THE RELATIONSHIP BETWEEN VIOLENT MOTION-SENSING VIDEO GAMES AND AGGRESSION IN TAIWANESE CHILDREN

By

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ABSTRACT

The research in the effects of violent motion-sensing video game on aggression is scarce, particularly on Asian children. The first object of this research is to examine whether violent motion-sensing video games is positively correlated with children's aggression in Taiwan, where its cultural values discourage aggressive behaviors. Additionally, this research examines whether the GAM illustrate how violent motion-sensing video game influences aggression among Taiwanese children.

A survey study was conducted in 2008. More than nine hundred Taiwanese children were surveyed. Analyses of the data revealed that playing violent motion-sensing video game was not significantly associated with high levels of aggression in Taiwanese children, while controlling the influences of other explanatory variables. It seems that GAM was not effective in illustrating the process of violent motion-sensing video game influencing aggression. Although the result failed to demonstrate the influencing pathway of violent motion-sensing video games, the GAM illustrates the process of biological and social environmental modifiers affecting aggression in Taiwanese children. Some implications and limitations of this research were also discussed.

DEDICATION

This thesis is dedicated to everyone who helped me and guided me in my life of studying abroad, particularly my family and close friends.

LIST OF ABBREVIATIONS AND SYMBOLS

a	Cronbach's index of internal consistency
df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
F	Fisher's *F* ratio: A ration of two variances
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation
t	Computed value of *t* test
<	Less than
=	Equal to

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CHAPTER 1

INTRODUCTION

Introduction

Recently, motion-sensing technology in video game systems has attracted much public attention and has created a direct and immersive gaming experience for game players; some examples include Nintendo Wii, Sony Play Station Move, and Microsoft Xbox 360 Kinect. The first motion-sensing video game console, Wii, was released in November 2006 and has dominated the video game console market. Prior to June 2010, Wii sold 73.97 million units worldwide or approximately 17.7 million each year (Thorsen, 2010). Comparatively, PS2, PS3, and Xbox 360 sold 14.5, 9, and 8 million units each year, respectively (Yin-Poole, 2010).

Not only is Wii the most popular video game console, but it has also changed video gaming (Grossman, 2006). Before Wii was introduced, people used buttons and a directional pad to control characters onscreen. Players could enjoy playing games by pushing buttons on a game pad while sitting on a couch. Nowadays players can stand in front of a screen using their physical gestures to play Wii games. This tremendous change in gaming and the success of Wii are attributed to the innovative design of the controller called the "Wii remote" (Browman & Boyan, 2008). The Wii remote, which uses motion-sensing technology, allows players to replicate real-life motions and control avatars by real-life physical gestures. For example, if players want to play the baseball game in the Nintendo Wii, they need to grasp the Wii remote as a baseball bat and then swing their arms. At the same time the motion-sensing system in the Wii replicates the game players' physical motion to cause the character onscreen to swing the bat. In an attempt to

further immerse players into the games, Nintendo has introduced controller attachments to replace the Wii remote that looked like a real baseball bat, a golf club, a tennis racket, and a steering wheel. For players, this revolutionary controller not only makes video gaming easier, but also provides more ways to interact with mass media.

In addition to the motion-sensing controller, an interactive technological affordance offered by Wii is the potential to customize game avatars (Downs & Oliver, 2009). In Wii games, players can create avatars that resemble them or whomever they want the avatar to resemble (e.g., parents, siblings, peers, or celebrities). In the avatar customization system, players can manipulate or change approximately 80-90 different avatar characteristics, such as facial features, body types, hairstyles and clothing.

These two affordances—the motion-sensing controller and the potential to customize avatars—create a new gaming experience for game players and further engage and involve players in the games. Players experience an environment created by motion-sensing video games that makes them feel represented in the game (Rheingold, 1991) and feel a greater sense of presence—"the feeling of physical existence with a virtual environment" (Lombard & Ditton, 1997).

The advanced technology in media that provided more presence and realistic portrayals was more likely to increase the players' aggression (Persky & Blascovich, 2007), desensitization, and identification with aggressive avatars (Lombard & Ditton, 1997). Some research (e.g., Tamborini & Skalski, 2006) posited that players learn violent scripts through playing video games. Video game playing increased the likelihood of individuals to recognize aggressive cues outside of the gaming context and primed relevant cognition, affect, and arousal (Tamborini & Skalski, 2006). From a learning approach, motion-sensing video games allow players to feel

more involved when using motion-sensing controller and help players learn aggression more efficiently than the non-motion-sensing controller (Downs & Oliver, 2009).

However, little research investigating effects of motion-sensing video games exists, particularly research examining the effects on aggressive behavior, affect, cognition, or attitudes. Some non-motion-sensing video game studies (e.g., Persky & Blascovich, 2007) supported that advanced technology increased the likelihood of aggression; however, studies that examine the association of motion-sensing video games and aggression are few and far between. As motion-sensing video games grow more popular, it becomes necessary to study video games that utilize motion-sensing technology (Downs & Oliver, 2009). This gap in the literature is the impetus for the researcher to examine the effect of advanced technology in traditional video games on aggression.

Additionally, other issues demanded research attention that inspired the researcher to conduct this study. Most video games studies have supported findings that exposure to violent video games increases players' aggressive behavior and aggression-related constructs (e.g., aggressive cognition, affect, and attitude). Yet, this conclusion was derived from data collected among college students in western countries, particularly in the United States. A few studies attempted to examine the impacts of video games on aggression among participants in European countries (e.g., Möller & Krahé, 2009) that reveal findings that are consistent with results from the American study. Evidence from research in western societies verifies the inference that exposure to violent video games increases the likelihood of aggression among players.

Can these results be generalized to the participants in non-Western countries, particularly in Asian countries that have relatively low violent crime rates? Will playing violent motion-sensing video games influence Asian children who are educated by the values of self-abnegation,

in the same way as it does children in western countries where these values are less important? Unfortunately, little literature has been published on the effect of video games among participants in non-Western cultures (Anderson, Berkowitz, Donnerstein, Huesmann, Johnson, Linz, Malamuth, & Wartella, 2003), particularly in Asian countries. Recently, Anderson and colleagues attempted to answer that question in a cross-cultural, longitudinal study investigating effects of violent non-motion-sensing video games on aggression in Japanese and American students (Anderson, Shibuya, Ihori, Swing, Bushman, Sakamoto, . . ., & Saleem, 2010). Although some evidence from Asian countries is available, overall, the impact of violent video games on Asian children has not yet been explored. More cross-cultural research needs to be conducted to enhance the understanding of the effects of violent video games on people of different cultures (Anderson et al., 2010). The researcher was inspired to conduct a study of the effects of motion-sensing video games on the aggression in Taiwanese.

Another issue is that most video games studies are conducted on adult/collegiate participants. Few studies have been conducted on participants in early and middle adolescence due to ethical concerns. Nevertheless, children of that age group are frequently associated with school shootings (Kirsh, 2003) and play more violent video games than do children in any other age group. There is insufficient empirical evidence to demonstrate whether violent video games influence children. Adults are more commonly the participants of video game research. The findings from those studies should not be generalized to children, since many differences exist in the physical and mental development between children and adults (Kirsh, 2010). In order to determine the impact of violent video games on children and avoid committing an ethical violation, a survey was used in this research to obtain evidence of the impact of video games on early and middle children. This inspired me to do a study to try to reason the relationship

between motion-sensing video games and aggression with the data of Taiwanese children.

While discussing television violence, Rubinstein (1981) stated, "the crucial question is not whether the viewer, in particular the younger viewer, is affected by what he or she sees on television," but "*what* kinds of violent behavior are induced under *what* circumstances with *what* kinds of children watching *what* kinds of programs [italics added]." This notion of *what* represents the importance of the social environmental and biological factors in developing aggression. The General Aggression Model (GAM) is the only theory that demonstrates the importance of multiple causes of aggression, including social environmental and biological factors when considering the impact of the media. The GAM is also the only theory to examine the impact of interactive media violence. Nonetheless, the support for the GAM has been sporadic (Ferguson, C. J., Rueda, Cruz, Ferguson, D., Fritz, & Smith, 2008). Little empirical research has examined how social environmental factors moderate the impact of violent media (Anderson et al., 2003). This thesis study attempts to answer Anderson and colleagues call for more research to examine underlying psychological mechanisms of developing aggression, including the moderators and mediators of aggression (Anderson, Sakamoto, & Gentile, 2008). Research in moderators not only broadens our perspective of media violence and aggressive behavior, but also provides the clues to "potential avenues for preventive intervention" (Anderson et al., 2003). The shortage of studies utilizing the GAM inspired this attempt to verify this recent theory of aggression and interactive media and to broaden the understanding of theoretical framework of aggression.

This preliminary study is concerned with the association between violent motion-sensing video games and aggression among Taiwanese children, based on the GAM. This study expands upon previous video games research in several directions: (1) by examining the correlation

between motion-sensing technology and aggression, (2) by providing data collected from Asian children, (3) by verifying a part of the comprehensive media violence model (i.e., GAM). The current study attempts to provide empirical evidence to fill the gap in video game studies and to move beyond the understanding from traditional, non-motion-sensing video games to motion-sensing video games. For the academic community, the current study attempts to verify a model that is integrated from extant aggression theories, focusing on multiple causes (i.e., biological and social environmental factors) of aggression. For the general public, the notion of multiple causes of aggression provides parents, teachers, and governmental officials with several efficient ways to shield children from interactive media violence.

Research Questions

This research has two major objectives. First, investigate the relationship between violent motion-sensing video games and aggression. Motion-sensing technology changed the landscape of the video games; however, the effects of motion-sensing technology are not certain, as it is a new technology applied to video game systems. Therefore, the first research question of this study is: Is violent motion-sensing video games positively correlated with aggression?

The second objective of this study is to utilize the recent aggression theory, the GAM, to illustrate how violent motion-sensing video game affects players. The GAM incorporates key concepts of theories of aggression in the social cognition field (e.g., social learning theory, cognitive neoassociation model, social information-processing model, affective aggression model, script theory, and excitation transfer model) and is the first theory to explain the effects of interactive media (i.e., video games) on aggression. Although the GAM enhances the knowledge of the causes of aggression and has helped build a “house of aggression study” (Anderson &

Bushman, 2002), some scholars (e.g., Ferguson et al., 2008) question whether the GAM is adequate in predicting violent behavior. Most studies verified the GAM using Taylor Competitive Reaction Time Test (TCRTT) to assess participants' aggression in the laboratory. Nevertheless, Ferguson et al. (2008) argued that the measure of the result of TCRTT was not standardized and the reliability of TCRTT was also not reported in those studies. With these flaws in studies of testifying the GAM, their findings are in question. Thus, the second research question of this current study is: does the GAM illustrate the impact of habitual violent motion-sensing video games on real-life aggression in Taiwanese children?

The Organization of This Thesis

This thesis contains five chapters. The second chapter is a review of the literature, addressing both empirical and theoretical explanations of the effects of the violent motion-sensing video games on aggression. The third chapter describes the methodology and definitions of the major variables. Chapter four consists of the findings from the statistical analyses for this study. Finally, the fifth chapter contains conclusions of the study and suggestions are made for future research.

CHAPTER 2

LITERATURE REVIEW

Violent Non-Motion-Sensing Video Games and Aggression

Before discussing the impact of violent motion-sensing video games, an understanding of violent video games and their effects is necessary.

Video game violence is a relatively new topic in the media violence field, having emerged in late the 1980s and early 1990s. Advances in technology have allowed for video games to be played in many different formats. For instance, people can play video games on computers, consoles (e.g., Xbox 360, PlayStation, and Wii), handhelds (e.g., Nintendo DS), iPads, personal digital assistants, and mobile telephones. Considering the video game industry grossed 17.9 billion dollar revenue in 2007, a 43% increase from 2006, the popularity of video games is indisputable (Berardini, 2008).

In light of this massive exposure, the effects of violent video games on players, especially children, warrant closer examination. Accumulated empirical evidence revealed that a large portion of games contains violence (Anderson et al., 2003), and these games are often favored by children (Anderson, Gentile & Buckley, 2007). It appears children not only love violent video games but also spend an increasingly large amount of time playing video games. A recent study examined the amount of time adolescents spent playing videos per week and found that tweens (8-12 year-olds) spent an average of 13 hours per week playing video games while teens (13-18) spent an average of 14 hours per week (Martin & Openheim, 2007).

Adolescents are not just simply playing video games more often; they are also playing video games that are more realistic. Advanced video game technology (e.g., motion-sensing

technology) and television technology (e.g., 3-D technology) make violent video games feel like real, violent scenes. This realistic and interactive nature of video games allows children to become active aggressors rather than simply witnesses of aggression in front of the screen. Couple this with the nature of most violent video games, which reward players when violent acts are committed or punish players for not being violent enough, and the risk of players becoming aggressive may increase (Anderson et al., 2003).

Due to studies like these, this topic has garnered attention from the general public, government, and academic community during the past several decades. Numerous reports by professional health associations (e.g., American Academy of Pediatrics, American Psychological Association, Australian College of Pediatrics, Canadian Pediatric Society) and government health agencies (e.g., U.S. Office of the Surgeon General, U.S. Department of Health and Human Services) have reached the same conclusion that media violence, including video game violence, increases the likelihood of aggression in both immediate and long-term contexts (Anderson et al., 2010; Gentile et al., 2007).

Although most studies on violent video games seemed to have consistent results, some recent studies (e.g., Ferguson et al., 2008; Ferguson & Kilburn, 2010) insisted that exposure to violent video games did not cause aggression. These contradictory results make the violent video game studies controversial. With this in mind, this chapter reviewed selected research in non-motion-sensing violent video games, meta-analysis reviews on video games, and the studies of the impacts of motion-sensing video games on aggressive behavior.

Violent video game studies focus on the effects of violent video games on players' aggressive behavior, cognition, and affect. These conceptual variables are the same as those involved in media violence studies; hence, a similar positive relationship between media

violence and aggressive outcomes should be found (Dill & Dill, 1998). Some empirical evidence supported this contention. Several meta-analysis reviews (e.g., Anderson et al., 2010; Anderson, 2004; Anderson & Bushman, 2001; Sherry, 2000) had reported significant harmful effects of exposure to violent video game, both in short-term experimental studies and in cross-sectional correlational studies. The effect size of violent video games on aggression ranged from .15 (see Sherry, 2000), .189 (see Anderson et al., 2010), .19 (see Anderson & Bushman, 2001) to .26 (see Anderson, 2004). Anderson & Bushman (2001) reviewed 35 research papers and found a positive and significant relationship between video game violence and aggressive cognition in children and young adults. The findings were consistent with another meta-analysis conducted by Sherry (2001) that examined 32 studies. Three years after his initial analysis, Anderson (2004) furthered his previous conclusions by confirming that exposure to violent video games was significantly linked to increases in aggressive behavior, cognition, affect, and cardiovascular arousal. Experimental studies revealed this linkage to be causal, and correlational studies revealed a linkage to serious, real-world types of aggression (Anderson, 2004). To put this in perspective, these meta-analytic studies demonstrated that the effect of violent video games on aggression was larger than the effects of condom use to decrease HIV risk, of exposure to passive smoke at work and lung cancer, and of calcium intake on bone mass (Anderson & Bushman, 2001).

Nevertheless, some scholars (e.g., Olson, 2004; Ferguson, 2007; Ferguson & Kilburn, 2009) contended that previous meta-analytic reviews might inflate the effect of violent video games due to publication bias. Ferguson (2007) argued that some researchers chose outcomes that best fit their hypotheses and ignored other outcomes to generate a larger effect size for violent video games. Moreover, unstandardized measures of aggression were used, potentially

overestimating the effect of violent video games (Ferguson & Kilburn, 2009). Anderson et al. (2010) responded to Ferguson and Kilburn's queries with a meta-analytic study that employed stricter inclusion criteria to avoid publication bias. This updated study yielded favorable effect sizes for violent video games on aggressive-related constructs, supporting the findings yielded by the previous meta-analytic studies.

