. The predominant works in the decision making pathway is Pre-frontal Cortex as following, premotor cortex , dorsolateral prefrontal cortex (DLPFC) ; active in decision making process which predominantly on motor action regards to largely autonomous and autonomic fashion (The extended dorsal pathway ; E- dorsal). The ventrolateral pre-frontal, inferotemporal cortex (IT) are active in a primarily function

to deliberate decision and inhibit behavior (4) and adjusts information of each events decision, and decision plasticity (2). The characters decision making is two type, First, Hot or Effective decision making that controlled by limbic region such as Amygdala, ventral striatum (nucleus accumbens). Second, Cool or Cognitive decision-making that controlled by Pre-frontal Cortex such as Anterior cingulate cortex (ACC), Orbitofrontal cortex, dorsal striatum, for instance. (5-9). The different characters of decision making is affect to decision making performance because good decision making is required learning process after decision making for evaluate outcome and refer to other option that no chosen so necessary for the next decision making. This learning process is controlled by Pre-frontal Cortex which then be make a good decision making performance based on effective of Pre-frontal Cortex. Decision making performance has been described by higher function of (Pre-frontal Cortex) such as anterior cingulate cortex (ACC), Orbitofrontal cortex and medial prefrontal cortex than bad decision-making performance (10). The Pre-frontal Cortex is important region to control executive function and Cool or Cognitive decision making that means an effect to good decision making performance. In addition to the Pre-frontal Cortex is also involved to motor control such as timing, Sequencing of music performance or listener (11). The Right Pre-frontal Cortex is involved in the control of non-metric rhythm perception (12). The Rostromedial pre-frontal cortex is control track tonal space that musician and listener using for retain melodic input and detect wrong note or melody (13). The music is involve about active in Limbic region that shown in neuroimaging found music listen is effect to active in Limbic region such as Limbic and paralimbic structures, subcallosal cingulate cortex, anterior insular, posterior hippocampus, superior temporal poles, and a part of ventral striatum (nucleus accumbens) that active in aesthetic emotion and decrease aggressive while listening to happy song and familiar song (14, 15,16) which important for good decision making performance. The music effects to other brain region that control good decision making performance such as PFC, basal ganglia, parietal and temporal (11). Then there is the probability that music training can improve the good decision making performance.

The music is attending an activity by adolescence so can play individual or play a band with their peers. Several researches had described the advantage of

music effect to Cognitive so they found music effect to enhance mathematical performance, spatial reasoning and linguistic (17-20).

The music can enhance executive function in all of life span, in preschool; Ninuma Argprom (2013) studied about the influence of music movement on executive function that was assessed by The Behavior Rating Inventory of Executive Function–Preschool Version® (BRIEF®-P). The study focused on preschool children in music movement school compare with preschool children in normal school. The result was found that music can enhance executive function in preschool (21), in primary school child; Suppalark bunlue (2010) studied about the influence of music movement on cognitive executive function that was assessed by The Wisconsin Card Sorting Test (WCST) in primary student who study in music movement school compare with primary children in normal school. The result was found that music can enhance cognitive executive function in primary school children (22), More of above In adolescence has also studied by Elyse M. and Donna Coch (2011) focused of the influence of music training on cognitive executive function in working memory that assessed by ERPs and standardized test of working memory. This study aims to compare late adolescent music training and late adolescent of non-music training. The result was found that music could enhance cognitive executive function in working memory in late adolescent (23). This study showed consistent with Usa Boonphen (2012) finding in the influence of music training on cognitive executive function in working memory assess by The Wisconsin Card Sorting Test (WCST) and The Working memory part of Wechsler Adult Intelligence Scale-Fourth Edition (WAIS IV). That is study about adolescent that music training school compares with normal adolescent school. The result showed that music can enhance cognitive executive function in working memory in adolescent (24), In ageing has also studied by Chutinat Thasananuphan (2012), the influence of music training on cognitive executive function in working memory assess by The Working memory part of Wechsler Adult Intelligence Scale-Fourth Edition (WAIS IV). The result was found that music can enhance cognitive executive function in working memory in ageing (25). From the light of above can conclude that music is advantage to enhance cognitive process, executive function in preschool thoughout ageing (23, 17-24) but no research study

about music training on executive function especially in Decision making in adolescent.

In summary, the adolescent is a critical period that importance to becomes to mature. This period has changed in many systems related to physical, emotional, social and cognitive. The cognitive change is influence to executive function and decision-making to manipulate risk behavior. The enhancing of executive function that relate to decision-making would be applied in the adolescent might help to reduction of risk behavior. Several studies had been described the advantage of music intervention on executive function in preschool children throughout ageing. The several researches were found that music intervention help to enhance the ability of mathematical performance, spatial reasoning and linguistic (17-20) include enhance every cognitive, executive function in preschool though ageing such as working memory (23, 17-24). However, the study about music training on executive function that regards to Decision making in adolescent is still limited. Therefore the purpose of this research focused on the influences of music training on decision making in adolescent. Ex post facto, post-test research design was applied to compare mean of decision-making score between musicians and non-musician group by Independent Sample t-test statistic. Questionnaire was applied to describe a different in background about general information, family background, health, extra curriculum. This research showed higher means score of cool decision making in music training than non-music training adolescent. This result is the first study to reveal the advantage of music and decision making in adolescent. The impact of this study could be suggested that the music lesson should apply to either school curriculum or extra activities in classroom that beneficial for cool cognitive process in adolescent.

1.2 Research Question

Are there any differences in decision making scores between adolescent musicians and non-musicians?

1.3 Objectives of the study

1. To study the influence of music training on decision making in adolescence.
2. To compare decision making scores in adolescent musicians and non-musicians group.

1.4 Research Hypothesis

There are differences in decision making scores between adolescent musicians and non-musicians.

1.5 Expected Benefits

1. To learn in about music training has an affect on decision making in adolescence.
2. To create the way to decide strategy in related institute.

1.6 Scope of study

This research is focused on decision making ability in adolescent musicians and non-musicians assess by Iowa Gambling Task .It is a tool that use extensively in research. Participants are student in grade 11 that have music training and non-music training in Thailand.

1.7 Definition

Musician refers to adolescent group that have music training continuously for at least 4 years.

Non-Musician refers to adolescent group which never music training or have music training continuously for a little 4 more year.

1.8 Conceptual framework

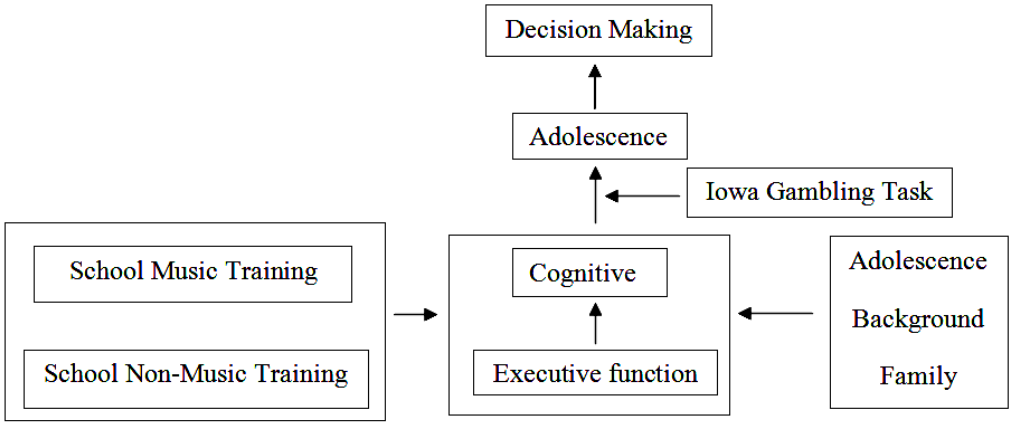

Figure 1.1 The conceptual frameworks.

Next chapter, The review of literature related to Adolescence brain development, Executive Function, and music are presented.

CHAPTER II
LITERATURE REVIEW

This research is aim to study influence of training music to decision making skill in adolescence and to compare decision making skill between adolescent musicians and non- musicians group .This chapter presents the relevant background for the research presented in this thesis. This issue has been started with a review in, Section 2.1 is explain and discuss some background of emotional development in adolescence. In Section 2.2 is explain to cognitive definition and module classification based of executive function and which represent a core context of similar decision making process. In section 2.3 In Section 2.4 has been reviewed a state of decision making and influence of training music to decision making.

2.1 Emotional Development in Adolescent

Emotion and other psychophysiological are related in an important of decision making skill under the risk environment or situation (3). Adolescence is a critical period in maturation of emotion, risk behavior and including the social and executive function development. The transition from childhood to adolescent are very crucial on the pruning and hard wire architecture array on Prefrontal cortex to supervise an executive function including inhibitory control, planning, organization, abstract thought, decision making. An emotional intelligence is also improved during this, the most important emotional skill discrimination of emotion cues, affective modulation. Prefrontal cortex is widely network contribution and complex neurowire connection, which ladder maturation from childhood to adolescent is remain not fully develop (26).The most brain development during adolescence period is ventromedial Prefrontal cortex , associate with amygdala which plays a role in emotional expression (27). Laura N. Martin and Mauricio R. Delgado (2011) investigated an influence of emotion regulation on decision making under risk in late adolescent by using fMRI

apply to determine the association between a cue phase and a decision phase the result suggest exerting cognitive control over emotion response can modulate neural response activated by reward process and help decision making to goal-direct (28).

Gray matter composes of cell bodies, dendrites and nonmyelinated axons of neuron, as well as glial cell and capillaries .In frontal and parietal lobes are highly distribution of gray matter volume in age 12 of boys and in age 11 of girls (29). The decline of a number of Gray matter is happening by a phenomenon of synaptic pruning, that loss of weak or unused synapses use it or loss it. The synaptic pruning is improve overall efficiency and add speed in information processing capacity and support complex computations in region circuit (30).The longitudinal data show change in gray matter volume in adolescent is inverted U-shape pattern (1). Lenroot RK and colleagues (2006) released a map of brain development which done by MRI study represent the loss of cortical gray matter in primary sensory area and in dorsolateral prefrontal and lateral temporal cortices throughout childhood to adolescence ,see in figure 2.1(31)

There are other factor influences to gray matter such as puberty hormones that variation in gender, in male it express positive correlation between gray matter volume in amygdala and testosterone whereas negative correlation between hippocampus volume and testosterone. On the other hand, in female has shown positive correlation between limbic gray matter and estrogen levels but negative correlation between testosterone and parietal cortex gray matter (29).

The development of white matter is gradually develop and stable when reach to adult the rate of white matter development in male are more increasing by age than female (29)

The one of necessary development is prefrontal cortex and subcortical limbic regions has show in figure 2.2 (1)

The fundamental of adolescent behavior is related to the development of prefrontal cortex and limbic regions (such as amygdala and nucleus accumbens) that influence to emotional control and associated with risky behavior. The limbic regions has shown earlier mature than prefrontal cortex in adolescent, the highly rate of limbic system development in adolescent has been explained as that phenomenon effect on lately prefrontal cortex maturation (1).

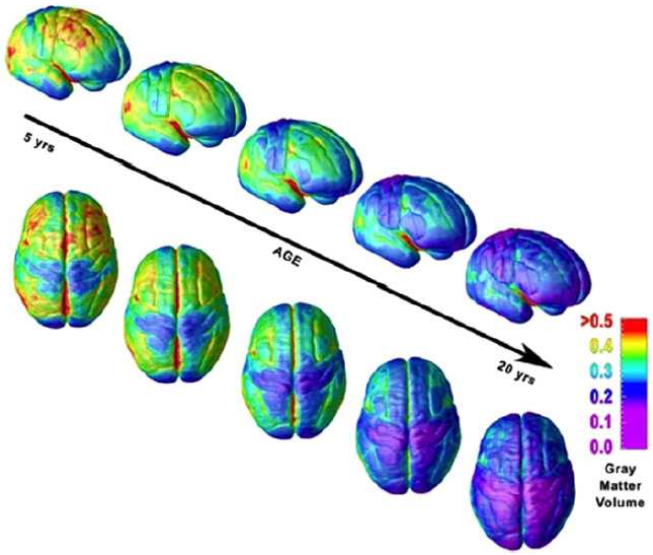

Figure 2.1 The loss of cortical gray matter in primary sensory area and in dorsolateral prefrontal and lateral temporal cortices throughout childhood to adolescence(31)

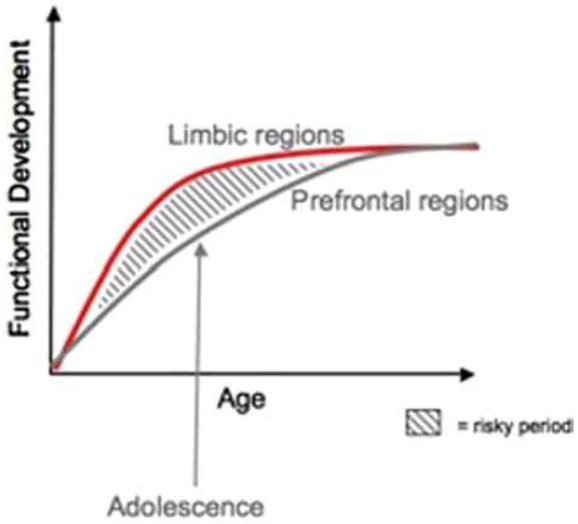

Figure 2.2 The limbic regions has shown earlier mature than prefrontal cortex in adolescent (1)

Summary Adolescent is critical period in development of several brain area especially limbic systems. The limbic regions (such as amygdala and nucleus accumbens) have shown more rapidly development than prefrontal cortex in adolescent. Limbic system regulates emotional intelligent and risk behavior which

then be influence adolescent in decision making , risk behavior such as drug abuse. In next section will focus on Cognitive and Executive Function.

2.2 Cognitive

The definition of Cognitive is a brain functional process that perceived several both data and information from sensory systems to perform a mental activity as working, motoring, planning, thinking, and realizing (32).