Additionally, in the literature reviews of Barlett, Anderson and Swing (2008) and Dill and Dill (1998), they confirmed that playing violent video games significantly promoted aggression. These reviews demonstrated that across research designs, exposure to violent video games is associated with higher levels of aggressive behavior, cognition, affect, and physiological arousal. Exposure to violent video games can also lead to lower levels of prosocial behavior.

Additional studies (e.g., Anderson & Dill, 2000; Carnagey & Anderson, 2005; Irwin & Gross, 1995) also found that those who had played violent video games behaved and thought more aggressively than those who had played non-violent video games. Most recently, Lee, Peng, and Klein (2010) supported the effect of violent video games on participants' attitudes toward violence. They noted that people who played violent video games were more accepting of real-life crimes and criminals, especially if the crimes were similar to what the players committed during the game.

As shown, most experimental studies supported that playing violent video games lead to increases in aggressive behavior, affect, cognition, and attitudes. Nonexperimental studies that examined the short-term or long-term effects of violent video games on real-life aggression have also shown consistent findings. In an attempt to examine the effects of long-term exposure to violent video games, Gentile, Linder, and Walsh (2003) surveyed more than two hundred third

and fifth grade children. In this study, the researchers chose to measure aggression, the dependent variable, by self-report, peer-nomination, and teacher nomination. The study used verbal, physical, and relational aggression to assess aggression. The results suggested that students who consumed more media violence, including video games violence, early in the school year were more likely to have a hostile attribution bias later in the school year. They were likely to be aggressive, to perceive hostile intent on the part of others, and to interpret event in a paranoid manner.

Wallenius and Punamäki (2008) tracked a group of over three hundred 12- and 15-year-old adolescents in Finland for two years. The results demonstrated that digital game violence was linked to direct aggression. They found that the parent-children communication moderated the effects of digital games and direct aggression, in particular for the adolescents who were in the poor parent-children communication. The digital game violence appeared to be one of the risk factors of increased aggressive behavior.

In a longitudinal study, Möller and Krahé (2009) tracked 143 German adolescents over 30 months. The mean age of participants was 13.34 years. Physical aggression was assessed by a 6-item subscale of the Buss and Perry aggression questionnaire (BPAQ). Indirect aggression was also measured by Buss and Warren's aggression measure. These two measures used five-point scale from "1-not at all like me" to "5-completely like me." Some issues regarding these measures may occur. The 5-point scale seemed to be a Likert-scale. The participants' responses did not reflect the frequency or time of the aggression, but rather measured the degree of the particular aggressive behaviors. Specifically, the BPAQ is widely accepted as a valid measure of trait aggressiveness (Anderson & Dill, 2000); however, few published studies had used it to measure aggression. Although the BPAQ is sometimes used to measure aggression, it has only

been validated to measure trait aggressiveness not aggression. No measure of validity was reported by Anderson and Dill (2000) to prove that the BPAQ was suitable to assess aggression. Most nonexperimental studies utilized the self-report or third person nomination (e.g., peer, teacher, or parents) to assess aggression.

The normative acceptance of aggression was measured by a modified version of the normative beliefs scale by Krahé and Möller (2004). The scenario described a provocation by a peer and then asked participants indicated how they responded to if they had been in the situation. Twelve possible reactions were presented to participants. For example, "to kick and push him/ her" and "spread rumors about him/ her." Responses were rated in a five-point scale. The participants were also asked to rate the frequency of playing popular games reflecting the exposure to violent video games. The findings revealed that exposure to violent video games predicted physical aggression. From the path analysis, the violent video games influenced aggression via an increase of aggression attitudes and hostile attribution bias. It was consistent with the prediction of the GAM model. However, the additional variables (e.g., the level of aggression in participant's social environment) that could moderate the associations between violent video games playing and later aggression did not consider in the study (Möller & Krahé, 2009). This limitation inspired me to examine the effects of the social environmental aggression of children.

Anderson, Sakamoto, and Gentile (2008) had interviewed three population-based samples; including one sample consisted of 181 Japanese junior high school students aged from 12 to 15 year-old. A second Japanese sample consisted of 1050 students ranging in age from 13 to 18 years. The third sample was 364 U. S. elementary students ranging in age from 9 to 12 years. Physical aggression as the dependent variable was measured by the self-report nomination

in Japanese participants that used 6-item of the Buss and Perry physical aggression scale. For the American participants, aggressive behaviors were assessed by teachers, peers, and themselves. The violent video games exposure was calculated by the similar measure of Anderson and Dill (2000) and Gentile et al. (2003). The findings revealed that playing violent video game was a significant risk factor for later physical aggression in both western countries and non-western countries. Even in Japan, which has a relatively low violent crime rate compared to America, the longitudinal effect of violent video games in Japan is similar to the effect in the U.S. These longitudinal studies of violent video games concluded that the habitual exposure to violent video games would induce subsequent aggression in not only western countries but also non-western countries. Some studies revealed the longitudinal effect of violent video games on children in Eastern culture.

As a result, the findings of most research on violent video games across research designs supported the idea that exposure to violent video games was a risk factor for aggressive behavior, feeling, cognition, and attitudes. The empirical evidence of violent video games studies could shed light on the violent motion-sensing games study, especially at this moment when research in motion-sensing games is scarce and far more studies of motion-sensing games are needed.

Violent Motion-Sensing Video Games and Aggression

The characteristics of motion-sensing video games.

As previously noted in chapter one, Wii has not only the characteristics of interactive media, but also customizable game avatars and kinesthetic motion-sensing controls. These features provide a higher level of immersion and involvement (Tamborini & Skalski, 2006), ultimately making a player to feel more engaged in the game. Anderson and Dill (2000) posited

that video games were more dangerous than television and movies because video games made it relatively easy to identify with the characters in the games. Consistent with this notion, the ability to customize game avatars may make motion-sensing video games more "dangerous" than other video games. Because motion-sensing video games allow players to create avatars, players find it easier to identify with avatars that are created by themselves in motion-sensing video games than avatars in non-motion-sensing video games that do not allow players to create their own avatars. By creating avatars in their own image, players do more than control the game; they feel like a part of the game by experiencing it through the virtual eyes of their avatar.

More than just feeling a part of the game because of their avatars, players receive kinesthetic feedback in relation to their actions. The Wii controller also provides controller feedback using haptic technology that creates a more real-life gaming experience. Simply stated, if a player in a Wii racing game was hit by someone's car, he/ she would get vibrations via the Wii remote or steering wheel. By providing players with kinesthetic feedback, real-time reactions like these further immerses players into the reality of the video game.

The advanced technology in motion-sensing video games.

Because a game player has direct control over a character's violent acts onscreen, a player acts as a game character, not as an observer (Calvert & Tan, 1994). Players feel like they are present in the environment created by video games (Rheingold, 1991). This feel of physical existence within a virtual environment mostly is known as "presence"(Lombard & Ditton, 1997). Presence is the sense of "feeling of being there". It results from our brain being confused by the external stimulus or individuals' interval imagination. Presence can be divided into six concepts: immersion, transportation, realism, social richness, social actor within medium, and medium as a

social actor (Lombard & Ditton, 1997). These concepts can be further divided into two subgroups. The first one is physical presence, which includes immersion, transportation, and realism. The other is social presence and includes the remaining three concepts, social richness, social actor within medium, and medium as a social actor.

Briefly, the two modes of presence will be further described. Physical presence is the most often discussed concept. It consists of perceptual and cognitive components. It is the sense of being physically located in a virtual environment (Ijsselstein, de Ridder, Freeman, & Avon, 2000) or the sense of experiencing virtual objects as though they are actual objects (Lee, 2004; Tamborini & Skalski, 2006). Tamborini (2000) discussed that the two essential qualities of physical presence were the feelings of involvement and immersion. Involvement was defined as a psychological state in which attention and energy were focused on the medium (Eastin & Griffiths, 2006). Immersion was defined as the degree to which a player or person perceived being in and interacting with mediated environment (Witmer & Singer, 1998). Social presence could be thought of as the feeling of presence provided by a person interacting with media or some stimulus. For example, social richness, social actor within medium, and medium as social actor. They can be experienced while using interactive media, particularly in playing video games (Bracken, Lange, & Denny, 2005; Persky & Blascovich, 2007). Today both physical and social presence can be easily created by video game designers and then experienced by players through their interaction with video games (Tamborini, Eastin, Skalski, Lachlan, Fediuk, & Brady, 2004). Involvement and immersion, and the combination of vividness (relating to a user's sense) and interactivity (the ability to alter environment) are necessary for a player to experience both kinds of presence (Witmer & Singer, 1998; Eastin, Griffiths, & Lerch, 2008).

The characteristics of motion-sensing video games—realistic graphics, three-dimension

graphics, stereoscopic image, subjective camera shots (i.e., first-person point of view), surround sound system, haptic vibration feedback, and kinetic input (i.e., motion-sensing technology)—has created a more vivid and more immersive gaming experience for players. Motion-sensing controllers that have mapped natural body actions further increase the vividness and interactivity in games. This makes players highly conductive to the sensation of presence (Tamborini & Skalski, 2006). Considering these factors, players would feel a higher sense of presence from motion-sensing video games than from games that lack the characteristics of motion-sensing video games.

Motion-sensing video games accept more inputs from a player, not only pushing buttons but also acting out real-life behaviors. That means motion-sensing video games have more interactivity than non-motion-sensing video games (Lombard & Ditton, 1997). The controller of motion-sensing video games provides considerable mapping and creates a heightened sense of spatial presence (Tamborini & Skalski, 2006). Motion-sensing video games provide players with more input options, responding to tactile buttons and spatial movements. This increases the interactivity and heightens a user's sense of involvement with immersion (Tamborini & Skalski, 2006) and sense of presence. In that immersive vivid environment created by motion-sensing video games, players perceive themselves to be included in and interacting with the environment and its contents in a psychologically natural way (Persky & Blascovich, 2007). Furthermore, players who played motion-sensing video games on a larger screen were more aroused and benefited from a greater "sense of participation" and "sense of involvement" (Lombard & Ditton, 1997).

Research in violent motion-sensing video games and aggression.

As previously noted, motion-sensing video games have many important characteristics: an interactive nature, the capacity to reward and punish players for various aggressive behaviors, the immersive qualities brought by motion-sensing technology, and the fact that the user is both an enactor and an observer of aggression. These features heighten a player's sense of presence and increase the experience's realism (Persky & Blascovich, 2007; Bowman & Boyan, 2008). By increasing sensory engagement, a player's mental strain should be eased, enabling greater focus on the content and action, which subsequently increases the effects of the game's content (Eastin, Griffiths, & Lerch, 2008). Therefore, motion-sensing video games may have a larger impact on younger players than do non-motion-sensing video games.

Along this line, while a person played violent motion-sensing video games, they felt like they had engaged in the violent acts depicted in the games (Mahood & Cicchirillo, 2008). A person is not just a passive player who sits pushing buttons or a passive viewer who sits absorbing messages from television but becomes a "virtual aggressor" (Mahood, 2008). The player who played violent motion-sensing video games would have more aggressive behavior and aggression-related constructs than the player playing non-motion-sensing violent video games (Markey & Scherer, 2009). Additionally, according to the idea of technological advancement and script theory, consequences from an increased immersion in a video game that leads to higher levels of aggression is also supported by a number of psychological phenomena including desensitization, skills training, and identification (Lombard & Ditton, 1997; Persky & Blascovich, 2007).

As stated by the aforementioned studies, the more sense of presence perceived by a user, the more aggressive behavior, affect, cognition, and attitudes that a user will display after

playing violent video games. Some non-motion-sensing violent video game studies supported this inference. For example, Eastin and his colleagues found that players of a virtual reality game had more aggression than observers (Eastin, Griffiths, & Lerch, 2008).

Also, one of the primary research questions of the current study is to determine the relationship between violent motion-sensing video games and aggression in Taiwanese children. The video games studies of Immersive Virtual Environment Technology Platforms (IVETPs) which is a headgear system provide evidence that violent motion-sensing video games offers a different gaming experience from non-motion-sensing video games and may increase a player's aggressive behavior, feeling, cognition, and attitudes. Calvert and Tan (1994) demonstrated that playing violent video games using IVETPs led to more aggressive feeling than just observing game play. Persky and Blascovich (2007) duplicated the study and found consistent results that playing violent video game using an IVETP led to more self-reported aggressive feelings and more behavioral aggression than playing a video game on a desktop computer platform. Additionally, some studies demonstrated that the greater levels of presence experienced using IVETPs increases not only aggression but also the level of arousal and hostility (e.g., Ballard & Wiest, 1995; Calvert & Tan, 1994; Eastin, Griffiths, & Lerch, 2008).

Within the little research on violent motion-sensing video games, some scholars have found that violent motion-sensing video games caused aggressive cognition in players, similar to the studies of violent non-motion-sensing video games. For example, Melzer, Derks, Heydekorn, and Steffgen (2010) examined the effects of motion-sensing video game controllers on participants' aggressive affect, cognition, and trait aggression. The study consisted of sixty-two college students with an equal gender ratio. The participants' had modest experience with videogames and every participant had at least previously played video games. As the stimulus,

the researchers selected a violent action role-playing game on either a motion-sensing game console or computer. The participant's affect was assessed by the Positive and Negative Affect Schedule (PANAS), which is a widely used academic tool for measuring one's emotional experiences (Melzer et al., 2010). It included 10 items for each negative (e.g., afraid) and positive (e.g., active) affect and asked participants to rate on a 5-point scale. This measure was given before and after the experimental stimulus, so each participant had an emotional baseline and researchers could track his/ her emotional changes. Ambiguous conflict story vignettes were employed to assess participants' aggressive cognition. Participants were presented to four ambiguous conflict stories and asked how they would respond to each conflict situations on three categories (i.e., anger, hostile attributions, and desire for revenge) by using a 5-point scale. Finally, a 14-item Anger and Aggression questionnaire was used to measure participants' trait aggression and physical aggression.

Before administering the video game stimulus, the researchers randomly selected half of the participants and had them complete the anger and aggression questionnaire. Next, all participants were randomly assigned to play the video game using either standard controls or the Wii-mote controls. Following a tutorial and a 5 minutes familiarization session, all participants played video games for 15 minutes. After 15 minutes, participants were asked to complete a demographics questionnaire, the ambiguous conflict story vignettes, and the PANAS again. The findings revealed that participants who played violent video games on motion-sensing consoles tended to show more hostile cognitions (i.e., anger) than do participants who played computer games.

Other researchers found that violent motion-sensing video games do have a relationship with aggressive behavior and affect; the relationship, however, is opposite. That is, after people

played violent motion-sensing video games, their aggressive feelings actually decreased. Mahood and Cicchirillo (2008) examined the effects of violent motion-sensing video games on a player's aggressive affect. The findings suggested that playing violent Wii games would decrease a participant's anger, unease, and frustration. The reason behind this decrease was the catharsis effect rather than the priming effect. This finding was unexpected as most research on violent video games indicated that playing violent video games caused players' aggression to increase. Researchers posited that the nature of the Wii's controls might be an explanation. The motion-sensing controller has a higher level of interactivity than non-motion-sensing video game controllers, making players feel more engaged in the violent acts depicted in the games (Mahood & Cicchirillo, 2008). This notion was used as main rationale of this study.

Bailey demonstrated similar results in a 2008 study. He emphasized the differences between motion-sensing video games (e.g., Wii) and non-motion-sensing video game consoles (e.g., Xbox 360) on a player's aggression. The common assumption was that the effect of Wii on players' aggression would have a greater influence than did the non-motion-sensing console-controlled games. Several theories, namely behavioral theory, behavioral momentum, social learning theory, script theory, cognitive theory, cognitive neoassociation theory, excitation transfer theory, and the General Aggression Model (GAM), bolster the rationale of this assumption. In the study 111 college participants were assigned to four gaming conditions: the nonviolent button-only group, the nonviolent motion-interactive group, the violent button-only group, and the violent motion-interactive group. The researcher had these participants play video games *Godfather* for twenty minutes. Afterwards, they were asked to complete a questionnaire called the Competitive Reaction-Time Task, which would determine their post-test aggression. Additionally, Bailey considered players' frustration towards a game as a covariate variable.

Results indicated no significant difference between the effects of playing the Wii and those of playing the Xbox 360, after controlling participants' prior exposure to video games and frustration toward video game *Godfather.* The author noted a possible confound in the video game *Godfather*. Specifically, participants' aggression might not be provoked, as a player could go throughout the game and never be attacked. Without being attacked, participants might have lacked the necessary stimulus to commit aggressive behavior.

In a different study, motion-sensing video games were not regarded as an independent variable but as a possible moderator. Markey and Scherer (2009) examined the effects of violent and nonviolent video games on aggressive cognition, hostility, and aggression. Important to note were that motion-sensing technology was considered as a moderator and results revealed that technology had less effect on aggressive outcomes. 118 undergraduates, 50 females and 68 males, were asked to complete the questionnaire of psychoticism before playing video games. And then they were randomly assigned to play either a violent video game or a non-violent video game using either a non-motion-sensing controller or a motion-sensing controller in 20 minutes. After playing video games, participants completed the measure of aggression, hostility, and aggressive cognition. Similar to previous studies, results suggested that motion-sensing controls that afforded greater interactivity seemed to cause individuals to become more hostile and to have increased aggressive cognitions than individuals who played violent video games using a non-motion-sensing controller; however, the advanced technology of motion capture controls might have less impact on an individual's aggression than did the preexisting dispositions of that individuals (e.g., trait of psychoticism). That is, the preexisting dispositions of a player might have more influence on making them susceptible to violent media than the additional of motion-sensing controls.

The limitations of Markey and Scherer's study shaped future research on motion-sensing video games; for example, the results of the collegiate participants in the control setting could not be generalized to younger children or outside of the laboratory setting. The finding that playing violent motion-sensing games increased a player's aggressive feelings (e.g., hostility) and aggressive thoughts (i.e., aggressive cognition) could not answer the question as to how a player would actually behave in a real-world setting. Hence, Markey and Scherer suggested that future researchers might consider examining the effects of motion-sensing video games and the moderating effect of motion-sensing technology between video gaming and aggression outside the laboratory. In the current study, I attempted to overcome these limitations and to better understand the association between violent motion-sensing video games and real-life aggression in Taiwanese children.

The first hypothesis.

The first hypothesis was proposed; playing violent motion-sensing video games is positively correlated with aggression among Taiwanese children, according to a review of the current motion-sensing video game studies. As seen in the literature review above, present research on violent motion-sensing video game is scarce and the results are controversial. Those studies underlined the need for studies that focus on the effects of violent motion-sensing video games. Although studies pertaining to violent motion-sensing video games are few, a majority of research on the less specific non-motion-sensing violent video games concluded that the association between playing violent video games and increased aggression is positive. This finding is consistently supported in different countries, such as the United States, Finland, Germany, and Japan. Also, according to the rationale that advanced technology in non-motion-

sensing video games increases aggression by providing a higher sense of presence, the notion that playing violent motion-sensing video games should also increase aggression seems evident. This argument is also supported by most theoretical accounts (e.g., social learning theory, cognitive neoassociation theory, script theory, and General Aggression Model). Therefore, it is reasonable to expect that violent motion-sensing video game playing will be positively correlated with aggression among Taiwanese participants.

H1: The more violent motion-sensing video game Taiwanese children play, the more aggression they exhibit.

Although a link between violent video games and aggression seems to establish in the research, not everyone agrees. As such, the results of violent motion-sensing video game studies are controversial, and some findings are contradictory to those of violent video game and media violence studies. Some researchers found that playing violent motion-sensing video games increased aggressive feeling in collegiate participants (e.g., Melzer et al., 2010). Other researchers posited that the association between violent motion-sensing video games and collegiate participants' aggressive feelings was negative (e.g., Madhood & Cicchirillo, 2008). Additional studies found that violent motion-sensing video games could not provoke aggression in collegiate participants (e.g., Bailey, 2008). In the current study, the effect of advanced technology was examined, and the result may show slightly different effects from those of non-motion-sensing video games. Children were participants in the current and the result might differ from that of studies examining young adults because of developmental differences. Furthermore, findings of the current study that surveyed real-life aggression might also be different from those that examined aggression under controlled circumstances. Also, children involved in the current

study were educated in a society that stressed emotional restraint and discouraged the expression of aggression. The findings in these children might be different from those in western countries where children are not cultivated to restrain expressing their aggressive feeling. Due to these differences in the design of this research, playing violent motion-sensing video games might increase aggression, but it might also have different effects on real-life aggression in Taiwanese children. These differences might be reflected in how violent motion-sensing video game influenced aggression among children by multiple influencing pathways.

Violent Motion-Sensing Video Games in Learning Aggression

According to the social cognitive theory, people follow the processes of attention, retention, production, and motivation to execute modeled behaviors learned from others (Bandura, 2002). For learning aggression, observing violence stimulates an associated cognitive schema, engages aggression-related networks in individuals' head, and develops aggressive scripts that individuals have learned from external contexts, such as media, family conflict, and peers aggression. These violent scripts are then reinforced when a person practice them repeatedly. People ordinarily do not have many opportunities to present aggression, at least not in the same form as it occurred in aggressive scripts in their minds. As such, playing violent motion-sensing video games becomes a good way to practice aggressive scripts and learn more aggressive scripts. In a word, based on the logic of script theory, technological advancements in video games actually facilitates learning of violent scripts through rehearsal of actions, active decision-making, and the use of related motor patterns in a gaming environment lacking in the types of inhibition typically present in the real world (Tamborini & Skalski, 2006).

Whether aggressive scripts adopted during observational learning are internalized depends on the consequences the imitated behaviors generate (Anderson et al. 2003). That is to say, rewards and punishments for the imitated behavior have an important role in aggressive behaviors that are acquired through modeling. When players kill an enemy or destroy an object in video games, they will be positively reinforced with rewards such as higher scores, hidden weapons, or more coins. These benefits encourage players to behave more aggressively, and players may generalize these reinforcements and believe that aggression can be an appropriate way to resolve conflicts. Also, if persons earn respect and receive compliments because of higher scores or achievements in video games, they will learn that acting aggressively might be a good way to gain social recognition.

Furthermore, motion-sensing video games allow gamers to enact physical actions that are consistent with what would be expected in the real world. As a player using a motion-sensing controller physically acts out a beating, the cognitive learning of the behavior may become paired with a physical motion sequence, thus joining cognitive memory with muscle memory. This could lead gamers to believe that they possess the skills to enact these violent acts in real life (Downs & Oliver, 2009). This unique characteristic of motion-sensing video games may intensify some of the processes of attention, retention, production, and motivation to a level above and beyond that of traditional, non-motion-sensing video games that rely on button pushing only (Downs & Oliver, 2009). In other words, violent motion-sensing video games provide gamers with an acceptable environment to experiment with and show the aggressive behaviors or scripts they have learned. And the symbolic controller, known as the non-motion-sensing controller, just helps players to develop a cognitive aggressive script for showing aggressive behaviors. Players' aggressive scripts would be developed when they played non-

motion-sensing video game; however, players could not enact and practice the aggressive script or aggressive behaviors depicted onscreen with their muscles. For that reason, motion-sensing video games may help game players learn, practice, and acquire aggressive behaviors more efficiently than non-motion-sensing video games.

Explanation of Aggression Effects

Some scholars, most prominently Arnett (2007), divided media violence into three types of effect: aggressor effect, such as, social learning theory, cognitive association theory, script theory, disinhibition theory, and the GAM; bystander effect, such as, desensitization theory; and fear effect, such as cultivation theory. According to social learning theory and the GAM, media violence provides models and reinforcements for aggression. Media violence would also help to elaborate audiences' aggressive thought networks by priming them and cuing the aggressive scripts in their brains. This is known as aggressor effect, such as cognitive neoassociation theory, script theory, and the GAM. Additionally, media violence would provide the bystander effect (e.g., desensitization theory) that weaken inhibition against involving violence and decrease empathy toward victims of violence. Also, heavily exposing people to media violence will shape their mean worldview and induce the fear effect (e.g., cultivation theory). On the other hand, from the psychoanalytic approach, media violence may discharge audiences' aggressive urge and decrease their aggression (e.g., catharsis hypothesis).

According to the theories directed by the social cognitive model (e.g., social learning theory, cognitive neoassociation theory, and script theory), generally speaking, for a person who has been exposed to minimal media violence, the primary path of media violence effect will be social learning. Such an unexposed person, having few aggressive schemas in his/ her brain,

would learn aggression by mimicking aggressive behaviors in the media or by observational learning from other sources. For a person with developed aggressive schema, being exposed to media violence would strengthen his/ her connections among aggressive schema and provoke the urge to enact aggressive scripts, based on the cognitive neoassociation theory and script theory.

Overall, these micro-level and macro-level theoretical structures provide an understanding of violent video games (Anderson, 2004), including violent motion-sensing video games.

Application of existing aggression theory.

The biggest difference between interactive media and non-interactive media is that interactive media, including non-motion-sensing and motion-sensing video games, provides direct reinforcements and punishments to encourage aggression in players. Interactive media (e.g., motion-sensing video games) also offers a forum for players to practice aggressive behavior and aggressive scripts learned through observational learning and experience from their families, peers, and media. According to social cognitive theory, cognitive neoassociation theory, and script theory, motion-sensing video games, as well as non-interactive media, provide users with behavior models to respond to provocations. In the case of motion-sensing violent video games, players receive rewards for aggression and punishments for nonaggression. Being rewarded for aggression encourages people to display similar aggressive behaviors while punishments would discourage them. Motion-sensing video games enforce these types of connections in a game player's head. Weapons, aggressive acts, opponents, the consequences of aggression, and any other information about violence will be developed as schemas existing among thousands of other schemas. These schemas are connected to some aggressive units and

some nonaggressive units. Corresponding rewards and punishments will strengthen particular connections between these schemas and weaken other ones.

In violent motion-sensing video games, rewards of aggression (e.g., higher scores) and punishments of nonaggression (e.g., being beaten up, failing games) will strengthen connections between stimuli (e.g., opponents) and aggressive reactions (e.g., beating up). The connections among aggressive schemas will be stronger than the connections among nonaggressive schemas; thus, the linking of aggressive schemas to nonaggressive schemas will be eliminated. This will result in the rest of the cognitive network consisting entirely of aggressive schema. In this sense, after a schema related to aggression is retrieved, it will be connected to aggressive schemas and not to nonaggressive schemas. The whole aggressive network will be activated, and the only behavior that a player will display is aggression. This process of developing aggression will be automated in a person who habitually plays violent motion-sensing games. With every round of playing, a person rehearses the whole aggression network, continually reinforcing aggressive schemas. Finally, as soon as the stimulus activates the schema, the aggression would be enacted. Moreover, the theme of most violent video games is to annihilate opponents. This idea to control and destroy will become internalized, become a script demonstrating how to react to provocation. When players confront a provocation onscreen, their fight or flight response will be activated. If a player chooses to fight against opponents and succeeds, he will get higher scores, complete missions, and resolve conflicts through aggressive behaviors. These rewards encourage players to choose “fight” from their scripts of behaviors. The simple fact is most violent video games do not allow players to flee. If a player does not want to fight against opponents, the avatar he controls will be hurt or killed, and the game will end. In other words, most violent video games ask a player to fight until the game ends. The fighting script taught by violent

motion-sensing video games will build the aggressive thought network in a player's head and assist in the development of an aggressive script for resolving conflicts.

Video games employ multiple forms of reinforcement to develop players' scripts. The fear of being killed, the fear of failing games, the rewards from beating up opponents, these characteristics of violent games all instruct players to develop the script of kill or be killed. These aggressive scripts will be created, activated, rehearsed, and enhanced not only during playing violent motion-sensing games but also by witnessing or being involved in aggression in the real world. And these scripts will be modified through receiving direct punishments for "bad" behavior (e.g., killing wrong characters will decrease scores, or cause the death of avatars) and reinforcements for "right" behavior (e.g., killing right characters will gain higher scores, rewards, and advancements to the next stage). Learning these scripts helps individuals to recognize aggressive cues outside of the gaming context and can prime relevant cognition, affect, and arousal (Lindsay & Anderson, 2000; Persky & Blascovich, 2007). If children rehearse these scripts of aggression again and again by repeatedly playing violent video games, it is no surprise that unintended aggression will happen more frequently, and the consequence of it will be worse (Tamborini & Skalski, 2006).

Players of violent motion-sensing video games may develop positive attitudes toward violence and easily accept aggression as a solution to conflict. Moreover, the direct effect from motion-sensing video game violence, the situational factors (e.g., aggressive cues, frustration, provocation, pain and discomfort, drugs, incentives, peer aggression, and family conflict) and personal factors (e.g., sex, age, beliefs, attitudes, values, long-term goal, and scripts) would influence players' aggression by promoting aggressive beliefs and attitudes; creating aggressive schemas, aggressive scripts; disinhibiting aggression; decreasing empathy toward victims of

violence; and desensitizing individuals to aggression. Playing violent motion-sensing video games, similar to watching violent movies or playing non-motion-sensing violent video games, will increase players' physical arousal. This excitation may be transferred to another behavior after playing games, increasing the likelihood of aggression.

On another note, the cathartic effect felt from playing violent motion-sensing video games may decrease players' aggressive affect, cognition, and behavior. The advanced technology of motion-sensing video games allows a player to control avatars with corresponding real-life actions instead of pushing complicated buttons. In violent video games, players display exact aggressive behaviors to control their avatars onscreen. Players become virtual aggressors. These virtual aggressive behaviors cause similar reactions in a player's brain as real aggressive behaviors. Because of this, an individual's brain cannot distinguish between fact and fiction and perceives the individual as actually exhibiting aggression. Following the predictions of most aggression theories, these virtual aggressions may induce real aggressions in the real world. For some people playing some games in some contexts, virtual aggression may discharge negative feelings (e.g., anger, frustration) and decrease aggressive affect, cognition and behavior. Some studies have proved this hypothesis (e.g., Mahood & Cicchirillo, 2008). Overall, the cathartic effect provides an alternative explanation for the research that cannot prove a positive relationship between playing violent video games and subsequent aggressive behavior.

Not all research agrees on a positive correlation between aggression and violent motion-sensing video games. Some studies, most notably Bailey (2008), supported the notion that playing Wii was not significantly associated with aggression. Mahood and Cicchirillo (2008) even supported that playing violent Wii games decreased participants' aggressive feeling. Consequently, the current study is a preliminary study to examine whether the effect of motion-

sensing video game violence increases aggressive behavior, feeling, cognition, and attitudes, specifically in Taiwanese children.

The media violence theories mentioned before (e.g., social learning theory, cognitive neoassociation theory, and script theory) that stated short-term and long-term effects of media violence on aggressive cognition, feeling, attitudes, and behaviors, in an artificial laboratory setting and real life, rested on different paradigms, such as social cognitive model, psychoanalytic perspective, macro-level, and nonexperimental perspective. They do provide sound explanations of effects of violent video games. However, these theories do not take into account what an individual believes is acceptable behavior towards another individual. In order to determine what people believe are acceptable and intolerable behaviors, researchers need to assess normative beliefs about aggression (Kjos, 2008). Also, these theories did not consider the effects of social environmental factors and biological factors. These limitations dictate that these theories could not offer a solid theoretical ground of this study, which attempts to examine the effect of violent motion-sensing video games in a broader context, taking into account social environmental and biological modifiers.