2.2.1 Components of Cognitive

Cognitive function is divided to two main modules, lower and a higher cognitive function. A lower cognitive function refers to a process of either automatic function or the daily routine work management. A higher cognitive function is an intimately associated with consciousness which gather all information held in mind for a period of time which may be derived for activate or active in both from the past or generated for the future. Therefore cognitive function processes is clear that always contain a novel element and require controlled, strategic or executive processes. The main distinguish of these accounts between Lower and Higher Cognitive function is a modular and non-modular system, respectively. The study of neuroimaging found that Prefrontal cortex and basal ganglia are associated with Cognitive process that means the cognitive function is worked under supervision of conscious or voluntary control (33).

2.2.2 Brain regions and associated cognitive functions

In recent year, Neuroscientist who works on neuroimaging has found that cognitive function is controlled by the large scale of brain network. The supervise of critical thinking and problem solving are required the compiling from several brain regions to direct the either complex or complicate the goal of decision that especially located on the prefrontal regions.

Several current studied in cognitive neuroscience are agree that the main region for processing cognitive network is located on Prefrontal cortex which plays a major function not only in higher thinking the administration, integration, and manage patterns in neural activity all around the brain but also in the lower-level sensory and

motor modules. An alternative name of this brain network is said that the *prefrontal parietal network*– involves efficient and reliable communication between specific areas of the lateral prefrontal cortex (critical for high-level abstract integration) and posterior parietal lobe (critical for sensory integration) (34).

Prefrontal cortex is the latest regions to reach to maturity. Therefore, the delay of maturation is may explained why teenager make some in appropriate decision. However it is also advantage and Particularly interesting to cognitive promotion research because it conducts the way of planning, working memory, organization, and modulating mood. As the delay matures, adolescence can make a reason better, develop more control over impulses and make judgments better. It may explain as the area of sober second thought. The delay stage, which occurs in the adolescence, is implied as the period of pruning back, in which the brain actually loses gray matter, is as important for brain development as is the period of growth. The advantage of pruning of connections in the brain of adolescence between 13 and 18 is a particularly important stage of brain development in which what teens do or do not do can affect them for the rest of their life. It is remarkable as the evidence of "use it or lose it principle". The positive promotion for intervene this stage by let an adolescence held on several activity such as music sports or their own interested in advance academics.

Prefrontal cortex is divided to two main parts, anterior and posterior prefrontal cortex .Posterior prefrontal cortex perceived a signal directly from sensory and motor areas transmit to anterior prefrontal cortex (34).

The most evident in adolescent brain development occur before mature is that synaptic pruning process, this process is trim brain connection when not use is decompose but always use is still that call “use it or loss it principle”. There are many factor influences to Synaptic pruning process that break up Synaptic pruning process in frontal lobe and normal development mature brain. Therefore highly function in prefrontal region means to mature. Considering, adolescence who receive an increasing risking choice of behaviour that possible to exaggerate the negative information which may influence a disorder onset such as drug addict, anxiety, and risky behaviour. The negative factor which influence to synaptic pruning process such as drink alcohol has been studied in 583 Argentinean adolescent ages between 13 – 18

years old by Angelina Pilatti and colleagues (2013) The questionnaire was applied to participant to survey about age at first alcohol usage and drug usage This study shows the association between drug usage and heavy alcohol usage in early age (35). In addition the emotional stress in adolescence risk behaviour has been investigated by Elizabeth K. Reynolds and colleagues, study in 2013 about 34 adolescent with holding social anxiety and risk-taking behavior were evaluated by Balloon Analogue Risk Task .The result showed correlation between high social anxiety and high risk-taking behavior (36)and affect on the brain and behavior in life span (37).

Therefore, adolescent period is most important in the latest stage of the rest brain area maturation, prefrontal and lateral cerebellum, (34).

Summary Cognitive brain function acts as a CEO of brain to control the ability of decision of human daily life throughout all ages. .In next section will focus in Emotion development in adolescence.

2.2.3 Executive function

According to the review of above has shown that the adolescent brain is not fully developed. The remarkable of adolescent brain first develop are mainly control physical coordination, emotion and motivation. The most widely a change in adolescence brain development is located on prefrontal cortex, which plays a major role in direct complex goal, problem-solving, and related tasks. On the delight of above is also implied the evidence of specific changes by means of myelination and continuing adding and pruning of neurons that affect the efficiency in its functioning. The main function on this cluster function is called **"Executive suite": Executive suite or function** is devoted to prioritize or adjust the risk and reward, conduct complex problem solving, self-directed evaluation, and emotional regulation.

2.2.3.1 Components of Executive function

Executive function has been divided to three main components based on particular brain regions and there particularly function as working memory, inhibition and shifting. The more background of each component will be described as following.

2.2.3.1.1 Working memory

Working memory is a cognitive function, which means simply as either mind search engine or brain's post-it note over a brief period of time. The receiving of information is stored in a moment and then further replaced by novel element or data. For instance, working memory is a constantly in human living daily life by means of the things delegating process that has been encountered or activated to the parts of brain that can take action. Consequently, working memory is necessary for stunning focused on a task, shading out distractions, and holds on the updated and to be awareness about what's going on all around. (38)

Working memory capacity is gradually increasing over childhood until adolescence and declines gradually in aging (39).

A view from neuroimaging has been found the active emergence of lateral prefrontal cortex that related to the working memory function. (40)

In addition the emergence of the activated of ventromedial prefrontal cortex (VMPFC), thalamus, basal ganglia and increases expansion to right dorsolateral prefrontal cortex and anterior cingulated cortex that associated with visuospatial working memory is also described in childhood throughout the old of age adult by Scherf and colleagues (2006). Interestingly, the evidence of left dorsolateral prefrontal cortex and anterior cingulated cortex activity in adult is more higher than younger has also been reported (41)

The association among long term memory, working memory and better decision making has also been studied in early adulthood's with Iowa Gambling Task Test, (42)

In the over past decade, the association among gambling decision making, working memory and somatic marker has been examined by using gambling task test. The study points to working memory as a controller of adolescence decision making. (43)

The task, IGT, of estimating working memory associates with decision making in drug-addicted person is a challenge one. This research result is also become to another flash point in debate over the cause of poor decision making, because of impairment of working memory (44)

2.2.3.1.2 Inhibition

One of the most important of fundamental task in the executive system of the cognitive function is an inhibition control. Inhibition is simply means as the enable task to suppress behavioral or verbal response that are inappropriate in spontaneous though or action. It is the central and major role of cognitive neurophysiology in across of different tasks. This task is a normal nervous regulatory function. Inhibition has also been described by neo-behaviorist psychology, as the human task for prevention of an action, repression to the prevention of a thought or feeling. (39,45).The development of inhibitory control is beginning since the late of infancy throughout all ages span parallel with maturation of frontal brain function(39). several researches have been reported the impact of inhibitory control on learning and social control is correlated with an existence of development of executive functioning from childhood through adolescence. Theses data has currently come under scrutiny in order more clearly to understand and assess the mechanisms of control and organization of behavior. Moreover the different tasks could provide information about different components of the inhibitory mechanisms or could measure inhibitory control with different sensitivity that means the role of inhibitory is required critical cognitive skill. This skill is highly considered because it is very crucial not only for school-related learning but is necessary in everyday living. (46).Therefore many test to assess inhibition task have been founded such as Stop-signal , Go/No-go , Eriksen flanker , Stroop ,A-not-B and the bear-dragon task (46) including neuroimaging method that used to identify the association between inhibit task and brain regions. Durston and colleagues (2006) reported that significantly larger mean volumes of activation were observed in children than adults within the frontal cortex, bilateral ventral and dorsolateral Prefrontal cortex, and parietal cortex while adults showed greater activation than children in ventral frontal area (47). The advent of functional near infrared imaging (fNIR) has substantially increased neuroscientists' ability to examine the neural mechanisms underlying age-related improvements in inhibitory control. Schroeter and colleagues (2004) reported that fNIR reveal the extent of activation in the dorso-lateral prefrontal cortex in participants aged between 7-29 years during a Stoop task response inhibition task. (48). Donna and colleagues (2011) by compared Lateralized readiness Potential (LRP) , even related potentail (ERP) during

Stroop task in participants age 5,8 and adult that could be classified inhibitory control to two process as early process and a later process (46).

2.2.3.1.3 Shifting

Shifting or task switching refers to ability in shift between mental states, performance or tasks back and forth (49). Shifting is containing more than 2 tasks and rules that adjust depend on age. Hughes and colleagues (1998) has studied with child 3-4 and 5-6 years old, the result showed that children age between 3-4 years old has performed reliably shift between two simple tasks whereas children age between 5-6 years old showed higher improve Shifting skill (50). Neuroimaging research has shown the prefrontal cortex is important for shifting skill .Smith AB and colleagues (2004) study in adult with fMRI found Shifting function is associated with inferior frontal, parietal and superior temporal (51). Rubia K and colleagues (2006) has also found that parietal and anterior cingulated regions, inferior frontal are activated during measurement by EEG apply toi with participants age 10-17 years old and 20-43 years old (52).

2.2.3.2 The Proposed fundamental of Executive function

Result researches indicate the proposed fundamental of executive function be compose of Metacognitive executive function and Emotional executive function (53-54).

2.2.3.2.1 Metacognitive executive function

Metacognitive executive function refers to ability in problem solving, planning, strategy development, working memory and implementation .The study of fMRI indicate Metacognitive executive function relation with dorsolateral prefrontal cortex then other measurement such as the Wisconsin Card Sorting Test, The Tower of Hanoi etc (55).

2.2.3.2.2 Emotional executive function

Emotional executive function refers to ability to accept others and living with the social community and has an inhibition of selfish task or inhibit an inappropriate behavior. Emotional executive function depends on an accomplishment with both cognitive and emotion association with the inhibitory control. The most functional area of inhibitory control is located on medial and orbital parts of prefrontal cortex (53).

Summary Executive function means the potency of emotional control, cognitive process, behavioral control and most important is decision making skill .This function is controlled by several part of Prefrontal cortex .The critical period of brain development is in a period of early childhood and adolescent. All of above may explain that both emotion and cognition is important for decision making in adolescence Next section is further review about decision making.

2.3 Decision making

Decision making is a process of cognitive function which work on select to apply behavior or play a role in action in appropriate manner in each condition of situation (2).It is regarded a continuous process and it always come out with outcome. It also regards to the problem solving with they are becomes all set by satisfy outcome (3).

2.3.1 The pathways in decision making

It has been explained as decision making is a cognitive process. Therefore decision making pathway will be reviewed. Decision making is divided to two pathways, the extended dorsal pathway; (E- dorsal-the parieto-premotor) and the extended ventral pathway (E - ventral); (the temporo-ventrolateral prefrontal) (2, 4), describe in detail as following.

2.3.1.1 The extended dorsal pathway (E- dorsal)

The E- dorsal pathway plays a primarily role in decision making process which predominantly on motor action regards to largely autonomous and autonomic fashion (4) Subsequently sensory information is interpreted which then active organize and control rapid motor movement and automatic fashion (2).In conclusion that it plays a role of both function as to compute and to interpret several informations from visual cortex to inferotemporal cortex to influnce action (2,4).

2.3.1.2 The extended ventral pathway (E- ventral)

The E- ventral pathway plays a primarily function to deliberate decision and inhibit behavior (4) and adjusts information of each events decision, and decision plasticity (2).It navigates a spatial location and locates an

object". This function is distribute from visual cortex thought the parietal cortex, see in figure 2.3 (2,4).

Figure 2.3 This figure represents to two pathway of decision making, visual process pathway (green arrows) and decision making pathway (red arrow) both of them are connected together (black arrow) . The dorsal pathway begins from the parietal cortex (PC) to the premotor cortex and the dorsolateral prefrontal cortex (DLPFC).The ventral pathway begins from the inferotemporal cortex (IT) to the ventrolateral prefrontal cortex (VLPFC).The connection from the PM to the primary motor cortex (M1) in orange arrow is shared by 2 pathways. The route of decision making is composed of 6 routes Route 1 begins from VLPFC to DLPFC and the premotor cortex in the route 2. The DLPFC project to the premotor cortex (route 3) and the parietal cortex (route 4).The VLPFC influence on the connection of inferotemporal cortex in route5. There are also interconnect between the inferotemporal and parietal cortical areas in route 6including to V1, a primary visual cortex (2).

The decision making process regards to the result of on motivational state as well as cognitive. The VLPFC receives information from orbitofrontal cortex and subcortical (midbrain, amygdala) that plays a role in motivation process and emotional information. The delight of above can be concluded that VLPFC is worked by integration between cognitive and emotional process to conduct decision making (2).

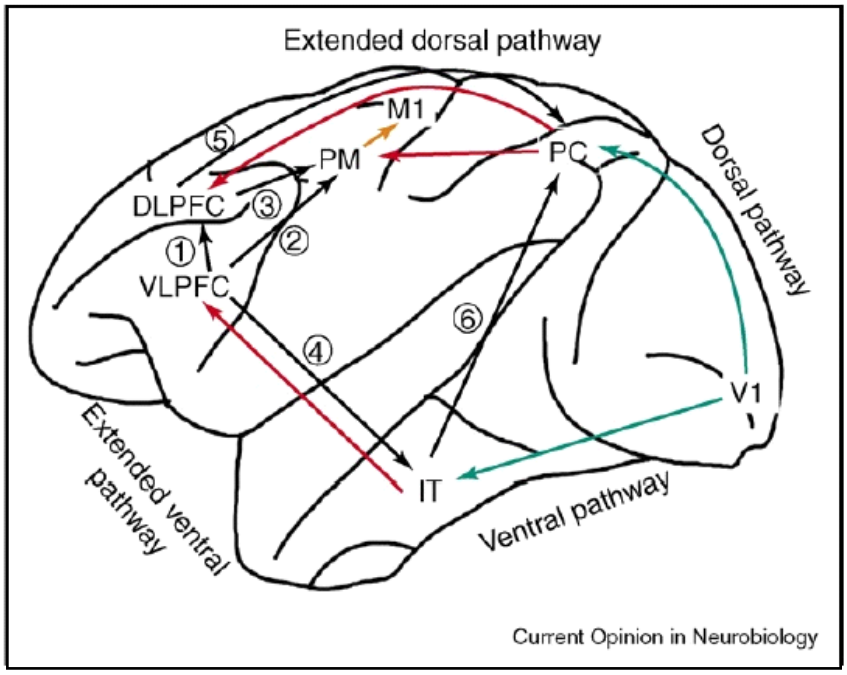

Figure 2.3 This figure represents to two pathway of decision making, visual process pathway (green arrows) and decision making pathway (red arrow) both of them are connected together (black arrow) . The dorsal pathway begins from the parietal cortex (PC) to the premotor cortex and the dorsolateral prefrontal cortex (DLPFC).The ventral pathway begins from the inferotemporal cortex (IT) to the ventrolateral prefrontal cortex (VLPFC).(2)

2.3.2 Type of Decision Making

The decision making process has divided to two types, First, Hot or Effective decision making that is controlled by reward and emotion brain such as ventromedial prefrontal areas include orbitofrontal cortex (OFC) that compose of two main parts, medial OFC plays a function role of evaluate reward and find the way to get it, lateral OFC plays a function role of evaluate punishment or loss and look for long-term rewards, anterior cingulate cortex (ACC) that evaluate option in choices, ventral striatum/ nucleus accumbens and amygdala include anterior cingulate gyrus, Subsequently, medial prefrontal cortex, insula be function of connection between medial and orbital prefrontal cortex, ACC, and several nuclei of the amygdala (5-8), this called somatic maker hypothesis.