General Aggression Model

The primary theoretical explanation of aggression employed by this study is the General Aggression Model (GAM). The main rationale is because it emphasizes multiple causes of aggression, such as social environmental and biological factors. Also, it is the one theory that examines the effects of interactive media, particularly violent video games.

The GAM borrows key ideas from previously mentioned theories: social learning theory, priming theory, script theory, and excitation transfer theory. The GAM provides a

comprehensive model to explain short-term and long-term effects of media violence. It is a dynamic and social-cognitive model that includes multiple causes of aggression, namely biological, individual, and situational factors (Anderson & Carnagey, 2004).

Anderson and Bushman (2002) noted that the GAM assumed that knowledge structures—including affective states, behavioral programs, and beliefs—developed out of experience and were used to guide people's interpretations and behavioral responses to their social and physical environment. Knowledge structures would influence an individual's perception at multiple levels, from basic visual patterns to complex behavioral sequences. A specific knowledge structure could become automatized with repeated use. The GAM not only incorporates many aggression theories from the social cognition field but also adopts many key ideas from aggression studies from various fields to develop some of its important features, including multiple causes of aggression, risk and resilience approach, cumulative risk model, and developmental tasks.

Multiple causes of aggression.

The GAM operated on the assumption that a wide variety of factors impacted the development and expression of aggression at multiple levels of analysis, factors concerning the individual to social patterns (Anderson et al. 2007). To explain the effects of media, the GAM adopted the idea of Bronfenbrenner's ecological levels (the microsystem, the mesosystem, the exosystem, and the macrosystem). For example, considering children's aggression. Family and school would comprise the microsystem around children. The mesosystem is something related to the microsystem, and the exosystem involves social settings that do not have direct interactions with children, for example, a parent's workplace. The broadest system, the

macrosystem, would consist of an individual's cultural environment, such as their history. The GAM took into account context from these four ecological levels surrounding children to discuss the effects of the media violence on children's aggression.

In accordance with the GAM, habitual aggressive tendencies are most likely to develop in children who grow up in environments that reinforce aggression, offer aggressive scripts, victimize them, or teach them that aggression is an acceptable and successful strategy to resolve conflicts (Anderson & Carnagey, 2004). Following this, aggressive cognition, beliefs, and scripts learned from these adverse environments would most likely be influenced by situational factors that instigate and disinhibit aggression (Anderson et al., 2007). Therefore, aggression and environmental factors share a reciprocal relationship.

The short-term effects of playing violent video games would be priming effects that trigger players' aggression-relevant knowledge structures during and after game playing. More than this, the short-term effects ultimately contribute to longer-lasting effects by teaching game players aggressive beliefs and developing their aggressive scripts (Anderson et al., 2007).

According to the GAM, a wide variety of factors can affect the hostile and instrumental aggression of a person. These factors can be divided into two categories, personal (i.e., traits, sex, beliefs, attitudes, values, long-term goals, and scripts) and situational factors (i.e., aggressive cues, provocation, frustration, pain and discomfort, drugs, and incentives). These biological and social environmental modifiers were discussed as follows:

Biological modifiers.

Biological modifiers include age, gender, intelligence, and the aggressiveness of individuals. Aggressive individuals are likely to have multiple risk factors predisposing them

toward aggression (Anderson et al., 2003). Empirical evidence have suggested that highly aggressive individuals have shown greater effects on their aggressive behaviors, affect, cognition, and attitudes when exposed to violent media (e.g., Anderson & Dill, 2000; Bushman & Geen, 1990). Bandura's concept of "reciprocal determinism" offers a theoretical explanation for this; aggressive children are more likely to be affected by exposure to violent media, and yet, aggressive children may be especially attracted to viewing violent media (Anderson et al., 2003).

Observational-learning theory suggests that gender and age of viewers could influence the extent to which they identify with an observed aggressive character, and, in turn, influence learning and enactment of the observed aggression in the viewers (Anderson et al., 2003). Some gender differences are noted in the relationship between exposure to violent media and aggression. Unsurprisingly, males exhibit more physical/ direct aggression after their exposure to violent media. Media violence exposure in females, however, do produce a stronger relation to indirect aggression than females without this exposure (Huesmann, Moise-Titus, Podolski, & Eron, 2003). Therefore, the first sub-hypothesis of the second hypotheses was proposed as follows:

H2a: Boys express more physical/ direct aggression than girls

In terms of age issues, several developmental psychologists have theorized that media violence is more prevalent in younger children (Anderson et al, 2003) and age can be a proxy to moderate the effects of media violence on aggression (Anderson et al., 2007). Incorporating the information about age in regards to the GAM, the sub-hypotheses of the second hypotheses was proposed as follows:

H2b: Aggression differs by school

Social environmental modifiers.

Social environmental modifiers that heighten the effect of media violence include media, influence of parents, influence of neighborhood, Social Economical Status (SES) of parents, and influence of culture. Mass media is the greatest potential factor that helps children shape aggressive behavior (Anderson et al, 2003). The GAM states that no individuals are immune to the effects of violent media (Carnagey & Anderson, 2004) and considers media violence as an environmental moderator.

Parents who display aggressive behaviors in the home unintentionally offer aggressive scripts and models of aggression for their children (Wilson, 2008). A national study found that a family conflict was positively related to violent video game playing for over 1,000 children aged 6 to 12 (Vandewater, Lee, & Shim, 2005). Parents could reduce the risks of overall exposure to video games and decrease aggressive behaviors in their children (Robinson et al., 2001). Ferguson, et al. (2008) indicated that trait aggression, family conflict, and male gender were predictive of violent crime based on the catalyst model of violent crime; however, playing violent video games was not. The findings suggested that using family violence and innate aggression as predictors of violent crime better fits the data than exposure to video game violence.

Parents also have the potential to moderate the effects of violent media on their children (Anderson et al., 2003). Children receive ideas about violence from media, and they may discuss what they have observed with their parents and friends. The response of parents and friends may have an important role in forming beliefs and attitudes of children. Regardless, too few studies have examined parents' aggression as a moderator on the effects of violent media (Huesmann et al., 2003), and the current study attempts to answer what impact this has on children.

Peer group, alongside family, is the most important socializing agent for children. Peer group can both inhibit and encourage the expression of aggressive behaviors in children. Often times a child who is aggressive toward others is rewarded with high status by other members in the peer group, reinforcing violent behaviors.

With regard to the influence of SES of parents, some studies (e.g., Comstock & Paik, 1991) suggested that Low-SES children watched more television violence. Nevertheless, little research examined whether children' SES increased or decreased aggression. The research that examined the effect of cultural differences on the perception of violent media also failed to look at the effects on children's aggression. Also, most violent media research had been conducted in western cultures. Although the findings were consistent, the results could not be generalized to the non-western countries.

Based on these assumptions regarding social environmental modifiers in the GAM, additional sub-hypotheses of the second hypotheses were suggested as follows:

H2c: Family conflict is positively correlated with aggression

H2d: Consumption of media violence is positively correlated with aggression

H2e: Peer Aggression is positively correlated with aggression

H2f: Biological and environmental factors together are positively correlated with aggression

Risk and resilience approach.

The GAM also borrowed ideas from the risk and resilience approach. The risk and resilience approach posited that certain life experiences might put children at risk for future maladaptation. Conversely, some life experiences might protect children from risk exposures that increased maladaptation (Anderson et al., 2007).

Cumulative risk model.

Risk factors seldom occur in isolation (Anderson et al., 2007). When children experienced one risk factor, a variety of risk factors would be experienced simultaneously (Anderson et al., 2007). Anderson et al. (2007) stated that it might be no individuals were immune from the effects of media violence. Everyone exposed to media violence is vulnerable, where vulnerable is the sum of risk factors or the absence of protect factors.

Developmental tasks.

According to the developmental theory, the characteristic patterns of younger children's cognition are still developing. Their scripts, schemas, and beliefs are less crystallized. Also, their social cognition, which can predict later aggression, is less stable than older children's (Guerr et al., 2003). These developmental differences between younger and older children may suggest that younger children are more sensitive to violence. With this, age can be considered as a proxy for other variables that may moderate the effects of media violence on aggression (Anderson et al., 2007). In other words, the media effects may vary depending on the developmental stage of a particular child. For this reason, Barbara Wilson (Strasburger, Wilson & Jordan, 2010) suggested that a theory of aggression considering the development perspective of children was needed. Answering Dr. Wilson's call, the GAM provides this theory. It allows researchers to measure multiple risk factors at several ecological levels. Because of this, the GAM is an excellent approach for predicting aggression when considering the development perspective of children (Anderson et al., 2007).

The routes of developing aggression.

Following the idea of multiple causes of aggression, several pathways (e.g. affect, cognition, and arousal) that influenced the development of aggression were provided for each risk factor (Anderson et al., 2007). While risk factors initiated the development of aggression, they might also influence one, two, or all three routes of an individual's present interval states. At other times these three routes might influence each other. This means that risk factors could directly and indirectly affect an individual's present interval states. Empirically, exposure to violent video games changed a player's feelings, cognition, and physical arousal (Anderson & Carnagey, 2004; Anderson & Bushman, 2002).

Anderson, Gentile, and Buckley (2007) concluded that the GAM demonstrated a wide variety of effects noted in literature on media violence, including short-term and long-term effects on participants' physical arousal, aggressive feelings, thoughts, beliefs, and behaviors. The GAM also demonstrated emotional desensitization to violence that could occur in people. Parsimoniously integrating research and knowledge about aggression, the GAM is beneficial because it is one model instead of a handful of disparate studies and results. Anderson and Bushman (2002) aptly described the GAM as, "a house, not a heap of stones." Describing the multiple causes of aggression, explaining how individuals develop aggression through three routes, predicting whether individuals display aggressive behavior according to personal decision-making processes, the GAM has been extremely valuable to research on aggression. Beyond measuring aggression, the GAM also suggested ways to control aggression. After expressing aggression, a person would reflect on the social situation in hopes of modifying the decision made before aggressive acts. It also suggested a controlling way to reduce necessary

aggression by providing a multiple systemic therapy that would help individuals to decrease aggression by avoiding exposure to family conflicts, peer aggression, and media violence.

Based on these assumptions regarding the routes of developing aggression in the GAM, three more sub-hypotheses of the second hypotheses were proposed as follows:

H2g: Aggressive attitudes mediate the effect of violent motion-sensing video games on aggression

H2h: Trait aggression mediates the effect of violent motion-sensing video games on aggression

H2i: Aggressive attitudes and trait aggression together mediate the effect of violent motion-sensing video games on aggression

The GAM views aggression through a broad lens. It explains multiple motives of aggression (e.g., instrumental and affect aggression), predicts long-term and short-term effects of media violence, and provides micro-level (e.g., an individual's cognitive situation and decision-making procession) and macro-level perspectives (e.g., the influence of social environmental factors) on aggression. It also utilizes a developmental psychological perspective, as opposed to only a social psychological perspective, to discuss child rearing and development (Anderson & Bushman, 2002). The GAM served the heuristic value to suggest directions for future research to study the effects of the interactive media.

Although the GAM has received some empirical supports, the model needs further empirical evidence to support and to establish the ability to predict aggressive behaviors. A longitudinal study, in particular, would help to validate the long-term effects of aggression mentioned in the GAM. However, Kirsh (2006) had criticized the importance of social control, and the various components of social control were not clearly defined within the GAM.

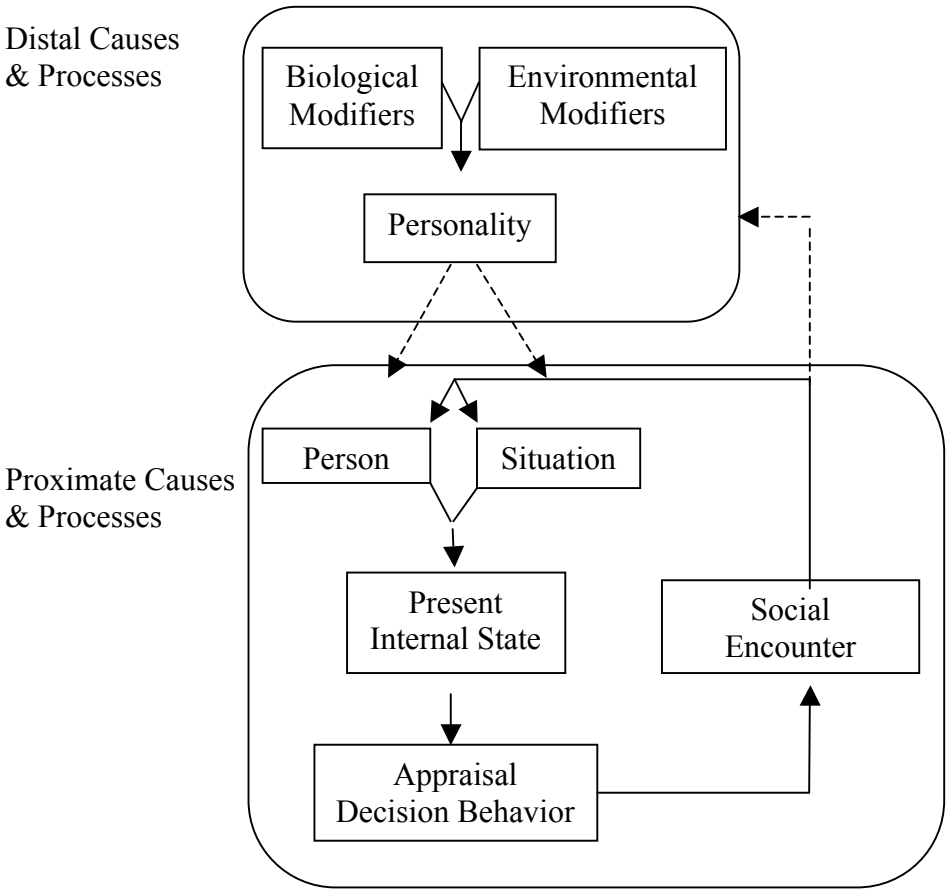


Figure 2.1. Single episode General Aggression Model. SOURCE: Anderson and Bushman (2002b) from the *Annual Review of Psychology*, Volume 53 ©2002 by *Annual Reviews*, www.annualreviews.org.

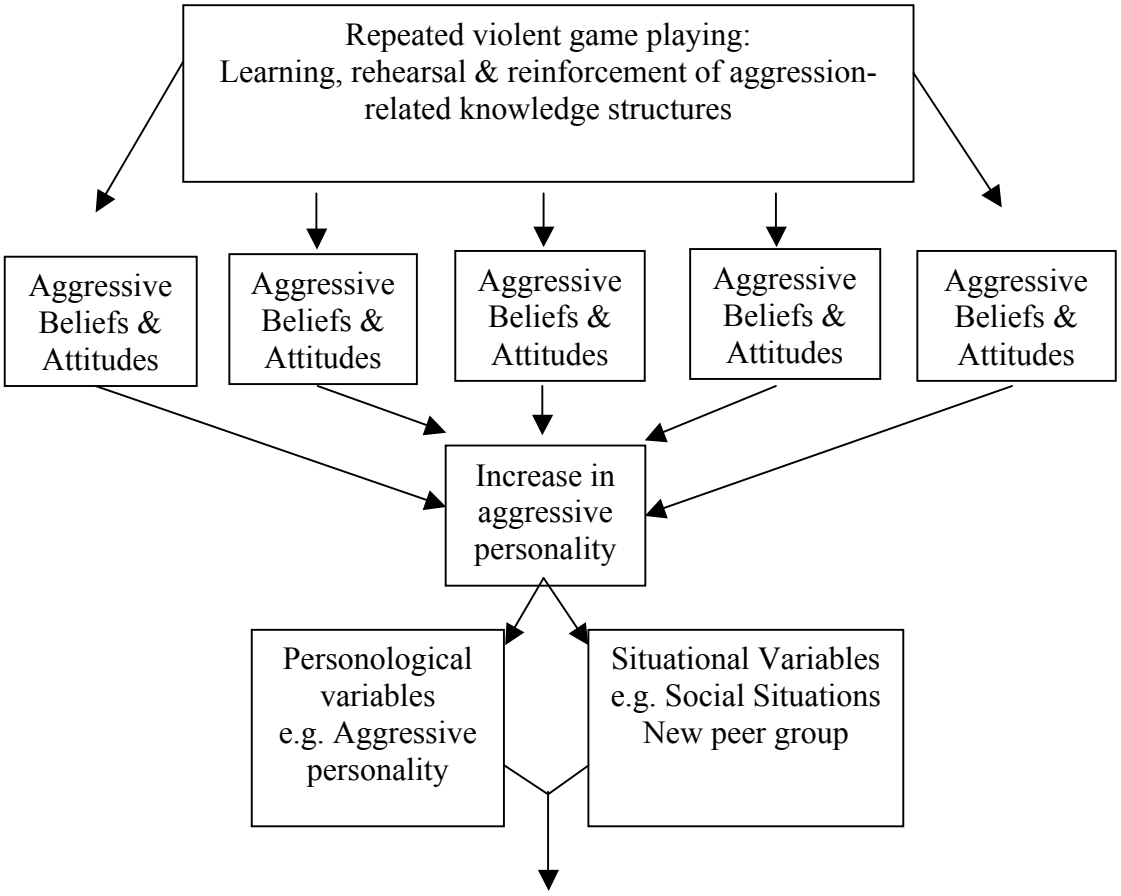


Figure 2.2. Multiple episode General Aggression Model: Long-term effects. SOURCE: Anderson and Bushman (2002b) from the *Annual Review of Psychology*, Volume 53 ©2002 by *Annual Reviews*, www.annualreviews.org.

Social and Cultural Climates in Taiwan

The cultural climate in Taiwan is quite different from that of western countries. People living in Taiwan are socialized by the ethics of Confucianism. The main teachings of Confucianism are based on the concepts of Jen (love and benevolence), Yi (righteousness), Li (propriety), and Chih (wisdom in distinguishing good from bad). These concepts teach people to be nice and respectful to others and to do what is best for society. What is best for society? In Confucianism, maintaining the harmony and stability of society is the most important for individuals (Benoliel, 2009). In order to reach those goals, people are encouraged to restrain emotion, to cooperate with others and discouraged to express aggression, aggressive feelings and tendencies.

How do the ethics of Confucianism influence the development of aggression among Taiwanese children? Two possible mechanisms of influence should be mentioned. One is that aggression among children may be restrained by parents or guardians (Cheah & Rubin, 2004). The other is that children may be internalized cultural values and learn to control their aggression (Ekblad & Olweus, 1986). Compared with western peers, Taiwanese children are asked to demonstrate a lower level of aggressive feeling and tendencies and to show a higher degree of control over their anger (Crystal et al., 1994).

These cultural differences between eastern and western countries reflected in different crime rates. The average annual crime rate per hundred thousand for 2000-2008 in Taiwan is 2217.91, a little higher than Japan's 1859.57, but much lower than United States' 3934.47 (http://sowf.moi.gov.tw/stat/national/list.htm).

Taiwanese children are living with and distilled by the values of Confucianism and educated by their parents or guardians to be nice and avoid fighting with others. Do violent

media influence them? And how do violent media influence them? Do they still have more aggressive behaviors, cognition, affect, and attitudes, after habitually playing violent motion-sensing video games, like the children in western countries? This study attempts to answer these questions in the current study.

Summary of this section.

Although findings of research exploring the relationship between violent motion-sensing video games and aggression were controversial, the characteristics of motion-sensing video games make it reasonable to propose the first hypothesis of the current study, which stated playing violent motion-sensing video game is positively associated with aggression among Taiwanese children. Meanwhile, the second research question was whether the GAM illustrates the correlations between motion-sensing video games and aggression among Taiwanese children. Therefore, the sub-hypotheses of the second hypothesis examined the relationship between the constructs of the GAM. These hypotheses included the associations between biological and social environmental modifiers and aggression, and mediating roles of aggressive attitudes and trait aggression in Taiwanese children.

CHAPTER 3

Research Methods

The Research Design

To explore the research questions, the researcher employed a cross-sectional design using a survey to collect data.

Participants and the Procedures

Participant Components.

Taiwanese children ranging in age from 8- to 14-years old were identified as participants for this study as this is the age where video game playing peaks among children. A convenience sample of students attending an elementary and junior high school in central Taiwan were selected to participate in this study. Both schools are located in an urban area (i.e., Chiayi City) of Taiwan, where the city population of 274,212, ranks 15th out of 40. Although the schools are small, over half of all students attending the schools participated resulting in a sample size of 985 (n=499 males, n=486 females). Table 3.1 provided the frequency of participants in each grade for this study.

Table 3.1: The Sample Composites

Schools	Grade Levels	N of Participants	Boys	Girls
Elementary School	3rd	127 (12.9%)	66	61
	4th	137 (13.9%)	65	72
	5th	139 (14.1%)	76	63
	6th	133 (13.5%)	69	64
Junior High School	7th	171 (17.4%)	79	92
	8th	164 (16.6%)	86	78
	9th	114 (11.6%)	58	56
Total N of Participants		985	499 (50.7%)	486 (49.3%)

Research Procedures.

This study was conducted in a school setting. One of the major advantages of selecting a school as the setting of research was that it allowed the researcher to collect a large amount of data in a short period of time. A high response rate and low subject attrition could also be guaranteed. Each participant was asked to write down his or her name on the questionnaire, so the researcher could identify everyone's questionnaire to create the peer aggression variable. The privacy of participants is protected because the researcher is the only person who was able to access the data set.

Measures of Major Variables

Participant's aggression.

The conceptual definition of aggression was defined as any act committed with intentions and perceived intentions to hurt or harm other persons, physically or psychologically (Baron, 1977). Nevertheless, not all aggressive behaviors are performed for the purpose of hurting or harming others. Children sometimes aggress others with instrumental motivations. The definition applied to this study encompasses both hostile aggression and instrumental aggression.

Some researchers also suggested that aggression should include aggression toward inanimate objects (e.g., Silvern & Williamson, 1987; Irwin & Gross, 1995), especially for video gaming. Many video games allowed players to hit or damage subjects to get rewards, for example, Super Mario needs to punch bricks to get mushrooms or a fireball to attack enemies); the rewards may be more tokens, upgrading the level of experience, or advanced weapons. Accordingly, the definition of aggression applied to this study also includes object aggression. This study regarded aggression as any motivated act, hostile or instrumental, that resulted in

physical or psychological harm to others. The acts that caused damage of inanimate objects were also included.

In the operational definition level, a participant's aggression was examined by his/ her frequency of performing particular acts against someone in the last month, including physical aggression (i.e., engaging in a fight with other students, pulling classmates' hair, pushing or shoving other students), verbal aggression (i.e., saying mean things or dirty words to other students, engaging in a verbal quarrel with other students), indirect or relational aggression (i.e., verbally threaten other students) and objects aggression (i.e., destroying objects of others). The measure of a participant's aggressive behavior was a self-reported measure that asked participants about frequencies of exhibiting these aggressive behaviors. In the study, the coefficient alpha for measure of aggression was .92.

Exposure to Violent Motion-Sensing Video Games (VMSVG).

The operational definition of playing violent motion-sensing video games was a score based on the amount of a participant's exposure to Wii violence.

Anderson and Bushman (2000) introduced a rigorous measure to assess the degree of playing Violent Video Games (VVG). Participants were asked to name their three favorite violent video games and to rate how frequently they played them on a five-point Likert scale. Participants also rated the extent of violence in their top three favorite video games. To compute the score of violent video game exposure, the frequency of playing each violent video game was multiplied by its violence rating and then three favorite video games were averaged. Finally, an overall score of media violence exposure was calculated by taking the mean of all nine products. However, this measure proved problematic when the researcher attempted to use it in this study.

For example, half of the participants in the study were third- and fourth-grade children who were too young to correctly write down the titles of their favorite games. In this situation, unlike Anderson and Bushman's (2000) approach, using category-based questions as hints to help participants remember titles correctly might be a better way to help younger children answer questions about motion-sensing video gaming.

Another issue in the assessment of VMSVG was that a few games were released in game markets elsewhere before being officially launched in Taiwan in July 2008. The data of this study was collected in June 2008 when Wii consoles and games were not widely available in Taiwan. Therefore, participants did not have access to many Wii games. The results of a pre-test study suggested that some participants had never played some genres of the eight categories of the games identified (i.e., adventure, wresting or boxing, shooting and real time strategy, action-adventure, fighting, puzzle, racing and sports, and simulation) and that participants' frequencies of playing some genres would be underestimated. For those reasons, Anderson and Bushman's measure of VVG was not employed; instead a revised measure was used.

First, each participant was asked to rate how frequently he/ she spent playing the Wii during a semester. Second, a participant was asked to pick three favorite game genres from an eight-game-genre list, following the pattern of the first favorite to the third favorite. The first favorite game scored 3 and the third favorite game scored 1. These eight game genres were rated by the extent of violence within the games from 0 (no violence) to 3 (most violent). If a participant rated the most violent Wii game as the first favorite game, the score of that game would be 3 multiplied by 3 and then the scores of the three rankings for each participant were summed. This summed score multiplied by the frequency of playing Wii in the last month created the final score of exposure to VMSVG.

The mediating variables.

Participant's aggressive attitudes.

Attitudes toward aggression was measured by adopting items from the Velicer Attitudes Toward Violence Scale (VATVS; Velicer et al., 1989) and Revised Attitudes Toward Violence Scale (RATVS; Anderson, Benjamin, Wood & Bonacci, 2006). It was assessed by ten items, examples included "The violent behavior is a good way to stop the quarrel" and "If somebody hit me, it is not a big deal to hit him back." In the study, the coefficient alpha of attitudes toward violence was .92.

Participant's trait aggression.

The participant's trait aggression was assessed with self-report questionnaire items using the Buss-Perry aggression questionnaire (Buss & Perry, 1992). It included 29 items that measured four areas of trait aggression: physical aggression (e.g., Given enough provocation, I may hit another person), verbal aggression (e.g., I cannot help getting into arguments when people disagree with me), anger (e.g., I have trouble controlling my temper), and hostility (e.g., I wonder why I sometimes feel so bitter about things). All 29 scales were on a five-point Likert-type scale from 1 ("extremely uncharacteristic of me") to 5 ("extremely characteristic of me"). A high score indicated high in trait aggression. The scale in the study yielded a coefficient alpha of .93.

Although little research has examined how social environmental and biological factors moderate the impact of violent media (Anderson et al., 2003; Ferguson et al., 2008), there is theoretical rationale and solid evidence that these variables may modify the effect of violent

media on aggressive outcomes (e.g., aggression, aggressive attitudes, and trait aggression). In the current study, the social environmental factors include family conflict (e.g., conflict among siblings), peer aggression, and media violence. These agents are the most common and primary socialization forces of youth (Kirsh, 2010).

Family conflict.

In the current study, participants were asked to assess how often during the semester their parents or guardians physically abused them, physical aggression took place between parents or guardians, verbal aggression was directed toward them, and siblings physically abused and were verbally aggressive. This scale yielded a coefficient alpha of .87.

Media violence.

Media violence was conceptualized on the definition provided by Anderson et al. (2008) and operationalized as the contents on media that depict characters intentionally harming other characters. Participants were asked to rate frequencies of consuming particular media violence during a semester; for instance, violent movies, television dramas, cartoons, and some common local media namely Chinese martial arts novels and Taiwanese puppet shows. Exposure to media violence was rated on a five-point Likert scale from 0 (“Never”) to 4 (”Almost every day”). Gentile et al. (2003) used a revised measure from Anderson and Bushman’s (2000) measure of exposure to media violence. Yet, half of the participants in the study, third- and fourth-grade children, were too young to correctly write down the titles of their favorite shows. In this situation, category-based questions might be a better way to help younger children to answer

questions about exposure to media violence. In this study, the coefficient alpha of exposure to media violence was .85.

Peer aggression.

Conceptually, peer aggression referred to the degree of aggression among friends with whom participants hanged around most frequently. In the study, a participant was asked to name three classmates in the class with whom he or she spent the most amount of time while in school. Because a participant was also asked to write down his or her name on a questionnaire, the researcher was able to check the extent of aggression of these three classmates. And every participant had three scores which were summed to represent the level of each participant's peer aggression. The final score of peer aggression ranged from 0 to 30 with a higher score indicating that a participant's peers have higher aggression.

Table 3.2. Reliability Test (Alpha coefficients) for major variables

Variables	Cronbach's α
Aggression	.92
Aggressive Attitudes	.92
Trait Aggression	.93
Family Conflict	.87
Media Violence	.85

Techniques of Data Analyses

The data were collected in June 2008. Statistical methods used for analyses in this research included: descriptive statistics (e.g., mean and variance), analysis of variance, Spearman

correlation, and multiple regression analyses. Since biological variables (i.e., gender and grade) are nominal, it is more reasonable to employ t-test analyses to examine the relationships between these two variables and ratio-level variables (i.e., aggressive attitudes, trait aggression, family conflict, peer aggression, and media violence). Also, mediated regression analyses would be employed to examine the GAM.

CHAPTER 4

Result of Analyses

The results of the data analysis were presented in this chapter. Three sections were included. The first section included the descriptive statistics on the data collected. Then, the results of correlation and regression analyses were discussed. Finally, the third section showed the results of the path analyses.

Descriptive Statistics of the Study

This section provided summary statistics for the data. The means and standard deviations of major variables of interest were given in Table 4.1.

Table 4.1. Summary Statistics for the Whole Sample

Variables	Mean	*SD.*	Median	Min.	Max	Scale	Skewness	Kurtosis
Aggression	9.40	7.61	9	0	40	0-40	1.06	1.70
Violent Motion-Sensing Video Game Playing	18.73	28.71	0	0	136	0-136	1.76	2.6
Aggressive Attitudes	20.94	8.59	20	3	50	0-50	.83	.52
Trait Aggression	80.39	20.22	82	29	145	0-145	.04	.58
Family Conflict	12.12	7.49	12	0	40	0-40	.70	.82
Media violence	22.91	8.78	22	0	48	0-48	.34	.31
Peer Aggression	27.29	14.61	26	0	108	0-120	.71	1.21

Participant's Aggression.

The measure of aggression was based on a participant's self-report of frequencies of 10 aggressive acts in the last month. As observed in Table 4.1, the mean of aggression for all students was 9.40 (*SD* = 7.61) on a scale that ranged from 0 to 40, which indicated the level of aggression of participants was low. Generally, participants were more likely to commit verbal aggression rather than physical aggression. For example, aggressive acts such as engaging in a verbal quarrel (35%) and saying dirty words to others (34.3%) were committed more frequently (i.e., once in several weeks) than physical aggression. Contrary to verbal aggression, participants committed the following physical aggressive acts once in several months, for example, taking thing of someone by force (32.3%), beating others (31.8%), and destroying objects of others (29.5%). Regarding more serious aggressive acts (e.g., to instigate other students to hurt someone, and verbally threaten other students), over 60% participants had never exhibited. This suggested that participants in this research were more likely to present verbal, less serious aggressive acts and less likely to exhibit physical, more serious aggressive acts.

Violent Motion-Sensing Video Games Playing (VMSVG).

Participants in this study showed a lower use of violent motion-sensing video games (*M* =18.73, *SD* = 28.71) on the scale that ranged from 0 to 136. The data collected showed that the majority of participants (30.2%) rated games with moderate violence, such as Resident Evil series, Grand Theft Auto series, as their first favorite games. In terms of the frequency of playing Wii, most participants (19.8%) played once in several months. That suggested that participants in this study played rarely motion-sensing video games, but their favorite games were the games with moderate or low-level violence.