Second, Cool or Cognitive decision making that is controlled by cognitive brain such as Dorsolateral Prefrontal Cortex plays an major role to look for the future, inhibit risk behavior and connect between E-dorsal process and E- ventral process (5,9). The parietal cortex plays a role of evaluate possibility, The anterior cingulate cortex (ACC) is a major part to assess risk and find reward, The right dorsolateral , orbitofrontal cortex be function of evaluate option choices, left middle and inferior frontal gyri in logic and carefully, dorsal striatum (6-7)**.**

2.3.3 Process in Decision Making

The decision making has three processes as follwing, first to form preferences; evaluate information in each choice that evaluates by individual experience. Second, to execution actions; choose action choices. Third Experiencing the Outcome; show outcome of choices that you choose.

After the decision making process has all set, the one necessary process is learning and then evaluate output's decision making, evaluate output's option choices and refer to output did not choose option choices. The learning and evaluate output's decision making is most importance of the decision making process because this experience was influenced to next decision making controlled by Executive function.

The learning and evaluate output's decision making Cool, Cognitive decision making's individual faster Hot, Effective decision making's individual (6).that show in figure 2.4

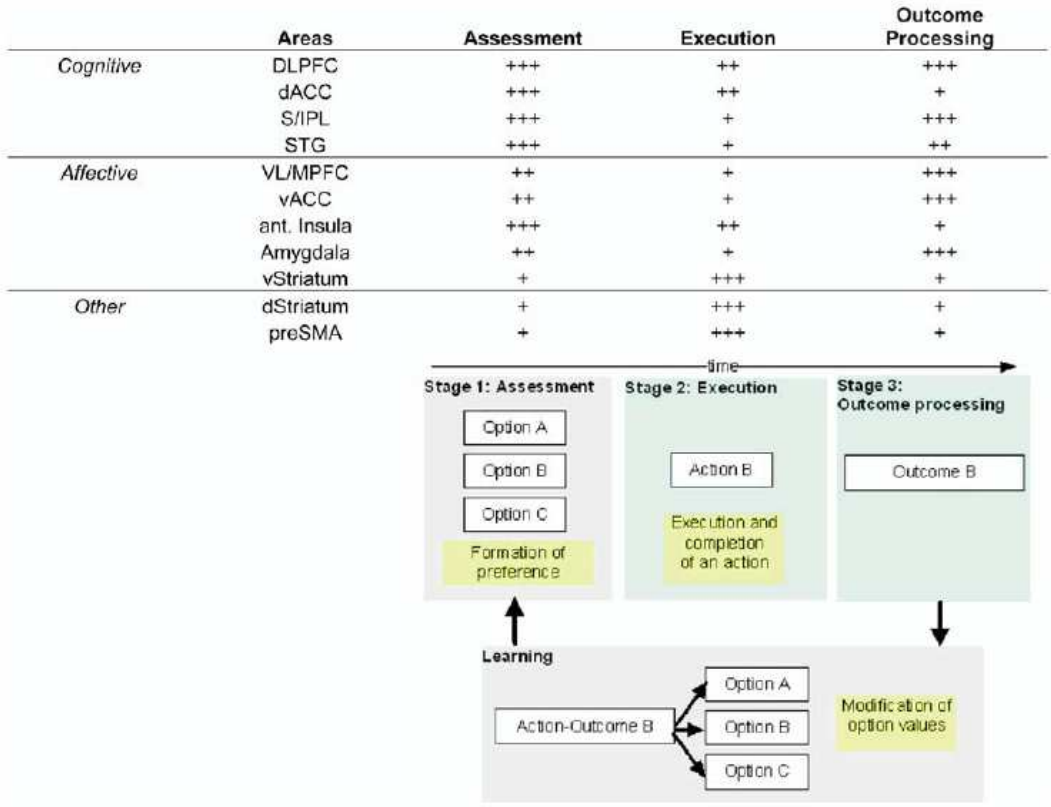

Figure 2.4 The decision making has three processes such as, First Forming Preferences; evaluate information in each choice that evaluates by individual experience. Second, Execution of Action(s); action choices. Third Experiencing the Outcome; show outcome of choices that you choose.

2.3.4 The Assessment tools of decision making

The ability of decision making can be evaluated by several assessment tools mostly in decision making during in an actual Gambling situation as following, E-prime, The trust game, reward-based motor decision task, Gambling Machine Task ,one – or two – dimensional decision making rules , proportional reasoning paradigms , stimulus-response-outcome(S-R-O) , Hungry Donkey Task (a child adapted version of the IGT) and task that use often most is Iowa Gambling Task (IGT) (56 - 64). In neuroimaging have many tools to apply to assess decision making such as EEG, ERP, and fMRI (57, 59, 61, and 64). The most favorite tool to assess decisions making during gambling situation is IGT (The Iowa Gambling Task). It was developed since

1994 by Bechara and colleagues. This tool is most popular because It apply to assess in a real-time of decision making .It is shot-term reward in favor to long term profits(65).The first propose is to assess patient VMPFC damage who show real-world decision making deficit. In the present IGT has used in several research about normal population (66). Ching-Hung Lin and colleagues (2008) was research in Brain maps of IGT for assure brain working of IGT. They were asses early adult by event-related fMRI. The result show brain area that active overlap while participant choose 4 deck is the bilateral striatum, insular cortex, middle temporal gyrus , thalamus ,and primary sensory area/motor cortex .The card select is active on bilateral inferior parietal lobule , insular cortex ,caudate nucleus ,posterior cingulated cortex ,frontal eye field and primary visual cortex (V1),as well as right superior frontal gyrus .The medial prefrontal cortex is play important role in large loss($1150)condition Deck B show in Figure 2.5

This Figure 2.4 show activity in the medial prefrontal cortex in large loss ($1150) condition Deck B that indicates the medial prefrontal cortex can be asses by IGT (63).

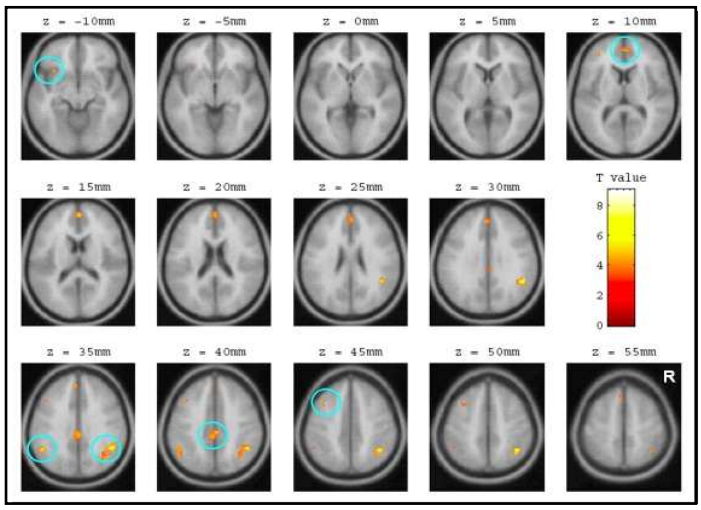

Figure 2.5 Show activity in the medial prefrontal cortex in large loss ($1150) condition Deck B that indicates the medial prefrontal cortex can be asses by IGT (63).

Summary The Decision making refer to ability in chooses action with properly situation. It is important for adolescent because bad decision making influence to risk behavior. It has 2 pathways: the extended dorsal pathway (E- dorsal), and the extended ventral pathway (E- ventral).The brain areas relation is the VLPFC, the VMPFC, the DLPFC ,the orbitofrontal cortex and other subcortical .In present has few intervention that improve decision making ability. The decision making ability depended on motivational state as well as cognitive. Then next section will focus in music.

2.4 Music

Music is sound that is organized by the principles of pitch, rhythm and harmony and that use timbres allow to differentiate between musical sound sources and identify musical instruments such as flute, violin and piano. Music is a non-verbal form to connection, relation with feelings and emotion and being predominantly process in the right cerebral hemisphere (67).

2.4.1 Music process in the brain

While the person listening to music, the sound is effecting to outside the auditory cortex, complex sound wave are into ear canal, tympanic membrane and ossicular to cochlear. The differ frequency of music influence to hair cell movement in cochlear. The sound will then transmit to cochlear nerve, sub-cortical, brainstem and the last before send data to brain is the primary auditory cortex (67).

The most function of auditory cortex is worked by hierarchical system in several sounds influx from primary auditory cortex (A1) that the one stream project to the temporal neocortex , and the rest of sound will be sent to anteriorl parallel and superior temporal gyrus (STG) However the explaination of this phenomenon is ambiguous. (11).

Steven Brown and colleagues (2004) applied the PET scan to identify brain function area in participants who after listen to music. The result showed that primary auditory, secondary auditory and temporal polar areas were activated (68)

2.4.2 Music performance (playing Music)

2.4.2.1 Motor control system

The musician requires at least 3 basic skills of motor control functions: timing, sequencing and spatial organization of movement. The timing of movement is related to the organization of rhythm. The fMRI study suggest that motor area, several cortical and sub- cortical regions, the cerebellum, basal ganglia and supplementary motor area (SMA), are associated to conduct with is. an interval timing at longer timescales (1second and above).The cerebellum is more necessary for control motor timing at shorter timescales (millisecond). The sequencing refers to the ordering of movement individual. The brain areas which associated to control sequence of movement during plays music are cortical and sub- cortical regions, basal ganglia, the SMA, the cerebellum, the premotor and the prefrontal cortices. In addition the special organization is important for musician performance that controlled by the dPMC associated to learning in special trajectory (11).

2.4.2.2 Auditory-Motor interactions

Several studied represents auditory-motor interaction while musical performance. This interaction composes of feed forward and feedback interaction. The feed forward is a musician play an instrument, the motor system control the fine movement needs to generate music sound afterwards the feedback will begin to adjust sound when pith is variable. The feedback is important in musician such as musician playing violin as shown figure 2.5 (11).

2.4.3 Music training and Executive Function

The music can enhance executive function in all of life span, in preschool; Ninuma Argprom (2013) studied about the influence of music movement on executive function that was assessed by The Behavior Rating Inventory of Executive Function–Preschool Version® (BRIEF®-P). The study focused on preschool children in music movement school compare with preschool children in normal school. The result was found that music can enhance executive function in preschool (21), in primary school child; Suppalarkbunlue (2010) studied about the influence of music movement on cognitive executive function that was assessed by The Wisconsin Card Sorting Test (WCST) in primary student who study in music movement school compare with

primary children in normal school. The result was found that music can enhance cognitive executive function in primary school children (22), More of above In adolescence has also studied by Elyse M. and Donna Coch (2011) focused of the influence of music training on cognitive executive function in working memory that assessed by ERPs and standardized test of working memory. This study aims to compare late adolescent music training and late adolescent of non-music training. The result was found that music could enhance cognitive executive function in working memory in late adolescent (23). This study showed consistent with Usa Boonphen (2012) finding in the influence of music training on cognitive executive function in working memory assess by The Wisconsin Card Sorting Test (WCST) and The Working memory part of Wechsler Adult Intelligence Scale-Fourth Edition (WAIS IV). That is study about adolescent that music training school compares with normal adolescent school. The result showed that music can enhance cognitive executive function in working memory in adolescent (24), In ageing has also studied by Chutinat Thasananuphan (2012), the influence of music training on cognitive executive function in working memory assess by The Working memory part of Wechsler Adult Intelligence Scale-Fourth Edition (WAIS IV). The result was found that music can enhance cognitive executive function in working memory in ageing (25). From the light of above can conclude that music is advantage to enhance cognitive process, executive function in preschool throughout ageing (23, 17-24) but no research study about music training on executive function especially in Decision making in adolescent.

2.4.4 Music training and emotion

Music training relates to long term of concentrate to attention, daily practices, reading musical notes, memory in large musical passage, learning involve a multiplicity of music organization , develop practical skill and transmit emotion while being music performed(69).

There are many researches in the advantage of music training .Musical training is associated with improve multiple tasks such as language, mathematics, verbal memory, and IQ. In addition, it has been studied in preschool children who were received early music intervention. The participants have been tested by battery of

musical and linguistic tests. The study found the correlation between early reading ability and early musical rhythm and/or pitch intervention (70). It may conclude that musical achievement may postulate to predict early reading ability.