Participant's Aggressive Attitudes.

The attitudes toward violence were measured by a participant's response to10-item questions. A score of 0 implied that a participant had no positive attitudes toward violence. As table 4.1 showed, the mean of participants' attitudes toward violence was 20.94 (*SD* = 8.59) on the scale ranged from 0 to 50.

Trait Aggression.

Trait aggression was according to a participant's report to the 29-item Buss & Perry Aggression Questionnaire. The mean score (*M* = 80.39, *SD* = 20.22) indicated participants' trait aggression were moderate on the scale ranged from 0 to 145.

Family Conflict.

The score of family conflict was based on the 10 aggressive acts exhibited by parents/ guardians and siblings, including punishment by presents/ guardian, and parents/ guardians and siblings engaged in verbal quarrel and physical fights. The mean score of the family conflict (*M* = 12.12, *SD* = 7.49) represented that participants got involved in the low level of family conflict, according to a scale ranged from 0 to 40.

Media violence.

The score of media violence was calculated based on a participant's response about exposure to 12 genres of media violence. A score of 48 implied that a participant accessed to media violence several times in a day. The means of participants' exposure to media violence

was 22.91 (*SD* = 8.78). It showed that on average participants accessed to a low level of media violence. Most participants accessed to the following media violence once in several weeks, for example, police procedural (41.6 % of all participants), action drama (36.0%), martial art drama (37.7%), crime films (26%), martial art movies (36.9%), adventure/ action movies (35.7%), fighting cartoons (29.5%), detective cartoons (34.6%), silly cartoons (29.3%), and local traditional drama (27.3%).

Peer Aggression.

Peer aggression was measured by the extent of aggression of three good friends in class of participants. A score of 0 represents that a participant engaged in no peer aggression. Table 4.1 indicated that the means of peer aggression was 27.29 (*SD* = 14.61). It showed that participants engaged in a low level of peer aggression.

Subgroup by Gender.

The result of T-Test showed significant differences among gender in all main variables, for example, violent motion-sensing video games playing, aggression, aggressive attitudes, trait aggression, family conflict, media violence, and peer aggression, as Table 4.2 displayed.

Table 4.2. Summary Statistics for the Males and Females Participants

Variables	Males	*SD*	Females	*SD*	*T*
Aggression	11.09	8.52	7.71	6.12	6.92**
VMSVG	26.64	34.49	10.80	18.24	8.80**
Aggressive Attitudes	23.63	9.53	18.20	6.48	10.12**
Trait Aggression	83.05	21.01	77.74	19.07	3.70**
Family Conflict	12.46	8.03	11.77	6.89	1.39
Media violence	25.59	9.08	20.22	7.59	9.65**
Peer Aggression	31.30	16.06	23.47	11.90	8.33**

Note: The F Ratios demonstrated the extent of differences between male and female participants in their responses.
The numbers of male and female participants were 514 and 490, respectively.
Level of Significance: * p< .05 **p< .01

Participant's Aggression.

The data showed that boys used more aggression than did girls. The mean score of aggression of boys was also significantly higher than that of girls (M = 11.09, SD = 8.52; M = 7.71, SD = 6.12), t (1, 917) = 6.92, p < .01. On average, the degree of aggression of boys was 44% higher than that of girls.

Violent Motion-Sensing Video Games Playing.

The study showed that boys played more violent motion-sensing video games than did girls. The mean score of VMSVG of boys (M = 26.64, SD = 34.49) was significantly higher than that of girls (M = 10.80, SD = 18.24), t (1, 938) = 8.80, p < .01. The extent of playing VMSVG of boys was 260% higher than that of girls.

Participant's Aggressive Attitudes.

The study revealed that boys had more positive attitudes toward violence than did girls. The mean score of attitudes toward violence of boys ($M = 23.63$, $SD = 9.53$) was significantly higher than that of girls ($M = 18.20$, $SD = 6.48$), t (1, 924) = 10.12, $p < .01$. On average, the degrees of the attitudes toward violence of boys were 7% higher than that of girls.

Trait Aggression.

The study revealed the result that boys had more aggressive tendency than did girls. The level of trait aggression of boys was significantly higher than that of girls ($M = 83.05$, $SD = 21.01$; $M = 77.74$, $SD = 19.07$), t (1, 778) = 3.70, $p < .01$). Additionally, the extent of trait aggression of boys was around 10% higher than that of girls.

Family Conflict.

The mean scores of boys and girls on family conflict were 12.46 ($SD = 8.03$) and 11.77 ($SD = 6.89$), respectively. Comparing these two scores, it appeared that boys experienced significantly more family conflict than did girls, t (1, 909) = 1.39, $p < .01$, and that of boys was 5.8% higher than that of girls.

Media violence.

The exposure to media violence of boys and girls were 25.59 ($SD = 9.08$) and 20.22 ($SD = 7.59$), respectively. Comparing these two scores, it appeared that boys consumed media violence more frequently and significantly than did girls, t (1, 902) = 9.65, $p < .01$. The degree of media violence of boys was 26.5% higher than that of girls.

Peer Aggression.

The extent of peer aggression of boys was significantly higher than that of girls (M = 31.30, SD = 16.06; M = 23.47, SD = 11.90), t (1, 896) = 8.33, $p < .01$. The level of peer aggression of boys was 33.3% higher than that of girls.

That is to say, boys played more violent motion-sensing video games, using more aggression, being more aggressive, experiencing family conflict, and being exposed to more media violence than girls.

Subgroup by School.

The means and standard deviations of all variables for each school were provided in Table 4.3. As observed in the table, elementary school and junior high school participants were significantly different in most main variables, for example, aggression, violent motion-sensing video games, attitudes toward violence, family conflict, and media violence.

Table 4.3. Summary Statistics for Elementary and Junior High Participants

Variables	Elementary	*SD*	Junior	*SD*	*T*
Aggression	8.89	8.33	10.04	6.58	-2.28*
VMSVG	18.60	26.90	18.90	30.81	-.16
Aggressive Attitudes	19.78	9.03	22.35	7.81	-4.58**
Trait Aggression	80.35	23.11	80.42	16.94	-.05
Family conflict	12.16	8.12	12.07	6.67	.17
Media Violence	23.25	9.45	22.52	7.93	1.25
Peer Aggression	25.81	14.65	29.34	14.33	-3.60**

Note: The F Ratios demonstrated the extent of differences between elementary school and junior high school participants in their responses. The numbers of elementary school and junior high school participants were 534 and 470, respectively.
Level of Significance: * p< .05 **p< .01

Participant's Aggression.

Comparing the two mean scores of aggression, the mean score of aggression among junior high school participants was 10.04 (SD = 6.58), which was significantly higher than and that of elementary school participants (M = 8.89, SD = 8.33), t (1, 917) = -2.28, $p < .05$. On average, the extent of aggression of junior high school participants was 13% more than that of elementary school participants.

Violent Motion-Sensing Video Games Playing.

The level of playing VMSVG of junior high school participants (M = 18.90, SD = 30.81) was higher than that of elementary school participants (M = 18.60, SD = 26.90) and the difference was not significant. The degree of violent motion-sensing video game playing of junior high school participants was 1.6% higher than that of elementary school participants.

Participant's Attitudes toward Violence.

The mean scores of attitudes toward violence of elementary school and junior high school participants were 19.78 (SD = 9.03) and 22.35 (SD = 7.81) and the difference was significant, t (1, 924) = -4.58, $p < .01$. The extent of aggressive attitudes of junior high school participants was 12.9% higher than that of elementary school participants.

Trait Aggression.

The degree of trait aggression in elementary school and junior high school participants were 80.35 (SD = 23.11) and 80.42 (SD = 16.94), respectively. It appeared that junior high school participants had more aggressive tendency than participants in elementary school (t (1, 737) = -.05, $p < .01$). The degree of trait aggression of junior high school participants was .08% higher than that of elementary school participants.

Family Conflict.

The mean score of family conflict of elementary school samples was 12.16 (*SD* = 8.12), which was more than that of junior high school participants (*M* = 12.07, *SD* = 6.67). The elementary school participants experienced more family conflict than did junior high school participants. The level of family conflict of elementary school participants was .6% higher than that of junior high school participants.

Media violence.

The exposure to media violence among elementary school and junior high school participants were 23.25 (*SD* = 9.45) and 22.52 (*SD* = 7.93), respectively, but the difference was not significant. The extent of media violence of elementary school participants was 3.24% higher than that of junior high school participants.

Peer Aggression.

As the extent of peer aggression among elementary school and junior high school samples was examined, the result showed that the junior high school participants tended to hang around with peers higher in aggression than elementary school participants. The mean score of peer aggression of participants in junior high school (*M* = 29.34, *SD* = 14.33) was significantly more than that of elementary school participants (*M* = 25.81, *SD* = 14.65), t (1, 896) = -3.6, $p <$ .01. The level of peer aggression of junior high school participants was 13.72% higher than that of elementary school participants.

In short, the degrees of some variables in junior high school were significantly more than those in elementary school participants, for example, aggression, aggressive attitude, and peer

aggression. Junior high school participants were more aggressive, displaying more aggression, and experiencing more peer aggression.

Conclusion of this section

The extents of main variables in boys were significantly more than those of girls. For aggression, the result showed that boys expressed more aggression than girls and this supported the H2a. In addition, boys played more violent motion-sensing video games, being more aggressive, experiencing family conflict, and being exposed to more media violence than did girls.

For elementary and junior high school participants, elementary school participants expressed significantly less aggression than did junior high school students. This result supported H2b, which hypothesized that aggression differed by school. Meanwhile, elementary school participants had less positive attitudes toward aggression and got involved in less peer aggression.

Correlation Analyses of the Study

In order to examine whether the violent motion-sensing video games playing influences aggression, the first step is employing correlation analysis to assess the relationship between these two main variables. Having a significant association between these variables is a requirement to infer the effects of violent motion-sensing video games on aggression among Taiwanese children. In addition, the research attempted to examine whether the General Aggression Model (GAM) demonstrated the process of violent motion-sensing video game influencing aggression among Taiwanese children. Therefore, other explanatory variables, for

example, three socializing agents for children, were taken into account to test how violent motion-sensing video game affected aggression.

Since the distributions of main variables were non-normal (see Table 4.1), the nonparametric correlation analysis was employed. The results of nonparametric correlation analysis were presented in Table 4.4. The correlation coefficients described the bivariate associations among violent motion-sensing video games playing, participants' aggression and other major variables. As the table showed, the association between violent motion-sensing video games and aggression was positive and significant ($r = .11$, $p < .01$). This meant that participants who played more violent motion sensing-video games showed more aggression. The more violent motion-sensing video games a participant played, the more aggression a participant exhibited.

VMSVG was positively and significantly correlated with aggressive attitudes ($r = .09$, $p < .01$), trait aggression ($r = .11$, $p < .01$), family conflict ($r = .09$, $p < .05$), and media violence ($r = .21$, $p < .01$). The results suggested that the participants who played more violent motion-sensing video games experienced more family conflict and consumed more media violence. And they were more aggressive and had more positive attitudes toward violence.

The results of correlation analyses also suggested that aggression were positively and significantly associated with all main variables, including social environmental factors. In the study, the correlation coefficient between trait aggression and aggression was .52 ($p < .01$). This meant that the participants who were aggressive used more aggression. Attitudes toward violence were correlated with aggression ($r = .60$, $p < .01$). It said that participants who tolerated more aggression expressed more aggression. For socializing agents of children—family conflict, media violence, and peer aggression—were all positively and significantly related to aggression

(r = .47, p < .01) (r = .37, p < .01) (r = .27, p < .01). In other words, the participants who experienced more family conflict, media violence, or peer aggression displayed more aggression.

Table 4.4. Nonparametric Coefficients among Variables

	1. Aggression	2. VMSVG	3. Aggressive Attitudes	4. Trait Aggression	5. Family Conflict	6. Media Violence	7. Peer Aggression
1							
2	.11**						
3	.60**	.09**					
4	.52**	.11**	.55**				
5	.47**	.09**	.42**	.36**			
6	.37**	.21**	.27**	.39**	.26**		
7	.27**	.01	.24**	.13**	.06	.10**	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed)

Regression Analyses of the Study

The results of multiple regression analyses of the data were presented in this section. One of research questions was whether the GAM demonstrated the association between playing violent motion-sensing video game and real-life aggression among Taiwanese children. According to the GAM (see Figure 2.1 and 2.2), the major explanatory variables in this thesis could be divided into four types of factors: biological modifiers (i.e., sex and grade level of participants), social environmental modifiers (i.e., family conflict, media violence, and peer violence), aggressive outcomes (i.e., aggressive attitudes), and personality predisposition of participants (i.e., trait aggression). Furthermore, the main objective of this thesis was to examine the effects of advanced technology (i.e., motion-sensing technology) in violent video games on aggression among children. The violent motion-sensing video game playing needed to be analyzed independently. Therefore, four types of explanatory variables, as well as violent motion-sensing video game playing, were entered in the equation to predict the dependent

variable—aggression. At the first step (see Block 1 in Table 4.5) of hierarchical multiple regression, the demographic characteristics of participants (sex and grade level) were entered in the equation. VMSVG was entered in the equation at the second step (see Block 2 in Table 4.5). Family conflict, media violence, and peer aggression were entered at the third step (see Block 3 in Table 4.5). At the forth step (see Block 4 in Table 4.5), aggressive attitudes was entered. At the final step (see Block 5 in Table 4.5), trait aggression was entered in the equation.

The results of multiple regression analyses were displayed in Table 4.5. As observed in the table, this regression model explained about 55% of the total variance in the aggression by all participants, F (1, 642) = 96.00, $p < .01$.

After controlling the impacts of other variables, violent motion-sensing video game playing significantly and positively related to the aggression of participants (*Beta* = .08, $p < .05$). However, the violent motion-sensing video games to the second model contributed just 1% to the explained variance in participants' aggression.

The table also presented that all biological and social environmental variables significantly and independently predicted aggression. The correlation between gender and aggression was significant but negative (*Beta* = -.21, $p < .01$). The relationship between grade and aggression was significantly positive (*Beta* = .09, $p < .05$). The association between family conflict and aggression of participants was significant. The degree of family conflict was positively associated with the extent of aggression (*Beta* = .40, $p < .01$). It supported H2c. The consistent results were found in the correlation between media violence and aggression (*Beta* = .22, $p < .01$) and supported H2d. For peer aggression, a positive and significant relationship was still found (*Beta* = .17, $p < .01$) and supported H2e. In addition, the result of whole regression model supported H2f, which proposed that biological and social environmental factors together

were correlated with aggression. Additionally, the extent of aggression was positively related to attitudes toward violence (*Beta* = .49, $p < .01$), and trait aggression (*Beta* = .17, $p < .01$).

According to the R Square showed in the Table 4.5, the social environmental factors contributed more to the explained variance in the aggression. And nearly no contribution was made by violent motion-sensing video games to the explained variance in participants' aggression. It represented that the effect of VMSVG might be easily modified by other explanatory variables.

Table 4.5. Hierarchical Multiple Regression Analyses on Data of Participants

	Explanatory Variables	*B*	*Beta*	*R Square*
Block 1	Gender	-3.08	-.21**	.05*
	Grade Level	.38	.09*	
Block 2	VMSVG	.02	.08*	.06*
Block 3	Family Conflict	.41	.40**	.36**
	Media Violence	.19	.22**	
	Peer Aggression	.09	.17**	
Block 4	Aggressive Attitudes	.43	.49**	.53**
Block 5	Trait Aggression	.06	.17**	.55**

Path Analyses of the Study

The results of hierarchical multiple regression analyses indicated that violent motion-sensing video games playing could predict aggression in Taiwanese children, while controlling the impacts of other variables. However, the contribution of violent motion-sensing video games to the explained variance in participants' aggression is too small. In order to attempt to account for the process of violent motion-sensing video game playing, biological, and social

environmental modifiers influencing aggression, the path analysis was conducted and the mediated regression analysis was employed.