The more study of the impact of Music training can on executive function has also been studied by Elyse M. and Donna Coch (2011) by using ERPs and standardized test of working memory in late adolescent. The study found musician show faster update of working memory than non-musician (23). A decade, it has been studied the affect of music on emotion by using physiology method, PET scan. The study has shown participants brain function in real time while listen to several types of music. Limbic and paralimbic structures , subcallosal cingulate cortex , anterior insular , posterior hippocampus , superior temporal poles, and a part of ventral striatum (nucleus accumbens) have shown stronger signal than others during listen to happy song (14). This study showed consistent with the research was done by Blood and Zatorre in 2001, by using regional cerebral blood flow (rCBF) method to observe brain function during the participants listen to their happy favorite song. The result showed an increasing function of reward and emotion reward and emotion, insula, orbitofrontal cortex, ventral striatum and reduction of amygdale, hippocampus, and ventral medial prefrontal cortex (15). Stefan Koelsch and colleagues (2006) has also conducted research in the impact of music on emotion in early adult by using fMRI. The result found the activation of amygdala, hippocampus, para hippocampus gyrus , temporal polesbut while participant listen to unpleasant music whereas inferior frontal gyrus (IFG,inferior Brodmann's area (BA)44,BA45,and BA 46), anterior superior insula, ventral striatum, Heschl'sgyrus , Rolandic operculum has been activated while listen to pleasant music (16).

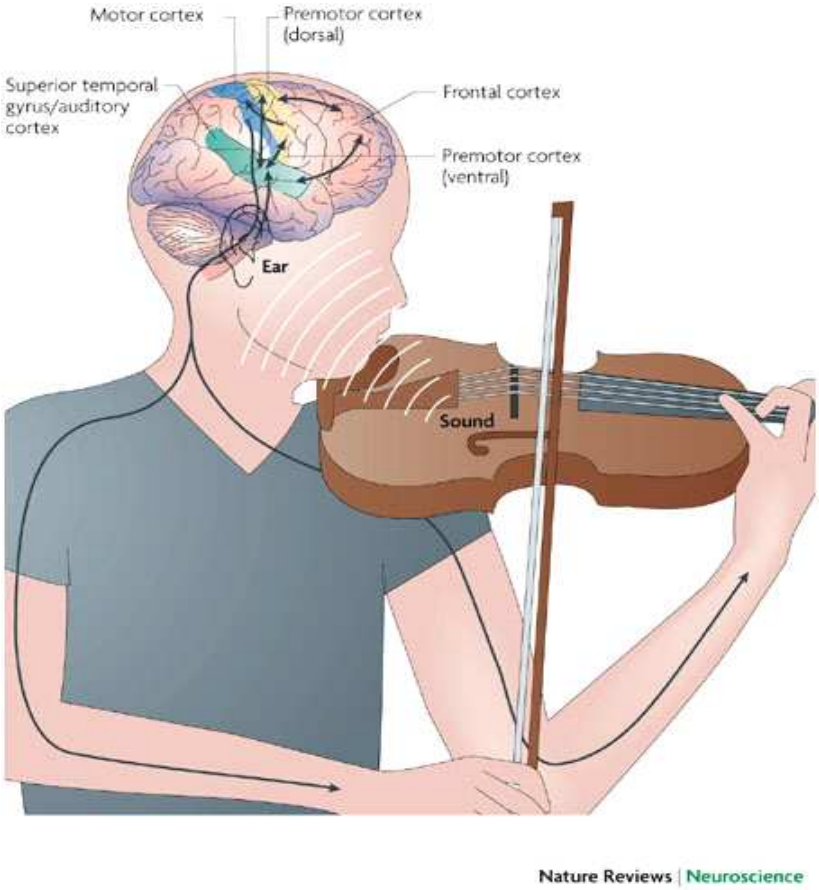

Figure 2.6 The figure represents an auditory-motor interaction while musical is being performed. This interaction composes of feed forward and feedback interaction. The feed forward refers to musician play an instrument, the motor system control the fine movement conduct to generate music sound afterwards the feedback will begin to adjust sound when pith is variable. The feedback is important in musician such as musician playing violin

Summary In the light of above, It can be concluded that music shows advantage for human executive function, skill, cognitive and emotion improvement throughout life span However the integration of cognitive and decision making is still limited then this is begin to question of this research that will be explained in the next chapter.

CHAPTER III
MATERIALS AND METHODS

3.1 Introduction

This chapter describes the methodology of this research. The chapter begins with the research questions and hypothesis, followed by the setting and population, variables and the instruments used in the current research. At the end of the chapter, the data collection procedures and data analysis are presented

3.2 Research Questions and Hypotheses

The objective of the study is to examine the influence of music training on decision making in adolescent by comparing the decision-making performance of the adolescent in the musician and non-musician groups. The research question and hypothesis are followed.

Research question:

Are there any significant differences in mean scores on decision-making skills between the adolescent in the musician and non-musician groups, as measured by IGT?

Research hypothesis:

H_0 : There are no significant differences in the mean scores on decision-making skills between the adolescent in the musician and the non-musician groups, as measured by IGT.

H_1 : There are significant differences in mean scores on decision-making between the adolescent in the musician and non-musician groups, as measured by IGT.

3.3 Populations and Sample Group

Populations of the research

The populations of the current study were retrieved from 11th grade students studying in the school where music training was included in the school program and the school where music training was not included in the school program. Therefore, the target population was the 11th grade students who were studying in the two kinds of schools mentioned above. The students in music training school and playing every kind of music instruments at least 4 years were assigned to be the musicians group. The students of another school who have never played music instrument were assigned to be the non-musicians group. The 11th grade students are the target of interest in this study due to the critical period of human development in adolescence in order to explained by Michael J. and colleagues (2009), "adolescence is a critical period of executive function development in prefrontal cortex; particularly, the decision making ability" (34).

Sample group

The sample of this research was divided into two groups; musician and non-musician groups, by using non-probability sampling method. Since the sample in the musician group studied in a particular musical - Training School, purposive sampling was utilized. Furthermore, matching method was utilized in order to choose the sample in the non-musician group whose background is similar to the sample in the musician group. A questionnaire was developed to describe the background of the sample in both groups in order to control confound variables of the sample such the parents' socio – economic status, parents' education, age and gender of the sample. Therefore, the students studying in the musical training school were assigned to be in the musician group and the students studying in the other school were assigned to be in non-musician group.

There were some inclusion and exclusion criteria for both musician and non-musician groups as follows,

3.3.1 Inclusion criteria

- Sex: Boy and Girl.
- Educational level: Currently studying in the 11th Grade at the different school programs as mentioned above.
- Health: Be healthy.
- Commitment: Participation agreement with the signed consent form for participating in the research from the sample's parents

3.3.2 Exclusion criteria

- Mental health: The present or report of psychiatric disorder.
- Cognitive function: The report of accident and head injury.
- Sensory deficits: The report of severe visual deficits.
- Sensory integration: The report of severe hand-motor deficits

After the sample recruitment procedure, the result showed that the total number of the sample was seventy-six 11th grade students; including 33 boys and 43 girls. The samples were thirty-eight 11th grade students in the musician group; including 16 boys and 22 girls. There were thirty-eight 11th grade students in the non-musician; including 17 Boys and 21 girls.

3.4 Independent variables and dependent variables

- Independent Variable was music training
- Dependent variables were decision making scores (T score net total in IGT).

3.5 Instruments

In this research, there were 2 kinds of instruments. First instrument was the questionnaire developed by the researcher for background evaluation. The second instrument was the Iowa Gambling Task (IGT), a standardized test for decision-making evaluation.

3.5.1 The questionnaire

The questionnaire was developed in order to serve two purposes. First, it is utilized to recruit the sample based on the matching method and the inclusion and exclusion criteria. The second purpose is to control confounding variables such as gender, status and educational background of parents. The questionnaire was divided into 4 parts, as follows.

Part 1: The general information of subject's

In Part one is questionnaire about participant background such as gender, age .the objective of this questionnaire to compare 2 background groups.

Part 2: The story about health of subject's

In Part two is questionnaire about general health of participant such as Have you ever been accident or head injury? .The objective of this questionnaire to assess about general health of participant because the IGT can not measure in participant who report of psychiatric disorder, report of accident and head injury, report of severe visual deficits, report of severe hand-motor deficits.

Part 3: The story about extra activity and hobbies of subjects.

In Part three is questionnaire about extra activity and hobbies of subjects.such as Do you have some activity? .The objective of this questionnaire to know about extra activity background.

Part 4: The story about music activity of subject's

In Part four is questionnaire about music background of music group such as Do you first start played music? .The objective of this questionnaire to know about music background of music group.

3.5.2 Iowa Gambling Task (IGT)

Iowa Gambling Task (IGT) was developed to assess real – life decision making. The IGT is consisted of 4 deck of cards, each label as Deck A, B, C and D. Every 20 cards is one block. The total number of cards is 100 cards or 5 blocks. Participants select the cards from one of the four decks in the IGT game. There are both reward and punishment in response to the selected card from each deck. If the participants choose reward card, their money is increased in the IGT game. On the contrary, if the participants choose punishment card, their money is decreased in the

IGT game. Research has shown that patients with brain damage to ventromedial prefrontal cortex (VMPFC) had less scores than the scores of the healthy sample (54). The following presents the process of the IGT

Process of the IGT:

- In the IGT, there are 4 decks of cards, each labeled as Deck A ,B , C and D. Participant must select one card at a time , by clicking on the card, from any deck she/he chooses
- When the participant chooses a card, the computer will tell him/her either she/he win some money or lose some money. Every time the participant loses the money, the green bars gets smaller
- The design of the task is such that Deck A and B are disadvantageous, despite the large rewards indicated on the cards in these decks. In contrast, Deck C and D are advantageous, despite the relatively smaller rewards indicated on the cards in these decks. Participants were told that they were free to switch between decks during the game and that the goal of the task was to maximize profit on a loan of $2000 in play money that they received at the beginning of the game. They were not told the total number of card selected 100 cards.
- Examiner will record every scoring of the IGT.

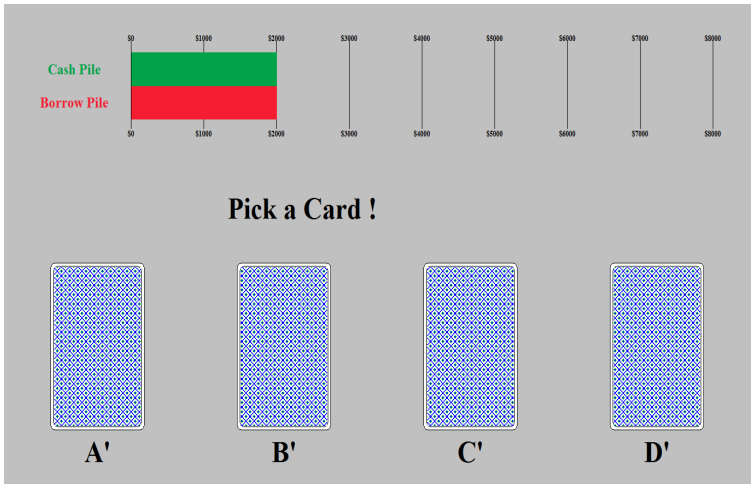

Figure 3.1 This picture is show program IGT

3.6 Data Collection and Procedure

The followings were the processes of the data collection:

- The informed letter was sent to the faculty of Graduate Studies to get a Letter of Recommendation; and permission for data collection was submitted to the director of the musician and non-musician schools. The letter indicated objectives, expected benefits and data collection process of this research.
- The consent forms were sent to the parents of the students in the musician and non-musician groups
- The questionnaires (See Appendix B: Questionnaires), The IGT were collect in August - September, 2012. Table 3.1 demonstrated the period of the measurements.
- The IGT scores were be analyzed, using Independent Samples T-test.
- The results and discussions were written in approximately in October 2012 – November 2013, respectively

Table 3.1 Demonstrated the period of the measurements.

2012 program	Jan	Feb	March	April	may	June	July	Aug	Sep	Oct	Nov	Dec
Ethic	⟷	⟷	⟷									
Contact school				⟷	⟷							
informed letter was sent to school						⟷	⟷					
Collect data musician group								⟷				
Collect data non-musician group									⟷			
Analyze data										⟷	⟷	⟷
2013 program	Jan	Feb	March	April	may	June	July	Aug	Sep	Oct	Nov	Dec
Writing results	⟷	⟷	⟷	⟷	⟷	⟷	⟷					
Writing discussion							⟷	⟷	⟷	⟷	⟷	

3.7 Ethics

This research was approved by the Committee on Human Rights related with Research Involving Human subjects of the Mahidol University. The human rights of the participants were carefully protected in all the processes of the research, the participants, the school directors, the participants' teachers, and the participants' parents were gently invited to a one - hour meeting with the researcher. They were introduced the researcher and advisors, the research objective, method, instrument, and benefits of the study in non-technical terms importantly, they were informed that the researcher would answer their questions anytime and they had all rights reserve to their decision of withdraw from this research anytime without any consequences. Their names would be coded and anonymous. Their data would be kept in a lock drawer at all time when not in use and would be shredded after analyzing the data.

3.8 Data Analysis

The descriptive and inferential statistics were used to analyze the obtained data for addressing the research objective. The followings were the processes of the data analysis:

1. For the sample background characteristics, the descriptive statistic was performed to explain the general information in percent of the sample in the two groups; including gender, age, risk behavior

2. For the IGT scores, the descriptive statistic was performed to explain the general data such, the number of the total remain money in order to show the descriptive data of each group and to support the results of the inferential statistic.

3. For the IGT scores, the inferential statistic was also utilized to examine the cause and effect of the musical training and decision making skills. Independent sample t-test was performed to evaluate the mean differences on dependent variables (IGT score) between the musicians and non-musicians groups and the frequency of chosen decks.

In Chapter 3 they describe about the research questions, hypothesis, population, variables, instruments, methodology of this research and they used the IGT to measure 2 group .In next chapter they explain to data analysis.

CHAPTER IV
RESULTS

The objective of this study was to examine the influence of music training on decision making of adolescence in continuous music training (musician) and non-music training (non musician) groups. This chapter presents the results of the analysis underlying the objective of the study and focusing on the research question, "Are there any significant differences in decision-making mean scores between the adolescent in the musicians and non-musicians groups, as measured by IGT?" The results of the analysis are divided to two sections. The first section describes the demographic data and background of the sample; including demographic, background, and music; training background of the sample, using descriptive statistic (see Appendix B: Questionnaires).

Next, the second section presents the results of the analysis concentrating on the impact of the music training on adolescence's decision making, as measured by IGT. Descriptive statistic and independent sample t-test was applied to evaluate the significance of mean differences in the IGT score between musicians and non-musicians groups.