As the GAM illustrated (see Figure 2.1. and 2.2), the biological modifiers and social environment in which individuals were engaged helped individuals to induce aggressive attitudes, and then increased individuals' aggressive personality. Therefore, a third-step path analysis was developed in this thesis. At first, aggressive attitudes was treated as the dependent variable, and other main explanatory variables, including biological modifiers, social environmental modifiers, aggressive outcomes, and aggressive personality, were entered in the model.

At the second step, trait aggression was considered as the dependent variable, and all other variables, including aggressive attitudes as the dependent variable at the first step, were entered in the equation.

Then the third step treated aggression as the dependent variable. All other variables, including the aggressive attitudes as the dependent variable at the first step and the trait aggression as the dependent variable at the second step were entered in the model.

In this section of the thesis, table 4.6, 4.7, and 4.8 displayed that the results of path analyses for all participants. As observed in Table 4.6 of the first step of path analysis, the gender of participants and grade level were positively associated with the extent of the attitudes toward violence, as the dependent variable as in that model. It meant that boys were more aggressive than girls. And older participants were more aggressive. Family conflict, media violence, and peer aggression significantly predicted aggressive attitudes (*Beta* = .37, $p < .01$) (*Beta* = .09, $p < .01$) (*Beta* = .11, $p < .01$).

Table 4.6. Regression Analysis using Aggressive Attitudes as Dependent Variable.

Predictor	*B*	*Beta*
Gender	-3.96	-.24**
Grade	.57	.13**
VMSVG	-.01	-.03
Family Conflict	.42	.37**
Media Violence	.09	.09**
Peer Aggression	.06	.11**

Dependent Variable: Aggressive Attitudes

The results of the second-step of path analyses for all participants were presented in Table 4.7. As the table showed, girls had more aggressive tendency than boys (*Beta* = -.08, $p <$ .05). Family conflict, media violence, and aggressive attitudes significantly affected trait aggression (*Beta* = .14, $p < .01$) (*Beta* = .21, $p < .05$) (*Beta* = .45, $p < .01$).

Table 4.7. Regression Analysis using Trait Aggression as Dependent Variable.

Predictor	*B*	*Beta*
Gender	3.48	.09*
Grades	-.83	-.08*
VMSVG	-.01	-.02
Family Conflict	.38	.14**
Media Violence	.49	.21**
Peer Aggression	.04	.03
Aggressive Attitudes	1.09	.45**

Dependent Variable: Trait Aggression

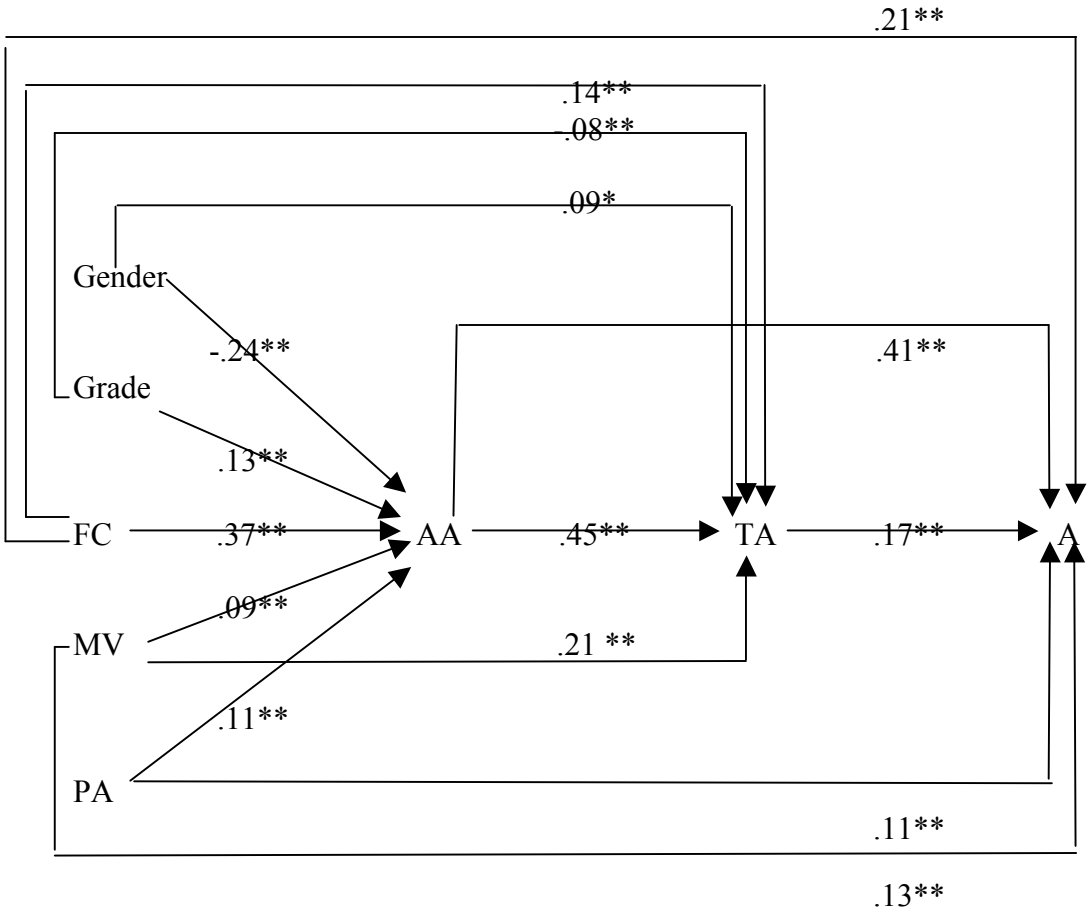
Table 4.8 showed that family conflict, media violence, peer aggression, aggressive attitude, and trait aggression predicted aggression significantly (*Beta* = .21, $p < .01$) (*Beta* = .13, $p < .01$) (*Beta* = .11, $p < .01$) (*Beta* = .41, $p < .01$) (*Beta* = .17, $p < .01$).

Table 4.8. Regression Analysis using Aggression as Dependent Variable.

Predictor	*B*	*Beta*
Gender	.32	.02
Grades	.17	.04
VMSVG	.01	.04
Family Conflict	.21	.21**
Media Violence	.11	.13**
Peer Aggression	.05	.11**
Aggressive Attitudes	.37	.41**
Trait Aggression	.06	.17**

Dependent Variable: Aggression

The final results of the path analyses were depicted in Figure 4.1, after ignoring non-significant associations between predictors and dependent variables. The results demonstrated that violent motion-sensing video games did not directly or indirectly induce aggression. For gender and grade of participants, they indirectly predicted aggression. In additional, social environmental factors (i.e., family conflict, media violence, and peer aggression) and aggressive attitudes had both direct and indirect impact on aggression.



FC: family conflict MV: media violence PA: peer aggression AA: aggressive attitudes TA: trait aggression A: aggression

Figure 4.1. VMSVG, Biological, and Social Environmental Modifiers on Aggression.

CHAPTER 5

Conclusion and Discussion

Two research questions of this study were aimed to answer: (1) whether violent motion-sensing video games was positively correlated with the real-life aggression among Taiwanese children and (2) whether the General Aggression Model (GAM) illustrated the impact of violent motion-sensing video games (VMSVG) on real-life aggression in Taiwanese children. In attempts to answer these two research questions, correlation and hierarchical multiple regression analyses were conducted and the results were described in Chapter Four. In this chapter, the results of these data analyses were summarized in order to answer the research questions. Some theoretical and practical implications of the research were discussed and recommendations for future research were provided.

The first research question asked if violent motion-sensing video game was positively related to aggression among Taiwanese children. The zero-order correlations suggested that a significant and positive correlation between violent motion-sensing video game playing and aggression existed. This meant that as a Taiwanese child played more violent motion-sensing video games, his or her aggression also increased thus supporting hypothesis 1. However, this positive relationship between violent motion-sensing video game playing and aggression was not significant, after taking into account the effects of other explanatory variables (i.e., gender, grade level, family conflict, peer aggression, and media violence).

When examining this relationship between genders, the results suggested that boys exhibited more aggression than girls therefore supporting hypothesis 2a. The finding that the extent of aggression differed by grade supported hypothesis 2b.

Overall, the answer to the first research question is negative, which meant playing violent motion-sensing video games does not necessarily influence aggression in Taiwanese children. Although the positive association between violent motion-sensing video games and aggression was found, violent motion-sensing video game playing might not be a significant predictor of aggression among Taiwanese children.

The second question asked if the GAM illustrated the impact of violent motion-sensing video games on real-life aggression in Taiwanese children. The GAM provided a theoretical framework to examine the influence of violent video games on aggression. In the current study, the researcher tried to verify a part of this model using empirical data collected from Asian children. In order to accomplish this, path analyses were employed. Aggression, trait aggression, and aggressive attitudes were each used as the dependent variable in three separate path analyses.

The results of the path analyses revealed that the effect of violent motion-sensing video game playing could not directly or indirectly influence aggression, when extrapolating the effects of violent motion-sensing video games into a broader social context. The results of data analyses suggested the correlation between violent motion-sensing video game playing and aggression was spurious. This means the significant and positive association might be caused by other variables and violent motion-sensing video game playing could not independently influence aggression. Therefore, the answer to the second research question whether the GAM illustrates violent motion-sensing video game influences aggression is negative. This meant the GAM could not illustrate the process of violent motion-sensing video game influencing aggression, because the effect of violent motion-sensing video games on aggression in Taiwanese children could not be found.

Although the results revealed that playing violent motion-sensing video games did not predict aggression, other modifiers (i.e., biological and social environmental factors identified in the GAM) might be better predictors of aggression. Hence, the second research question had been re-framed to ask how biological and social environmental modifiers influenced aggression in Taiwanese children.

The results of mediated regression suggested that social environmental modifiers were significant predictors of aggression. Hypotheses 2c-2i were supported.

Path analyses could reveal either a direct or indirect effect on the dependent variable. A direct effect suggested that a predictor directly influenced the dependent variable. There were also two types of indirect effects, two-step and three-step, which showed that the relationship between a predictor and dependent variable was mediated by another variable. Two-step indirect effect meant that there was one mediator, whereas a three-step indirect effect had two mediators.

As observed in Figure 5.1, gender indirectly influenced aggression via a two-step and three-step indirect effect. A two-step indirect effect revealed that gender affected aggressive attitudes and then aggression. A three-step indirect effect showed that gender influenced aggressive attitudes, and then trait aggression, and finally aggression. An indirect effect was also found between grade level and aggression.

In regard to social environmental factors, family conflict, media violence, and peer aggression had both a direct and indirect effect on aggression. Family conflict and media violence directly affected aggression. They also indirectly provoked aggression by two two-step effects. One indirect two-step effect was through trait aggression and the other was through aggressive attitudes. A three-step effect also occurred in the association between family conflict and aggression. Family conflict affected aggression with aggressive attitudes and trait aggression

as mediators of this association. Media violence also had a three-step indirect effect on aggression with aggressive attitudes and trait aggression as mediators. Peer aggression directly affected aggression; indirectly influenced aggression by a two-step effect through aggressive attitude; and a three-step effect with aggressive attitudes and trait aggression as mediators. There was no two-step effect where peer aggression provokes aggression via trait aggression. Figure 5.1 showed the relationship between biological and social environmental factors and aggression.

Gender → aggressive attitudes → aggression (2-step indirect effect)
Gender → trait aggression → aggression (2-step indirect effect)
Gender → aggressive attitudes → trait aggression → aggression (3-step indirect effect)

Grade → aggressive attitudes → aggression (2-step indirect effect)
Grade → trait aggression→ aggression (2-step indirect effect)
Grade → aggressive attitudes → trait aggression → aggression (3-step indirect effect)

Family Conflict → aggression (direct effect)
Family Conflict → aggressive attitudes → aggression (2-step effect)
Family Conflict → trait aggression → aggression (2-step effect)
Family Conflict → aggressive attitudes → trait aggression → aggression (3-step effect)

Media Violence → aggression (direct effect)
Media Violence → aggressive attitudes → aggression (2-step effect)
Media Violence → trait aggression → aggression (2-step effect)
Media Violence → aggressive attitudes → trait aggression → aggression (3-step effect)

Peer Aggression → aggression (direct effect)
Peer Aggression → aggressive attitudes → aggression (2-step effect)
Peer Aggression → aggressive attitudes → trait aggression → aggression (3-step effect)

Figure 5.1. Biological and Social Environmental Factors on Aggression

Table 5.1. The Summary of Hypotheses and Results

H1	The more violent motion-sensing video game Taiwanese children play, the more aggression they exhibit.	Supported
H2a	Boys express more physical/ direct aggression than girls	Supported
H2b	Aggression differs by school	Supported
H2c	Family conflict is positively correlated with aggression	Supported
H2d	Media violence is positively correlated with aggression	Supported
H2e	Peer aggression is positively correlated with aggression	Supported
H2f	Biological and social environmental factors together are positively correlated with aggression	Supported
H2g	Aggressive attitudes mediated the effect of violent motion-sensing video games on aggression	Supported
H2h	Trait aggression mediates the effect of violent motion-sensing video games on aggression	Supported
H2i	Aggressive Attitudes and Trait aggression together mediates the effect of violent motion-sensing video games on aggression	Supported

Conclusion of this section.

Based on the results from this study, the GAM could not illustrate the process of how violent motion-sensing video game influences aggression. Nevertheless, it did delineate the process of the biological and social environmental factors influencing aggression. The results of path analyses indicated that the biological and social environmental variables had different ways to influence aggression in Taiwanese children. For biological factors, the path was indirect. The biological modifiers (i.e., gender and grade level) affected aggression by a two-step effect through trait aggression or a three-step effect through aggressive attitudes and trait aggression. The social environmental modifiers could directly and indirectly provoke aggression by

influencing either aggressive attitudes or trait aggression. Also the social environmental modifiers could also increase aggression by developing aggressive attitudes and then trait aggression.

These findings reflected that conflicts among family members, aggression displayed on media, and aggression among peers demonstrated aggressive behaviors in real life among Taiwanese children. Children would directly learn aggression from their families, peers, and media and act out similar aggressive behaviors. Meanwhile, these social environmental factors helped children to develop more aggressive attitudes and personality.

Discussion and Limitations of This Research

After controlling for the other explanatory variables, the results of this research revealed that playing violent motion-sensing video games did not significantly relate to real-life aggression in Taiwanese children. This finding was not supported by multiple theoretical accounts (e.g., social learning theory, script theory, cognitive neoassociation theory, and the General Aggression Model) or by most research on media violence and violent video games. However, this finding was consistent with some studies examining motion-sensing video games (e.g., Mahood & Cicchirillo, 2008; Bailey, 2008) and research in non-motion sensing video games (e.g., Ferguson, et al., 2010; Ferguson, et al., 2008).

The results of the correlation analyses in this study indicated that playing violent motion-sensing video games positively associated with aggression in Taiwanese children, but that positive correlation was not significant when taking into account social environmental modifiers (e.g., family conflict, media violence, and peer aggression). In other words, the effect of violent motion-sensing video games on aggression was smaller than that of other social environmental factors. Researchers corroborated the effects of violent motion-sensing video games on

aggression with studies that suggested media violence increases concurrent aggression. Yet, in real life, social environmental and biological factors have shown a greater effect on the development of aggression. This finding was consistent with research that showed that exposure to violent video games did not relate to aggressiveness and might be a by-product of family violence and other environmental or biological factors (Ferguson et al., 2008; Ferguson et al., 2010).