Section 1: Results of descriptive statistic analysis for the demographic data and background of the sample

In this section, the demographic and background data of the sample in both groups was reported, following by the demographic and background data of each sample group. First, the demographic data of the sample in both groups included the number of sample, gender, and age. The result showed that the total number of the sample in both groups was 76 adolescent from 2 high schools in Nakhonpratom; one was musical training high school and another was non-musical training high school. For gender, 43.4 % of the sample was boys and 56.6 % of the sample was girls. For age, the range of the sample's age was between 15.50 to 19.08 years old, (See Table 4.1).

Moreover, the background data of the sample in both groups included health and risk behaviors. The result showed that the sample in both groups had no evidence of psychiatric or neurological disorders. The majority of the participant (86.84%) reported that they never smoked and 11.84 % of the participant reported that they rarely smoked. 63.2% of the sample reported that they never drink alcohol and 30.3 % of participants reported that they rarely drink alcohol (See Table 4.1).

Second, the demographic data and background of the sample in each group was reported. For the musician group, the results showed that the sample consisted of 38 in11th grade musicians. For gender, 42.1 % of the sample in this group was boys and 57.9 % of the sample was girls. For age, the average age of the sample in the musician group was 16.87 years old; ranging from 15.83 years old to 19.08 years old.

For background data, the results showed that the sample in the musician group was healthy. The results showed that none of the sample had severe hand-motor, visual deficits, a history of accident and head injury, and the evidence of psychiatric or neurological disorders. The majority of the sample in the musician group (92.1%) reported that they never smoked and 7.9 % of the sample in the musician group reported that they rarely smoke. 65.8% of the sample in the musician group reported that they never drink alcohol and 31.6 % of the sample in the musician group reported that they rarely drink alcohol (Table 4.1).

For music training background. The sample in the musician group was studying in the music school that gives precedence to music activity then had 4 main types as following, Stringed instrument, Percussion instrument, wind instrument and Singing. The majority of musician group (32%) are Stringed type, 28 % of musician group are Percussion instrument, 22% of musician group are Singing, 18% of musician group are wind instrument, (see Figure 4.1)

Table 4.1 Number & Percentage mean of demographic characteristics of adolescent (n=76)

Demographic	school Number (%) musicians group n=38	non-musicians group n=38	Total Number (%) n=76
Gender			
• Boy	16(42.1)	17(44.7)	33(43.4)
• girl	22(57.9)	21(55.3)	43(56.6)
Age (= 16.78 , SD = 0.53, Min = 15.50, Max = 19.08)			
• 15 - 16 years	27 (71.0)	28(73.7)	55(72.4)
• 17 - 18 years	10(26.3)	10(26.3)	20(26.3)
• 19 years	1(2.7)	0(0)	1(1.3)
Risk Behavior			
- smoking			
• never	35(92.1)	31(81.6)	66(86.84)
• rarely	3(7.9)	6(15.8)	9(11.84)
• 1-2 per month	0(0)	0(0)	0(0)
• Always	0(0)	1(2.6)	1(1.4)
- drinking			
• never	25(65.8)	23(60.5)	48(63.2)
• rarely	12(31.6)	11(28.9)	23(30.3)
• 1-2 per month	1(2.6)	3(7.9)	4(5.3)
• always	0(0)	1(2.6)	1(1.2)

The majority of the sample group (81.6%) spent 1 to 3 hours per day to continually play music and 15.8 % spent 3to 6 hours per day to continue playing music (range 0.50 hrs to 6.00 hrs). For the length of time period for music training, the majority of the sample in the musician group (71.0 %) had been playing music for 4 to 7 years; about 23.7 % had been playing music for 7 to 10 years. The age the sample began to play the music, the results showed that (52.6 %) of the sample began to play music at age 11 to 13 years old. About 28.9 % began to play music at age 7 to 11 years. For the first time of music training, the results from the parents' report showed that 68.4 % of the sample had the first a music training at musical school, 10.5 % had the first time of musical trained by themselves before going to the musical school

music. For parental support, the result showed that most of the parents of the sample (84.2%) supported the music program. For musical liking, most of the sample in musician group (89.5%) reported that they liked music very much and 7.9 % like music moderately (See Table 4.2).

For the non-musician group, the results showed that the sample consisted of 38. For gender, 44.7 % of the sample in this group was boys and 55.3% of the sample was girls. For age, the ranging age of the sample in the non-musician group was 15 – 18 years old.

For background data, the results showed that the sample in the non-musician group was healthy. The results showed that none of the sample had severe hand-motor, visual deficits, a history of accident and head injury, and the evidence of psychiatric or neurological disorders. The majority of the sample in the non-musician group (81.6%) reported that they never smoked and 15.8 % of the sample in the non-musician group reported that they rarely smoked. 60.5% of the sample in the musician group reported that they never drink alcohol and 28.9 % of the sample in the musician group reported that they rarely drink alcohol (Table 4.1).

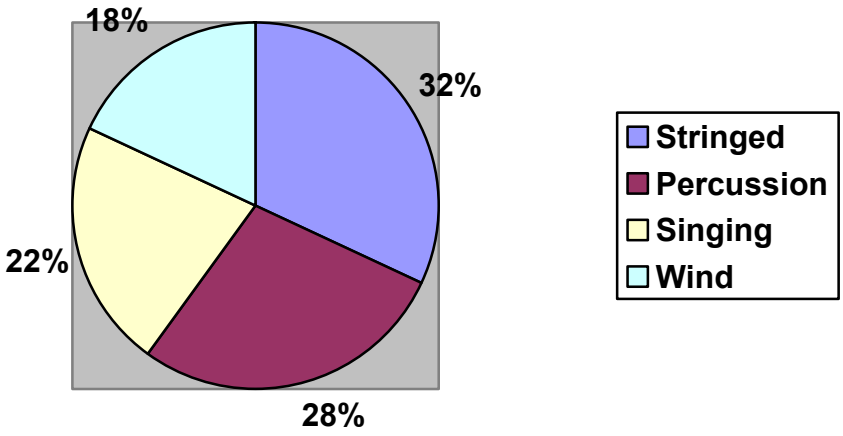

Figure 4.1 The picture indicates the percentage of music type in sample group (n = 38)

Table 4.2 Number & Percentage mean of demographic characteristics of musician group (N=38)

Characteristics	**Musician group number (%) N=38**
Total long time to continue playing music (hour) (=2.28, SD=1.10, Min=0.50, Max=6.00)	
• < 1 hr	1(2.6)
• 1-3 hrs	31(81.6)
• 3-6 hrs	6(15.8)
Total years play music (years) (=6.05, SD=2.30, Min=4.00, Max =12.00)	
• < 4 years	0(0)
• 4-7 years	27 (71.0)
• 7-10 years	9 (23.7)
• > 10 years	2 (5.3)
Age begin play music(years)	
• <5 years	3(7.9)
• 5-7 years	4(10.5)
• 7-11 years	11(28.9)
• 11-13 years	20(52.6)
The way to start playing music	
Drill by self	3(7.9)
force by parent	3(7.9)
Start by school music(ask parent)	26(68.4)

Table 4.2 Number & Percentage mean of demographic characteristics of musician group (N=38) (cont.)

Characteristics	**Musician group number (%) N=38**
The way to start playing music	
Start by school music (by self)	1(2.6)
Drill by self and Start by school music(ask parent)	4(10.5)
Drill by self and Start by school music(force by parent)	1(2.6)
Family support	
quietly	6(15.8)
support	32(84.2)
Like music	
Not like	1(2.6)
Moderately	3(7.9)
Like very much	34(89.5)

Table 4.3 Percentageof the hobbies

Covariate	**Musicians group (N=38)**	**Non-musician group (N=38)**	**Total (N=76)**
Playing computer game			
None	38%	11%	24.5%
Less than 5 hrs/week	26%	35.2%	30.6%
5-10 hrs/week	14%	17.9%	16%
More than 10 hrs/week	22%	35.9%	28.9%
Total	**100.0%**	**100.0%**	**100.0%**
Watching television			
None	48.8%	19%	33.9%
Less than 5 hrs/week	21.4%	17.5%	19.45%
5-10 hrs/week	18.2%	12.9%	15.55%
More than 10 hrs/week	11.6%	50.6%	31.1%
Total	**100.0%**	**100.0%**	**100.0%**
Listening to music			
None	30%	43.4%	36.7%
Less than 5 hrs/week	22%	12.9%	17.4%
5-10 hrs/week	15%	14.8%	14.9%
More than 10 hrs/week	33%	28.9%	40%
Total	**100.0%**	**100.0%**	**100.0%**
Playing music instrument			
None	23%	100.0%	61.5%
Less than 5 hrs/week	13%	0.0%	6.5%
5-10 hrs/week	14%	0.0%	7%
More than 7 hrs/week	50%	0.0%	25%
Total	**100.0%**	**100.0%**	**100.0%**
Housework			
None	78%	56.2%	67.1%
Less than 5 hrs/week	11.2%	4.6%	7.9%
5-10 hrs/week	8.1%	25.3%	16.7%
More than 10 hrs/week	2.7%	13.9%	8.3%
Total	**100.0%**	**100.0%**	**100.0%**

For background data, the results showed that the activity of subject in the hobbies of subjects in musicians and non-musicians groups that show in table 4.3.

For musician group, the majority of the sample group (38%) no playing computer game, 26 % spent less than 5 hours per week to playing computer game, 22 % spent more than 10 hours per week to playing computer game and 14 % use 5-10 hours per week to playing computer game. For the length of time period for watching television, the majority of the sample in the musician group (48.8%) no watching television; about 21.4% spent less than 5 hours per week; 18.2% use 5-10 hours per week and 11.6 % spent more than 10 hours per week to watching television. The listening to music, the result showed that (33%) of the sample listening to music more than 10 hours per week. About 30% no listening to music; 22 % spent less than 5 hours per week and 15% use 5-10 hours per week for listening to music. For playing music instrument; 50 % spent more than 7 hours per week; 23% no spent time; 14 % use 5-10 hours per week and 13% spent less than 5 hours per week to playing music instrument. For the housework, the majority of the sample in the musician group (78%) no spent time; 11.2% spent less than 5 hours per week; 8.1% use 5-10 hours per week and 2.7 % spent more than 10 hours per week to housework (See Table 4.3).

For the non-musician group, the results showed that the majority of the control group (35.9%) spent more than 10 hours per week, 35.2% spent less than 5 hours per week, 17.9% use 5-10 hours per week, 11% no playing computer game. For the length of time period for watching television, the majority of the sample in the non-musician group (50.6%) spent more than 10 hours per week, 19% no watching television, 17.5% spent less than 5 hours per week, 12.9% use 5-10 hours per week watching television.The listen to music found 43.4 % no listening to music; 28.9 % more than 10 hours per week; 14.8 % use 5-10 hours per week, 12.9 % less than 5 hours per week. For playing music instrument; 100% no spent time to playing music instrument. For the housework, the majority of the sample in the non-musician group (56.2%) no spent time; 25.3% use 5-10 hours per week; 13.9% spent more than 10 hours per week to housework; 4.6 % spent less than 5 hours per week (See Table 4.3).

Section 2: The Impact of music Training on decision making in sample group

In this section, the results of the analysis focusing on the research question; "Do the sample in the music training group have significantly higher measures of decision making scores than the sample in the non-musician group who not trained in music training, as measured by IGT?" The section begins with the results of the analysis, using descriptive statistic to describe the IGT data; including the number of chosen deck and the total remain money in each group. Then, the results of the analysis, using independent sample t-test to presents the impact of the music training on decision making in adolescences.

The results of the analysis regarding the IGT score; including the frequency of the chosen cards, the total amount of money remaining at the end of the IGT test are presents in descriptive statistic in order to support the results of the analysis using the inferential statistic. The total remains money that the goal of the task was to maximize profit on a loan of $2000 in play money that they received at the beginning of the game. Participant must choose card and try to remain money in game as much as they can.

The result has shown mean the total money is -1125.79(SD = 921.45) and between (-3610) to 1905 (Table 4.3)

Table 4.4 Number & Percentage mean of demographic IGT score of total group

IGT Score	**Group**	**Range**	**Mean**	**Std. Deviation**
Total money	Musician Group (N=38)	(-2735)-1905	-933.95	829.75
	Non- Musician Group (N=38)	(-3610)-750	-1317.63	978.26

The frequency of the chosen disadvantageous cards was calculated from total choose card A+B, card A and B were disadvantageous, despite the large rewards and large punishment indicated on the cards in these decks. The participants who evaluate card outcome before decision making process or decision choose card and have a learning process, look for future outcome card that money in game will be lost so the participant will choose a lot disadvantageous card. The frequency of the chosen disadvantageous cards is referring to decision making look for the future.

According to the Table 4.4, Independent samples *t*-tests was performed to determine the significant changes in mean scores on the frequency of the chosen disadvantageous cards. Significant differences were found in the two groups' the mean score changes between Musician Group and non-musician group at alpha level of 0.05 ($p.<0.05$) (Table 4.4) The Musician group's the mean score changes (M=47.89, SD=7.9)

Next, the frequency in choose advantageous card was calculated from total choose card C+D, card C and D were advantageous, despite the relatively smaller rewards indicated on the cards in these decks but the outcome of this will increase money in game more than choose deck A, B so the participant's decision making look for the future will be the frequency in choose advantageous card more than the other participant.

According to the Table 4.4, Independent samples *t*-tests was performed to determine the significant changes in mean scores on the frequency of the chosen advantageous cards. Significant differences were found in the two groups' the mean score changes between Musician Group and non-musician group at alpha level of 0.05 ($p.<0.05$) (Table 4.4). The Musician group's the mean score changes (M=52.11, SD= 7.9) significantly exceeded those of the control group (M=47.92 , SD= 9.9)

Table 4.5 Standardized means and standard deviation for The Iowa Gambling Task

	Group		*p*-value
	Musician Group (n = 38)	Control Group (n = 38)	
A+B	47.89 (7.9)	52.08 (9.9)	0.046*
C+D	52.11 (7.9)	47.92 (9.9)	0.046*

Note.*$p<0.05$, two-tailed

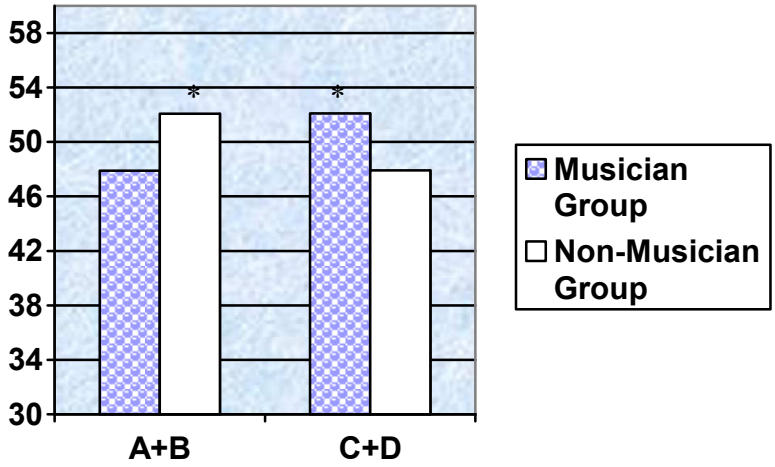

Figure 4.2 The picture showed the total number of choose card A+B and card C+D compare between musician and control group(n = 76)

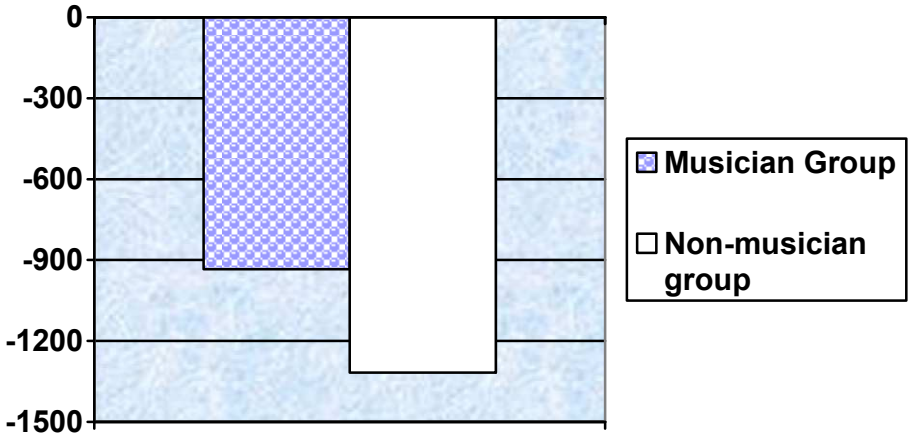

Figure 4.3 This figure showed the remaining money after finished the IGT game compare between musician and control group (n = 76)

Table 4.6 Standardized means and standard deviation for The Iowa Gambling Task

	Group		*p*-value
	Musician Group (n = 38)	Control Group (n = 38)	
Total T score	47.00 (5.53)	44.08 (7.02)	0.047*
T score Block 1	51.68 (6.52)	53.11 (7.50)	0.381
T score Block 2	46.84 (5.80)	46.61 (5.08)	0.850
T score Block 3	46.16 (6.50)	42.97 (6.57)	0.037*
T score Block 4	47.89 (7.27)	43.18 (6.60)	0.004**
T score Block 5	46.58 (9.69)	43.00 (9.70)	0.112

Note.*p<0.05, two-tailed

For the impact of the music training on decision making, the Iowa Gambling Task, Total T score, T score Block 1, T score Block 2, T score Block 3, T score Block 4, T score Block 5 were expected to predict the decision making. Table 4.4 showed the means and standard deviations of each group, as measured by the IGT.

According to the Table 4.4, Independent samples *t*-tests was performed to determine the significant changes in mean scores on the IGT. Significant differences were found in the two groups' the mean score changes Total T score , T score Block 3 and T score Block 4 between Musician Group and control group at alpha level of 0.05 ($p.<0.05$) (Table 4.4). The Musician group's the mean score changes (M=47.00, SD=5.53) significantly exceeded those of the control group (M=44.08, SD=7.02) on Total T score. However, control group's the mean score changes (M=42.97, SD=6.57) significantly exceeded those of the Musician group (M=46.16, SD=6.50) on T score Block 3. The Musician group's the mean score changes (M=47.89, SD=7.27) significantly exceeded those of the control group (M=43.18, SD=6.60) on T score Block 4.

No significant difference was found between Musician and control groups on T score Block 1, T score Block 2and T score Block 5. Therefore, it can be concluded that the variance of group mean differences for Total T score, T score Block 3 and T score Block 4 are statistically related to The music training.

Figure 4.4 presents the comparison between music training group scores who received music training and control group scores who did not receive music training in the IGT Scores. For the IGT score, the trained adolescent in The music training groups statistically and significantly had higher increases in Total T score, T score Block 3 and T score Block 4, compared to the adolescent in the non-musician group.

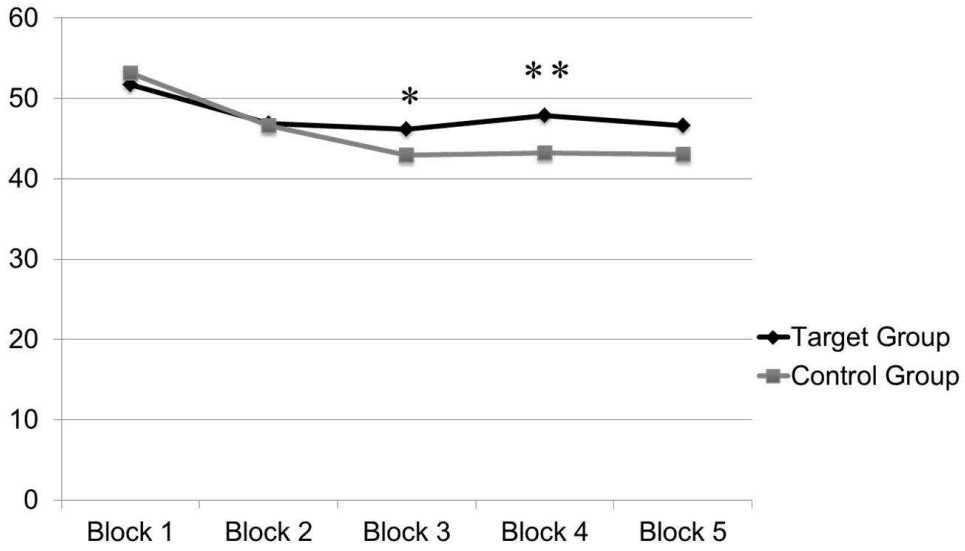

Figure 4.4 The Comparison between Groups on The Iowa Gambling Task Subscale Scores.

In the next chapter, a summary of certain finding and discussions for specific finding are provided. Then, the limitations of the current research and suggestions for further research study are discussed.

CHAPTER V
DISCUSSION

This research study about examine the influence of music training on decision making in adolescence by comparing the decision-making performance of the adolescence in the musician and non-musician groups, by using Independent sample t-test for compare mean IGT Score.

From this research result found that music training effect to good decision making by the musician group IGT score showed higher mean score than the non-musician group that means to answer this research question. So in Chapter 5 is provided research discussion, research limitation, and suggestion for the further research.

5.1 The Impact of Music Training on Decision making skill.

From several research and this research we found continuous music training enhance decision making skill in adolescence. This phenomenon may explained by the activation of pre-frontal cortex that involve Cool decision making. The music brain is worked in sequences as following; while the musician playing instruments they have to listening automatic and then play music instrument. For listen to music, the sound of music activates the Limbic region. Neuroimaging study has found that music listen is effect to active in Limbic region such as Limbic and paralimbic structures, subcallosal cingulate cortex, anterior insular, posterior hippocampus, superior temporal poles, and a part of ventral striatum (nucleus accumbens) that activated in aesthetic emotion and decrease aggressive while listening to happy song and familiar song (14-16) that importance in reduction of Hot decision making (60-64). Second, for playing music; this performance is working by motor-auditory control under supervision of pre-frontal cortex such as parietal, superior temporal, inferior frontal, thalamus and basal ganglia (31,67) and influence to increase

Cool decision making (5-9). Therefore, the music is influence to activate strong signal in limbic region brain and decrease Hot decision making. The music is influence to active in pre-frontal cortex and enhance Cool decision making and affect to learning process. This research consist with previous research that study in advantage music, music is enhance several cognitive skill, Executive function skill in preschool throughout ageing (23, 17-24)

5.2 Limitation and suggestion

Limitation of this study associated with the internal and external validity

First, this research is ex post facto design; purposive selection method has been used. The sample of this research is small size because the music training school is only one school. In the further study should longitudinal research.

Second, this research was no question about the favor of gambling in risk behavior based. In the further study should ask for gambling opinion in questionnaire.

Three, this research was not study about type of music instrument affect to decision making because of small sample. In the further study should study about type of music instrument affect to decision making.

5.3 Conclusion

The adolescent is a critical period that importance to becomes to mature. This period has changed in many systems related to physical, emotional, social and cognitive. The cognitive change is influence to executive function and decision-making to manipulate risk behavior. The enhancing of executive function that relate to decision-making in the adolescent might be helpful for reduction of risk behavior. Several studies had described the advantage of music intervention on executive function in preschool children throughout ageing. The several researches has found that music intervention enhance the ability of mathematical performance, spatial reasoning and linguistic (17-20) include cognitive, executive function in preschool though ageing such as working memory (23, 17-24). This research showed higher means score of cool decision making in music training than non-music training

adolescence. This result is the first study to reveal the advantage of music and decision making in adolescent. The impact of this study could be suggested that the music lesson should apply to either school curriculum or extra activities in classroom that beneficial for cool cognitive process in adolescent.

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APPENDICES

APPENDIX A
CERTIFICATE OF APPROVAL

ศูนย์ส่งเสริมจริยธรรมการวิจัยในคน
สำนักงานอธิการบดีมหาวิทยาลัยมหิดล
โทร. ๐-๒๘๔๙-๖๒๒๓-๕ โทรสาร ๐-๒๘๔๙-๖๒๒๓

ที่ ศธ ๐๕๑๗.๐๑๓๐/ ๙๘๖
วันที่ ๗ กรกฎาคม ๒๕๕๔
เรื่อง รับทราบการขอปรับเปลี่ยนรายละเอียดโครงการวิจัยเรื่อง "Influence of Music Training on Cognitive Executive Function in Thai Adolescence"

เรียน ผู้ช่วยศาสตราจารย์ ดร. นวลจันทร์ จุฑาภักดีกุล

ตามที่ ท่านได้ส่งแบบขอปรับเปลี่ยนรายละเอียดโครงการวิจัยเรื่อง "Influence of Music Training on Cognitive Executive Function in Thai Adolescence" รหัสโครงการ MU-IRB 2011/022.1102 มายังคณะกรรมการจริยธรรมการวิจัยในคนของมหาวิทยาลัยมหิดล เพื่อขอปรับเปลี่ยนรายละเอียดโครงการวิจัย ดังต่อไปนี้ คือ

๑) ขอเพิ่มเติมกระบวนการวิจัยโดยใช้แบบวัดที่เกี่ยวข้องกับกระบวนการคิดขั้นสูง คือ แบบประเมินความจำขณะทำงาน (working memory) และแบบประเมินการตัดสินใจ (decision making) เพื่อให้ได้ข้อมูลเชิงลึกของผลของการเรียนดนตรี ต่อการพัฒนากระบวนการคิดขั้นสูงที่เป็นการทำงานของสมองส่วนหน้า เพิ่มเติมหลักการและเหตุผล วัตถุประสงค์ ประโยชน์ที่จะได้รับ เกณฑ์การคัดเลือกกลุ่มตัวอย่าง ขั้นตอนดำเนินการวิจัย เอกสารชี้แจงผู้เข้าร่วมการวิจัย หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยฯ และเพิ่มผู้ร่วมวิจัย ๑ ท่าน คือ นางสาวอรนุช สีนารอด

๒) ขอเพิ่มโครงวิจัยย่อยเรื่อง "Influence of Musical Training on Cognitive Executive Function in Adolescence: EEG and ERP Studies" (อิทธิพลของการฝึกดนตรีต่อกระบวนการคิดขั้นสูงในเด็กวัยรุ่น: การศึกษาด้วยคลื่นไฟฟ้าสมอง) โดยคัดเลือกกลุ่มตัวอย่างจากผู้ที่เคยเข้าร่วมโครงการวิจัยหลักมาแล้ว จำนวน ๕๐ คน โดยมี ผศ. ดร. นวลจันทร์ จุฑาภักดีกุล อ.นพ. วรสิทธิ์ ศิริพรพาณิชย์ และ นายธีรัช พิริยะปัญญาพร เป็นผู้รับผิดชอบโครงการ

คณะกรรมการจริยธรรมการวิจัยในคนฯ ได้พิจารณารายละเอียดการขอปรับเปลี่ยนโครงการวิจัยเรื่องดังกล่าวแล้ว รับทราบการขอปรับเปลี่ยน/เพิ่มเติมรายละเอียดในโครงการวิจัยหลัก และเพิ่มเติมโครงการวิจัยย่อย ตามเอกสารที่แนบมาพร้อมนี้

จึงเรียนมาเพื่อทราบ

(ศาสตราจารย์แพทย์หญิงชูศรี พิศลยบุตร)
ประธานคณะกรรมการจริยธรรมการวิจัยในคนมหาวิทยาลัยมหิดล

หมายเหตุ: ถ้าข้อความใดที่ไม่เข้าใจ สามารถติดต่อสอบถามได้ที่
น.ส. วทินา วัชระรังนี และ น.ส. ชลิน กุ้งทอง เบอร์โทรศัพท์ ๐-๒๘๔๙-๖๒๒๓-๕

Documentary Proof of Mahidol University Institutional Review Board

This document is a record of review and approval/acceptance of a clinical study protocol

Protocol Title: Influence of Music Training on Cognitive Executive Function in Thai Adolescence

Protocol No.: 2011/022.1102

Type of approval/acceptance: **Protocol Amendment**

1) MU-IRB Submission form version received date 30 June 2011
2) Research Protocol version received date 30 June 2011
3) Participant Information Sheet for Student and Parent version date 30 June 2011
4) Infromed Consent form for Student and Parent version date 4 July 2011
5) Add Co-investigator: Miss Anuch Sinarod
6) Add Subproject Title: "Influence of Musical Training on Cognitive Executive Function in Adolescence: EEG and ERP Studies" Principal Investigator: Assistant Professor Dr.Nuanchan Chutabhakdikul and Co-investigators: Dr. Vorasith Siripornpanich and Mr.Teerut Piriyapunyaporn
7) MU-IRB Submission form (Subproject) version received date 30 June 2011
8) Research Subproject Protocol version received date 30 June 2011
9) Participant Information Sheet for Student and Parent (Subproject) version date 4 July 2011
10) Informed Consent form for Student and Parent (Subproject) version date 4 July 2011

Principal Investigator: Assistant Professor Dr.Nuanchan Chutabhakdikul

Date of Approval: 7 July 2011

Mahidol University Institutional Review Board is in full compliance with International Guidelines for Human Research Protection such as Declaration of Helsinki, The Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

.....

(Professor Shusee Visalyaputra)
Chairperson

7 July 2011
Date

Office of the President, Mahidol University, 999 Phuttamonthon 4 Rd., Salaya, Phuttamonthon District, Nakhon Pathom 73170. Tel. (662) 8496223-5 Fax. (662) 8496223

APPENDIX B
INFORM CONSENT FOR PARENT

เอกสารชี้แจงผู้เข้าร่วมการวิจัย
(สาหรับนักเรียนอายุ 15-17 ปี และผู้ปกครอง)
(Participant Information Sheet)

ในเอกสารนี้อาจมีข้อความที่ท่านและเด็กในปกครองของท่านอ่านแล้วยังไม่เข้าใจ โปรดสอบถามหัวหน้าโครงการหรือผู้แทนให้ช่วยอธิบายจนกว่าจะเข้าใจดี เด็กในปกครองของท่านจะได้รับเอกสารนี้ 1 ฉบับ นำกลับไปที่บ้านเพื่อปรึกษาหารือกับท่าน ญาติพี่น้อง หรือผู้อื่นที่ท่านและเด็กในปกครองของท่านต้องการปรึกษา เพื่อช่วยในการตัดสินใจเข้าร่วมการวิจัย

ชื่อโครงการ อิทธิพลของการเล่นดนตรีต่อการพัฒนากระบวนการคิดขั้นสูงในเด็กวัยรุ่น
ชื่อผู้วิจัย ผศ.ดร. นวลจันทร์ จุฑาภักดีกุล (โทรมือถือ 083-8986631)
นส. อุสา บุญเพ็ญ (โทรมือถือ 086-9981621)
นางอรพินท์ เลิศอาวัสดาตระกูล (โทรมือถือ 081-8211282)
อ.ดร. วสุนันท์ ชุ่มเชื้อ (โทรมือถือ 081-9168983)
นางสาวอนุช สีนารอด (โทรมือถือ 08-45970915)
สถานที่ที่สามารถติดต่อได้
สถาบันชีววิทยาศาสตร์โมเลกุล มหาวิทยาลัยมหิดล ศาลายา
โทรศัพท์ 02-4419003 ถึง 5 ต่อ 1330 โทรสาร 02-4411013

โครงการวิจัยนี้ทำขึ้นเพื่อ ศึกษาอิทธิพลของการเล่นดนตรีต่อการพัฒนากระบวนการคิดขั้นสูง ความจำ และการตัดสินใจในเด็กวัยรุ่น ซึ่งประโยชน์ที่คาดว่าจะได้รับ คือ สามารถนำมาใช้เป็นแนวทางในการจัดหลักสูตรการเรียนการสอนสำหรับครูและผู้ปกครองเพื่อช่วยช่วยส่งเสริมและพัฒนาศักยภาพด้านกระบวนการคิดขั้นสูงของเด็กวัยรุ่นได้

ท่านและเด็กในปกครองของท่านได้รับเชิญให้เข้าร่วมการวิจัยนี้เพราะ ท่านเป็นผู้ครองของนักเรียน และเด็กในปกครองของท่านกำลังศึกษาอยู่ในระดับชั้นมัธยมศึกษาปีที่ 5 มีสุขภาพสมบูรณ์แข็งแรงทั้งทางร่ายกายและจิตใจ ท่านเป็นผู้ครองของเด็ก

การวิจัยในครั้งนี้จะมีผู้เข้าร่วมการวิจัยประมาณ 300 คน

หากท่านและเด็กในปกครองของท่านตัดสินใจเข้าร่วมการวิจัยแล้ว จะมีขั้นตอนการวิจัยดังต่อไปนี้ คือ

- การเข้าร่วมการวิจัยนี้ จะใช้เวลาในการเข้าร่วมการวิจัย **จำนวน 1 - 2 ครั้ง** ซึ่งการเข้าร่วมการวิจัย **ครั้งที่ 2** ผู้วิจัยจะคัดเลือกและติดต่อเฉพาะนักเรียนที่มีเกณฑ์ตามที่ผู้วิจัยกำหนด จำนวน 80 คน

ครั้งที่ 1 (ขั้นตอนการคัดกรอง ใช้เวลาในประมาณ 20 นาที)

1. ผู้วิจัยจะขอให้ท่านตอบแบบสอบถามเกี่ยวกับความสัมพันธ์ในครอบครัว ทัศนคติ การส่งเสริมและสนับสนุนของครอบครัวในเรื่องการเรียนดนตรี ฯลฯ **ซึ่งประกอบด้วยคำถาม 3 ส่วน จำนวน 42 ข้อ** และจะขอให้เด็กในปกครองของท่านตอบแบบสอบถามเกี่ยวกับข้อมูลด้านสุขภาพ กิจกรรมทั่วไป ประสบการณ์ด้านการเรียนดนตรี ฯลฯ ซึ่งประกอบด้วยคำถาม 5 ส่วน จำนวน 24 ข้อ **โดยใช้เวลาในการตอบแบบสอบถามประมาณ 20 นาที**
2. ผู้วิจัยจะขอคัดกรองเด็กในปกครองของท่านโดยใช้ข้อมูลจากแบบสอบถาม เพื่อให้ได้กลุ่มตัวอย่างตามคุณสมบัติใกล้เคียงกับผู้วิจัยกำหนด จำนวน 80 คน โดยผู้วิจัยจะติดต่อเฉพาะเด็กที่ได้รับการคัดเลือก เพื่อขอนัดหมายวันเวลาและสถานที่ในการเก็บข้อมูล

ครั้งที่ 2 (ขั้นตอนการทดสอบ ใช้เวลาประมาณ 60 นาทีต่อคน)

1. หากเด็กในปกครองของท่านได้รับการคัดเลือกเข้าร่วมในงานวิจัยนี้ เด็กในปกครองของท่านจะได้รับการประเมินกระบวนการคิดขั้นสูงโดยใช้แบบทดสอบประเมินการคิด ซึ่งมีลักษณะคล้ายการเล่นเกมส์จับคู่โดยใช้การ์ดเป็นสื่อ จำนวน 1 ครั้ง **โดยใช้เวลาในการประเมินประมาณ 15-20 นาทีต่อคน**
2. ผู้วิจัยจะขอนัดหมายเด็กในปกครองของท่านอีกครั้งในวันถัดไป เพื่อรับการแบบประเมิน ดังนี้

2.1) การประเมินความจำขณะทำงาน โดยใช้แบบทดสอบในลักษณะการถามตอบด้านความจำเกี่ยวกับตัวเลข ตัวอักษร และการคำนวณอย่างง่ายๆ **โดยใช้เวลาในการทดสอบประมาณ 15 นาที**

2.2) การประเมินการตัดสินใจ โดยให้เด็กในปกครองของท่านตัดสินใจเลือกคำตอบจากหน้าจอคอมพิวเตอร์ **โดยใช้เวลาในการทอสอบประมาณ 15 นาทีต่อคน** โดยจะมีเวลาให้เด็กในปกครองของท่านพักระหว่างการทดสอบ **ประมาณ 5 นาที จำนวน 2 ครั้ง**

ความเสี่ยงที่อาจเกิดขึ้นเมื่อเข้าร่วมการวิจัย คือ ท่านและเด็กในปกครองของท่านอาจรู้สึกอึดอัด ไม่สบายใจอยู่บ้างกับบางคำถาม ท่านและเด็กในปกครองของท่านมีสิทธิ์ที่จะไม่ตอบคำถามเหล่านั้นได้ และสามารถถอนตัวออกจากการวิจัยได้ทันที และการไม่เข้าร่วมวิจัยนี้จะไม่มีผลกระทบใดๆ ต่อท่านและเด็กในปกครองของท่าน

การเข้าร่วมการวิจัยนี้ท่านและเด็กในปกครองของท่านจะไม่ได้รับค่าตอบแทน และไม่เสียค่าใช้จ่ายใดๆ

หากท่านและเด็กในปกครองของท่านมีข้อข้องใจที่จะสอบถามเกี่ยวกับการวิจัย ท่านและเด็กในปกครองของท่านสามารถติดต่อโดยตรงได้ที่ ผศ. ดร.นวลจันทร์ จุฑาภักดีกุล หมายเลขโทรศัพท์ 083-8986631 และผู้ร่วมวิจัยทุกท่าน ตามหมายเลขโทรศัพท์ที่ให้ไว้ข้างต้นได้ตลอดเวลา

ข้อมูลส่วนตัวของท่านและเด็กในปกครองของท่าน จะถูกเก็บรักษาไว้ไม่เปิดเผยต่อสาธารณะเป็นราย บุคคล แต่จะรายงานผลการวิจัยเป็นข้อมูลส่วนรวม ข้อมูลของผู้เข้าร่วมการวิจัยเป็นรายบุคคลอาจมีคณะบุคคลบางกลุ่มเข้ามาตรวจสอบได้เช่น ผู้ให้ทุนวิจัย สถาบันหรือองค์กรของรัฐที่มีหน้าที่ตรวจสอบ คณะ กรรมการจริยธรรมฯ เป็นต้น

ท่านและเด็กในปกครองของท่านมีสิทธิ์ถอนตัวออกจากโครงการวิจัยเมื่อใดก็ได้ โดยไม่ต้องแจ้งให้ทราบล่วงหน้า และการไม่เข้าร่วมการวิจัยหรือถอนตัวออกจากโครงการวิจัยนี้จะไม่มีผลกระทบใดๆ ต่อท่าน และจะไม่มีผลกระทบใดๆ ต่อการเรียน และผลคะแนนของเด็กในปกครองของท่านแต่ประการใด

โครงการวิจัยนี้ได้รับการพิจารณารับรอง จากคณะกรรมการจริยธรรมการวิจัยในคนของมหาวิทยาลัย มหิดล ซึ่งมีสานักงานอยู่ที่ สานักงานอธิการบดีมหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 หมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223 หากเด็กในปกครองของท่านได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ ท่านสามารถติดต่อกับประธานคณะกรรมการฯ หรือผู้แทน ได้ตามสถานที่และหมายเลขโทรศัพท์ข้างต้น ขอขอบพระคุณในความร่วมมือของท่านมา ณ ที่นี้

ข้าพเจ้าได้อ่านรายละเอียดในเอกสารนี้ครบถ้วนแล้ว

ลงชื่อ.....นักเรียน

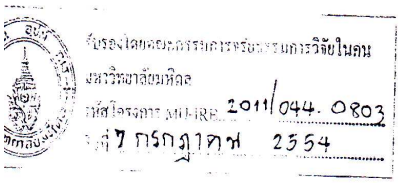
(.....)

วันที่.....

ลงชื่อ.....ผู้ปกครอง

(.....)

วันที่.....



หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ
(สำหรับนักเรียนอายุ 15-17 ปี และผู้ปกครอง)

วันที่.....เดือน.....พ.ศ.....

ข้าพเจ้า.....อายุ.....ปี อาศัยอยู่บ้านเลขที่.....
ถนน.....ตำบล.....อำเภอ.....
จังหวัด.....รหัสไปรษณีย์.....โทรศัพท์.....

เด็กในปกครองของข้าพเจ้า ดช./ดญ. .....

ข้าพเจ้าและเด็กในปกครองของข้าพเจ้าขอแสดงเจตนายินยอมเข้าร่วมโครงการวิจัยเรื่อง **"อิทธิพลของการฝึกดนตรีต่อกระบวนการคิดขั้นสูงในเด็กวัยรุ่น"**

โดยข้าพเจ้าและเด็กในปกครองของข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและจุดมุ่งหมายในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ประโยชน์ที่คาดว่าจะได้รับของการวิจัยและความเสี่ยงที่อาจจะเกิดขึ้นจากการเข้าร่วมการวิจัย โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด อีกทั้งยังได้รับคำอธิบายและตอบข้อสงสัยจากหัวหน้าโครงการวิจัยเป็นที่เรียบร้อยแล้ว

ข้าพเจ้าและเด็กในปกครองของข้าพเจ้าจึงสมัครใจเข้าร่วมโครงการวิจัยนี้:

หากข้าพเจ้าและเด็กในปกครองของข้าพเจ้ามีข้อข้องใจที่จะสอบถามเกี่ยวกับการวิจัย ข้าพเจ้าและเด็กในปกครองของข้าพเจ้าสามารถติดต่อโดยตรงได้ที่ ผศ.ดร.นวลจันทร์ จุฑาภักดี สถาบันชีววิทยาศาสตร์โมเลกุล มหาวิทยาลัยมหิดล วิทยาเขตศาลายา หมายเลขโทรศัพท์ 02-4419003-5 ต่อ 1330 หรือหมายเลขโทรศัพท์ 083-8986631 ได้ตลอดเวลา

ข้าพเจ้าและเด็กในปกครองของข้าพเจ้าได้ทราบถึงสิทธิ์ที่ข้าพเจ้าจะได้รับข้อมูลเพิ่มเติม ทั้งทางด้านประโยชน์และโทษจากการเข้าร่วมการวิจัย และสามารถถอนตัวหรือถอดเข้าร่วมการวิจัยได้ทุกเมื่อ โดยจะไม่มีผลกระทบใดๆ ต่อข้าพเจ้า และจะไม่มีผลกระทบใดๆ ต่อการเรียน หรือผลคะแนนของเด็กในปกครองของข้าพเจ้า และยินยอมให้ผู้วิจัยใช้ข้อมูลส่วนตัวของข้าพเจ้าและเด็กในปกครองของข้าพเจ้าที่ได้รับจากการวิจัย แต่จะไม่เผยแพร่ต่อสาธารณะเป็นรายบุคคล โดยจะนำเสนอเป็นข้อมูลโดยรวมจากการวิจัยเท่านั้น

หากข้าพเจ้าและเด็กในปกครองของข้าพเจ้า ได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถติดต่อกับประธานคณะกรรมการจริยธรรมการวิจัยในคนหรือผู้แทน ได้ที่ศูนย์ส่งเสริมจริยธรรมการวิจัยในคน สำนักงานอธิการบดีมหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 หมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223

ข้าพเจ้าและเด็กในปกครองของข้าพเจ้า เข้าใจข้อความในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และหนังสือแสดงเจตนายินยอมนี้โดยตลอดแล้ว จึงลงลายมือชื่อไว้

ลงชื่อ.....นักเรียน
(.....) วันที่.....
ลงชื่อ..... ผู้ปกครอง
(.....) วันที่.....
ลงชื่อ..... ผู้ให้ข้อมูลและขอความยินยอม/หัวหน้าโครงการวิจัย
(.....) วันที่.....

ในกรณีข้าพเจ้าไม่สามารถอ่านหนังสือได้ ผู้ที่อ่านข้อความทั้งหมดแทนข้าพเจ้า คือ .....
..... จึงได้ลงลายมือชื่อไว้เป็นพยาน

ลงชื่อ..... พยาน
(.....) วันที่.....

APPENDIX C
QUESTIONAIRE

แบบสอบถามสำหรับเด็กนักเรียน CODE.....

แบบสอบถามนี้มีจำนวนทั้งหมด 24 ข้อ กรุณาเติมเครื่องหมาย ✓ ลงในช่องหน้าคำตอบที่ **ตรงกับความเป็นจริงมากที่สุด** และเติมตัวเลขหรือข้อความลงในช่องว่างให้ครบทุกข้อ ข้อมูลที่ได้จากแบบสอบถามนี้จะถูกเก็บเป็นความลับและใช้เพื่อการวิจัยเท่านั้น **กรุณาตอบคำถามให้ครบทุกข้อเพื่อความสมบูรณ์ของแบบสอบถาม**

ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

1. เพศ ◯ชาย ◯หญิง

2. อายุ.....ปี.....เดือน (เกิดวันที่..... เดือน..... ปี.....

4. แผนการเรียน

◯คณิต – วิทย์ ◯ศิลป์ – คณิต

◯ศิลป์ – ภาษา ◯อื่นๆ(ระบุ).....

ส่วนที่ 2 ข้อมูลเกี่ยวกับสุขภาพของผู้ตอบแบบสอบถาม

5. ท่านมีโรคประจำตัวหรือไม่ ◯ไม่มี ◯มี
(ระบุ).....

6. ยาที่รับประทานเป็นประจำ ◯ไม่มี ◯มี
(ระบุ).....

7. ท่านเคยสูบบุหรี่บ้างหรือไม่

◯ไม่เคย ◯เคย บ้างนานๆครั้ง ◯เคย เดือนละ 1-2 ครั้ง ◯เคย บ่อยๆ

8. ท่านเคยดื่มสุราบ้างหรือไม่

◯ไม่เคย ◯เคย บ้างนานๆครั้ง ◯เคย เดือนละ 1-2 ครั้ง ◯เคย บ่อยๆ

14. ท่านเคยประสบอุบัติเหตุที่ได้รับแรงกระแทกที่ศีรษะจนหมดสติหรือไม่

◯ ไม่เคย ◯ เคย เมื่อ ปี พ.ศ. .....

15. ท่านประสบปัญหาใดบ้างเกี่ยวกับการนอน

◯ นอนไม่หลับ ความถี่ ◯ บ่อยๆ ◯ ทุกสัปดาห์ ◯ นานๆครั้ง

◯ นอนละเมอความถี่ ◯ บ่อยๆ ◯ ทุกสัปดาห์ ◯ นานๆครั้ง

◯ นอนกรน ความถี่ ◯ บ่อยๆ ◯ ทุกสัปดาห์ ◯ นานๆครั้ง

◯ สะดุ้งตื่นกลางดึก ความถี่ ◯ บ่อยๆ ◯ ทุกสัปดาห์ ◯ นานๆครั้ง

◯ ไม่เคยประสบปัญหาใดเลย

16. โดยเฉลี่ยท่านนอนหลับ (ในเวลากลางคืน) .....ชั่วโมงต่อวัน

ส่วนที่ 3 ข้อมูลเกี่ยวกับกิจกรรมทั่วไปของผู้ตอบแบบสอบถาม

17. ท่านมีโอกาสได้เรียนพิเศษเกี่ยวกับกิจกรรมต่างๆที่เพิ่มจากการเรียนการสอนในโรงเรียนหรือไม่

- กิจกรรมทางด้านภาษา เช่น เรียนภาษาอังกฤษ ภาษาจีน เป็นต้น

  ◯ไม่ได้รับ ◯ได้รับ .....ชั่วโมงต่อสัปดาห์

- กิจกรรมทางด้านศิลปะ เช่น เรียนวาดภาพ เรียนพื้นฐานสถาปัตยกรรม เป็นต้น

  ◯ไม่ได้รับ ◯ได้รับ .....ชั่วโมงต่อสัปดาห์

- กิจกรรมทางด้านวิชาการ เช่น เรียนพิเศษวิชาคณิตศาสตร์ สังคม ภาษาไทย เป็นต้น

  ◯ไม่ได้รับ ◯ได้รับ .....ชั่วโมงต่อสัปดาห์

- กิจกรรมทางด้านกีฬา เช่น เรียนยูโด เทควันโด เป็นต้น

  ◯ไม่ได้รับ ◯ได้รับ .....ชั่วโมงต่อสัปดาห์

- กิจกรรมอื่นๆ (ระบุ).....ได้รับ.....ชั่วโมงต่อสัปดาห์

18. ท่านเล่นเกมคอมพิวเตอร์หรือไม่ ◯ไม่เล่น ◯เล่น ความถี่ประมาณ.....ชั่วโมงต่อสัปดาห์

19. โดยเฉลี่ยท่านมีเวลาว่างประมาณ.....ชั่วโมงต่อวัน

20. ท่านใช้เวลาในการทำกิจกรรมอะไรมากที่สุดเมื่ออยู่ที่บ้าน (เรียงลำดับจากอันดับ 1-3)

◯ดูโทรทัศน์เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ฟังเพลงเล่นดนตรี เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯เล่นดนตรีเป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯เล่นกีฬา เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ใช้คอมพิวเตอร์เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ทำงานบ้าน เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯อื่นๆ(ระบุ).....เป็นเวลา.....ชั่วโมงต่อสัปดาห์

21. ท่านทำกิจกรรมอะไรร่วมกับคนในครอบครัวของท่าน มากที่สุด (เรียงลำดับจากอันดับ 1-3)

◯ ดูโทรทัศน์เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ ฟังเพลงเล่นดนตรี เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ เล่นดนตรีเป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ เล่นกีฬา เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ ใช้คอมพิวเตอร์เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ ทำงานบ้าน เป็นเวลา.....ชั่วโมงต่อสัปดาห์

◯ อื่นๆ(ระบุ).....เป็นเวลา.....ชั่วโมงต่อสัปดาห์

22. ที่ผ่านมาท่านเคยได้รับการฝึกดนตรีหรือไม่

◯ ไม่เคย (ไม่ต้องทำแบบสอบถามในส่วนที่ 4)

◯ เคย และไม่ได้เล่นนานกว่า 6 ปีมาแล้ว (กรุณาทำแบบสอบถามในส่วนที่ 4 ในข้อ 23.1-23.8)

◯ เคย และปัจจุบันยังเล่นอยู่ (กรุณาทำแบบสอบถามในส่วนที่ 4 ในข้อ 24.1-24.9)

ส่วนที่ 4 เฉพาะผู้ที่เคยมีประสบการเกี่ยวกับการเล่นดนตรีมาก่อน

23. คำถามสำหรับผู้ที่เคยเล่นดนตรีแต่ไม่ได้เล่นนานกว่า 6 ปีมาแล้ว (ข้อ 23.1 - 23.8)

23.1 ชนิดของเครื่องดนตรีที่เคยเล่น

◯ ดนตรีไทย (กรุณาระบุเครื่องดนตรี).....

◯ ดนตรีสากล(กรุณาระบุเครื่องดนตรี).....

23.2 ท่านเคยฝึกดนตรีชนิดดังกล่าวในช่วงวัยใด

◯ ตอนอายุน้อยกว่า 5 ปี ◯ ตอนอายุ 5-7 ปี

◯ ตอนอายุ 7-11 ปี ◯ ตอนอายุ 11 - 13 ปี

23.3 ช่วงเวลาที่เคยฝึกดนตรีอย่างต่อเนื่องนานเพียงใด

◯ ไม่ต่อเนื่อง ◯ ต่อเนื่องไม่เกิน 1 ปี

◯ ต่อเนื่องนาน 1-3 ปี ◯ ต่อเนื่องนานมากกว่า 3 ปี

23.4 ท่านเคยเล่นดนตรีโดยรวมวงกับเพื่อนหรือไม่ ◯ ไม่เคย

◯ เคย โดยชนิดของวงเป็นแบบ ◯ แชมเบอร์มิวสิก จำนวนสมาชิก.....คน

◯ วงซิมโฟนีออเคสตร้า จำนวนสมาชิก.....คน

◯ อื่นๆ (ระบุ).....จำนวนสมาชิก.....คน

23.5 ความถี่ในการเล่นรวมวงกับเพื่อนนั้นบ่อยแค่ไหน

◯ ทุกวัน ◯ สัปดาห์ละ 3 – 5 ครั้ง

◯ สัปดาห์ละ 1 – 2 ครั้ง ◯ เดือนละ 1-2 ครั้งหรือนานกว่านั้น

23.6 ท่านมีความสามารถในการเล่นเครื่องดนตรีชนิดดังกล่าวได้โดยวิธีใด

◯ ฝึกเองจากการดูโทรทัศน์หรือคนรอบข้าง

◯ ผู้ปกครองบังคับให้ไปเรียน

◯ ขอผู้ปกครองไปเรียนและผู้ปกครองสนับสนุน

◯ ผู้ปกครองไม่สนับสนุนแต่หาหนทางไปเรียนเอง

23.7 ครอบครัวของท่านสนับสนุนการเล่นดนตรีครั้งนี้มากเพียงใด

◯ ไม่สนับสนุน ◯ เฉยๆ ◯ สนับสนุนเต็มที่

23.8 ท่านชอบการเล่นดนตรีมากน้อยเพียงใด

◯ ไม่ชอบ ◯ เฉยๆ

◯ ชอบบ้าง แต่ไม่อยากกลับไปเล่นอีก ◯ ชอบมากและอยากกลับไปเล่นอีก

คำถามสำหรับผู้ที่เคยเล่นดนตรีและปัจจุบันยังเล่นอยู่ (ข้อ 24.1 – 24.9)

24.1 ชนิดของเครื่องดนตรีที่เล่น

◯ ดนตรีไทย (กรุณาระบุเครื่องดนตรี).....

◯ ดนตรีสากล(กรุณาระบุเครื่องดนตรี).....

24.2 ท่านเริ่มฝึกเล่นเครื่องดนตรีชนิดดังกล่าวในช่วงวัยใด

◯ ตอนอายุน้อยกว่า 5 ปี ◯ ตอนอายุ 5-7 ปี

◯ ตอนอายุ 7-11 ปี ◯ ตอนอายุ 11 - 13 ปี

24.3 ความถี่ในการเล่นเครื่องดนตรีชนิดดังกล่าวในปัจจุบัน

◯ ทุกวัน ◯ สัปดาห์ละ 3 – 5 ครั้ง

◯ สัปดาห์ละ 1 – 2 ครั้ง ◯ เดือนละ 1-2 ครั้งหรือนานกว่านั้น

24.4 ระยะเวลาที่เล่นดนตรีในแต่ละครั้งเฉลี่ยแล้วประมาณ.....ชั่วโมง

24.5 ท่านเคยเล่นดนตรีโดยรวมวงกับเพื่อนหรือไม่

◯ ไม่เคย

◯ เคย โดยชนิดของวงเป็นแบบ ◯ แชมเบอร์มิวสิก จำนวนสมาชิก.....คน

◯ วงซิมโฟนีออเคสตร้า จำนวนสมาชิก.....คน

◯ อื่นๆ (ระบุ)..... จำนวนสมาชิก.....คน

24.6 ความถี่ในการเล่นรวมวงกับเพื่อนนั้นบ่อยแค่ไหน

◯ ทุกวัน ◯ สัปดาห์ละ 3 – 5 ครั้ง

◯ สัปดาห์ละ 1 – 2 ครั้ง ◯ เดือนละ 1-2 ครั้งหรือนานกว่านั้น

24.7 ท่านมีความสามารถในการเล่นเครื่องดนตรีชนิดดังกล่าวได้โดยวิธีใด

◯ ฝึกเองจากการดูโทรทัศน์หรือคนรอบข้าง

◯ ผู้ปกครองบังคับให้ไปเรียน

◯ ขอผู้ปกครองไปเรียนและผู้ปกครองสนับสนุน

◯ ผู้ปกครองไม่สนับสนุนแต่หาหนทางไปเรียนเอง

24.8 ครอบครัวของท่านสนับสนุนการเล่นดนตรีครั้งนี้มากเพียงใด

◯ ไม่สนับสนุน ◯ เฉยๆ ◯ สนับสนุนเต็มที่

24.9 ท่านชอบการเล่นดนตรีมากน้อยเพียงใด

◯ ไม่ชอบ ◯ เฉยๆ

◯ ชอบบ้างเล็กน้อย ◯ ชอบมาก

ขอขอบพระคุณในการให้ความร่วมมือ

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