Moreover, the ethics of Confucianism, which highlights maintaining the harmony and stability of society, may also be a possible explanation for the spurious association between playing violent motion-sensing video games and aggression among Taiwanese children. Developing aggression is like a tug-of-war between factors that encourage and inhibit aggression. Family conflict, media violence, and peer aggression facilitate, demonstrate, and provoke aggressive behaviors. Moral beliefs opposing violence is one of the common aggression inhibitions (Anderson et al., 2010). Self-image, self-standards, and sense of self-worth help individuals to develop moral beliefs and regulate their aggression. Sometimes aggression facilitators activate individuals' "moral disengagement" (Bandura, 1999) to help them escape from the inhibition of aggression from their inner moral standards (Anderson & Bushman, 2002) and reduce inhibitions against aggression. Sometimes aggression inhibitions override aggression facilitation and decrease aggression. In this case, Taiwanese children are socialized by the teachings of Confucianism, which helps to develop their inner moral standards that restrain the expression of aggression and aggressive affect. Parents, teachers, and society reinforce this moral standard by punishing aggression and rewarding restraint. Hence, Confucianism teachings may help to explain why playing violent motion-sensing video games did not significantly increase aggression in Taiwanese children. However, the impact of Confucianism remains a speculation

in this study. Future research can test whether cultural differences influence the effects of violent motion-sensing video game on aggression by comparing children in western and eastern countries.

Another point that deserves notice is that VMSVG cannot predict aggression, which may indicate that motion-sensing video game systems using advanced technology may have different effects from non-motion-sensing video games or other non-interactive media. Some research on motion-sensing video games indicated this possibility. For example, Mahood and Cicchirillo (2008) found that violent motion-sensing video games decreased aggression. In a study by Barlett et al. (2008), video game technology (i.e., motion-sensing technology) could not moderate the effects on aggressive cognition or states of hostility. Crouse and Kalyabaraman (2010) posited that Wii enhanced a lower-level sense of presence than did non-motion-sensing video games.

Bandura's concept of "reciprocal determinism" may explain the difference in the effect of violent motion-sensing video games on players' aggression. Reciprocal determinism provides a theoretical explanation as to why aggressive children may be especially attracted to viewing violent media.

The participatory feature of motion-sensing video games (e.g., allowing players to replicate real-life physical gestures to control game characters) may attract people who exhibit aggression to play more violent motion-sensing video games. This explanation was supported by the results of the ANOVA of this study that reveal Wii players exhibited more aggression and were exposed to more media violence than did non-Wii players. Wii players were considered as early adopters or as the early majority in regard to the diffusion of Wii. These individuals may have some common characteristics that made them adopt Wii when it was introduced; for

example, they may be adventurous, have an interest for novelty and risk-taking behaviors, consume more media violence, and display more aggressive behaviors in real life. As such, they may be more aggressive.

The effect of family conflict on aggression.

Among the biological and social environmental modifiers (i.e., gender, grade level, family conflict, peer aggression, and media violence), family conflict had a greater effect on aggression among Taiwanese children and it had more varied paths to influence aggression (e.g., direct effect, indirect two-step, and three-step effect). The data supported that the GAM delineated that the biological and social environmental factors all had impacts on aggression among children. Also, family conflict played a more important role on aggression in Taiwanese children, which revealed the family as a more significant mechanism to encourage children in developing their aggression. The result was consistent with Ferguson et al. (2008), which posited that family violence was significantly predictive of aggressive behavior.

The influencing paths of family conflict were varied; not only did family conflict provide children with a model of aggressive behavior to imitate, but it also allowed children to develop aggression via two- or three-step effects. These effects may include having more positive attitudes toward aggression and then displaying more aggression; becoming more aggressive and then expressing more aggression; tolerating more aggression, being more aggressive, and then exhibiting more aggression in real life. Why did family conflict have a greater impact on aggression in Taiwanese children? From the study of child development, among the three main agents of socialization, younger children would be socialized more by the family. Younger children spent most time with parents and viewed parents as role models. Another reason that the

connection between family and children was tighter in Asian countries was because Confucianism teaches children to respect their parents, elders, and authorities.

Unlike peer aggression being discouraged by teachers, family conflict is relatively unrestricted. Corporal punishment, for example, is considered a reasonable aggression for misbehaving children. Conflict between parents is also inevitable because parents do not always restrain their aggression or aggressive feelings within the home. Aggression exemplified as punishment towards children seem justified to the children involved (e.g., "The naughty boy deserves punishments"; "It is good for society to punish children who misbehave"). Children were exposed to these reasonable aggressive behaviors or they see these justified aggressions demonstrated in front of them by their role models. That effect is stronger than any other kind of aggression.

Meanwhile, Taiwanese children are educated on social stability, so most children attempt to avoid expressing aggression and aggressive feelings in school. Additionally, teachers, parents and elders compliment children who express less aggression and aggressive feelings. Under these circumstances, Taiwanese children may exhibit less aggression in school and the influence of peer aggression may be limited. Conversely, children may feel free to display more aggression at home; especially in a family where family conflict and justified aggression (i.e., punishments) are unrestricted.

The findings of this research also indicated that these social environmental factors not only provide a model for mimicking aggression with children, but also develop aggressive attitudes that tighten aggressive cognition networks in children's head. Children who live in an environment filled with violence causes them to be more aggressive.

The limitation of GAM.

The results of this research support the GAM; however, the findings of this study reveal some limitations of the GAM. For example, the GAM does not illustrate all possible pathways for each of the explanatory variables. For example, aggressive attitudes are considered mediating variables in the GAM, which suggests that aggression-related stimulus in real life will create more positive attitudes toward aggression thus making individuals more aggressive, ultimately leading them to express more aggression. However, the data of this study consistently show aggressive attitudes can affect aggression without producing trait aggression. In most cases, these direct effects are stronger than the indirect effect. Similarly, for some social environmental factors, such as family conflict, the effects on aggression may be more likely to be direct. Family conflict also directly impacts trait aggression without influencing aggressive attitudes.

One of the limitations in the GAM is that it does not identify a direct effect between biological and social environmental modifiers and aggression. A multi-factor approach (e.g., GAM) examining media violence needs to encourage and fit the development of aggression in real life. “Violence is a complex interpersonal phenomenon that occurs when a host of contributing factors converge at the right (wrong) time and place (Anderson et al., 2003)”. And the effects of media are not “in an all-or-none fashion”; rather, its influence occurs in the context of combination of biological and environmental factors (Kirsh, 2010). Also, a multi-layered approach to resolve whether media violence, including video game violence, influences aggression is necessary (Anderson et al., 2003).

Current research findings clearly reveal that no one variable is the cause of aggression, but rather some variables (e.g., sex, media violence exposure, and aggressive personality) are associated with future aggressive behavior (Gentile, Linder, & Walsh, 2003). Violent motion-

sensing video game exposure in combination with other cultural, biological, and social environmental factors for aggression can produce a stronger effect than any single risk factor alone (Gentile, Linder, & Walsh, 2003).

Limitations.

The obvious limitation of this research is that the relationship between violent motion-sensing video games and aggression may be limited because the data were collected at a time when the Wii console and its games were not widely available. This lack of exposure is evident in that only half of the participants had previously played Wii.

With limited access to Wii, some younger participants had difficulty in distinguishing Wii games from non-motion-sensing video games. When conducting surveys, the researcher attempted to assuage the problem by answering questions from participants; however, this issue still existed. This limitation may reduce the accuracy of the variable measuring the frequency of violent motion-sensing video game play, which may affect the reliability of the measure of VMSVG.

In real life, it is hard to distinguish the effects of violent motion-sensing video games, violent non-motion-sensing video games, and other violent media. Most people have motion-sensing (e.g., Wii) and non-motion-sensing video game consoles (e.g., PS2, Nintendo DS Roms, or computer games) at home and play both consoles, as well as, being exposed to other media violence. The effects from violent video games and other violent media may modify the effects of violent motion-sensing video games, which is another limitation of this research. Future research can come up with a better measure or research design to examine a non-spurious association of violent motion-sensing games and aggression.

Another limitation to this study is the minimal Wii use of most of the participants. Approximately half of the sample had played Wii; however, the majority of these participants had played for less than six months. Some effects of aggression, especially aggressive attitudes and trait aggression, may not be able to fully develop in such a short time period; therefore, the changes in those factors may not be measurable (Gentile & Linder, 2003).

Another related issue is that measure of exposure to violent Wii games may be problematic. Since many Wii games were not available in the Taiwanese market when the data were collected, the researcher employed a modified measure to assess the exposure to violent Wii games. Although this method of assessment was adapted from a rigorous measure introduced by Anderson and Bushman (2000), the adapted assessment was not tested in many studies to ensure its reliability. It may be a limitation of this research and future research can employ more rigorous measure to assess these variables.

Suggestions for future research

This preliminary study of motion-sensing video games, with survey methodology and incorporating the GAM, present many opportunities for future studies. Future studies should be altered with the limitations of this study in mind. For example, a more rigorous measure of VMSVG should be performed.

Further studies are also needed to provide more detailed knowledge about the psychological, physiological, and psychophysiological effects of motion-sensing technology on users. For motion-sensing technology in video games, future research should further determine the impacts of the motion-sensing technology in video games. Investigating the correlation of motion-sensing video games and aggression is the first step in examining the effect of motion-sensing technology in video games. After confirming that motion-sensing video games positively

correlates to aggression, the next step will be to verify the effect of motion-sensing video games on aggression. This is crucial because the effect of motion-sensing video games is controversial within existing research. Some studies revealed that violent motion-sensing video games increases aggression while others showed that motion-sensing video games have a cathartic effect that decreases a player's subsequent aggression. Additional studies focusing on this aspect would be of great value in understanding the exact influence of motion-sensing video games on players.

Research regarding the effects of motion-sensing technology in video games is sparse, and the gap is large in video game studies. Thus, research employing an experimental design to test the short-term effects of violent motion-sensing video games and using a longitudinal design to examine the long-term effects of VMSVG should be undertaken. Using a longitudinal design could examine not only the impact of motion-sensing technology in video games on aggression in real life but also provide more reliable evidence if the sample size is large enough.

Different types of violent motion-sensing video games may have different effects on aggression in children (Ivory & Kalyanaraman, 2006). For some types of motion-sensing violent video games, motion-sensing technology will augment the effects of violent content on those games. Motion-sensing technology in video games makes players feel more involved in the games, helping players to learn, practice, and acquire aggressive behaviors more efficiently by increasing their muscle memory; players easily act out that aggressive behavior in real life without their awareness. Since some types of games (e.g. first person shooting games) are more appropriate for using motion-sensing controls, players may be more easily influenced by the violent content. Future studies are required to further examine which types of violent video

games are more influential by motion-sensing technology in order to warn parents not purchase those games for children.

Meanwhile, future studies might consider examining the characteristics of motion-sensing video games players to determine whether the players who love to play motion-sensing video games have different characteristics than players who just play non-motion-sensing video games. For example, are Wii or Kinect players more adventurous or aggressive than non-motion-sensing video games players? Answering these kinds of questions will help researchers and the public to draw conclusions about the effects of violent motion-sensing video games.

More GAM studies are necessary to broaden its explanation of real-life aggression. The GAM is a comprehensive model to explain the development of aggression by multiple causes of aggression, including social environmental modifiers. However, most GAM studies use a single cause of aggression to determine the effects of media violence on aggression, not multiple causes of aggression. Some critics argue that research designs in most such studies do not match the assumptions of the GAM. Also, the explanatory power of the GAM is limited because the aggression as the dependent variable in GAM studies is manipulated, not real-life aggression. Therefore, more nonexperimental studies determining the effects of media violence on aggression by the GAM are required. That is what has been undertaken in the present study that examined the GAM in a nonexperimental setting and suggested that the GAM not only provides an explanation of aggression in a laboratory setting, but also delineates real-life aggression. The relationship between violent motion-sensing video games and extreme violence needs to be examined in future research. Most people wonder whether media violence results in extreme violence (e.g., school shooting). Although cross-sectional and experimental studies support that video game violence was associated with later aggression, critics believe this association is

biased by study design or methodology (e.g., self-report surveys that require participants to recall their real-life aggression or the aggression in laboratory-based studies rather than real-life aggression).

The effect of violent motion-sensing video games is controversial, but "the truth is a variety of media violence entering the home and inviting active participation of every young children- often with little parental supervision (Anderson et al, 2003)." Preventing aggression among children is necessary for the betterment of society as a whole. According to the findings of this study, efficient means of prevention include reducing children's exposure to family conflict, violent media, and peer violence through supervision by parents, elders, or teachers. This supervision would be an inexpensive and potentially effective means to shield children from the harmful effects of media violence.

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Appendix: Questionnaire

Today we are going to answer a number of questions. There are not tests. We just want to know how much video game you play, how much television you watch at home and how do you feel about some things. We promise you that all the answers you give us today will only be used for scientific research. We will not tell your answer to anybody, not even the teachers. So please read every question carefully, and select one answer that you think is appropriate for you.

Please write down your grade level, number, and name:
Grade level_____ Your number: ____ Your Name: _____

[Exposure to video games]

( )1. How many years have you played video games?
(1) Never play video games (2) less than 1 year (3) more than 1 year but less than 2 years
(4) more than 2 year but less than 3 years (5) more than 3 year but less than 4 years
(6) more than 4 year but less than 5 years (7) more than 5 years

( ) 2. How often do you play video games in the last month?
(1) Never play video games (2) more than 30 times (3) about 30 times (4) 10- 15 times
(5) 4-5 times (6) 2-3 times (7) 1 time (8) less than 1 time

( ) 3. How long do you play video games in the last time?
(1) Never play video games (2) less than one hour (3) 1- less than 2 hours
(4) 2-less than 3 hours (5) 3- less than 4 hours (6) more than 4 hours

4. Please pick out your three favorite video games from the following list.
The first favorite _____The second favorite _____The third favorite_____
(1) Adventure- the characters and sets in video games are cartoonish (e.g. Sonic The Hedgehog, Super Mario Bros.)
(2) Wresting or Boxing
(3) Shooting, Real-time Strategy, the theme of game is about war or destroying (e.g., Warcraft series, Age of Empires series, Command and Conquer and Dune II)
(4) Action-adventure, Action Role-playing (e.g., Resident Evil series, Grand Theft Auto series)
(5) Fighting (e.g., Mortal Kombat, Street Fighter series, Super Smash Bros. Brawl)
(6) Puzzle game and music game (e.g., Guitar Hero, Rock Band and Sing Star)
(7) Racing game and sports game (e.g., Mario Kart, Madden NFL, NBA 2007)
(8) Simulation (construction and management simulation, life simulation) (e.g., SimCity, SimLife)

[Exposure to Violent Video Games]

1. Have you played the following games in the past month?

--1. Almost everyday
--2. Once in several days
--3. Once in several weeks
--4. Once in several months
--5. Never

	1	2	3	4	5
(1) Fighting…… (e.g., Mortal Kombat, Street Fighter series, Super Smash Bros. Brawl)	__	__	__	__	__
(2) Shooting, Real-time Strategy…… (e.g., Warcraft series, Age of Empires series, Command and Conquer and Dune II)	__	__	__	__	__
(3) Action-adventure, Action Role-playing …… (e.g., Resident Evil series, Tomb Raider, Grand Theft Auto series)	__	__	__	__	__
(4) Adventure…… (e.g., Sonic The Hedgehog, Super Mario Bros.)	__	__	__	__	__
(5) Wresting or Boxing …… ……	__	__	__	__	__

( ) 2. Do parents/ guardians limit your time to play video games?
(1) Never play video games (2) Absolutely (3) Usually (4) Sometimes (5) Never
( ) 3. Do parents/ guardians concern about the video games that you played?
(1) Never play video games (2) Absolutely (3) Usually (4) Sometimes (5) Never

[Exposure to the Wii]

1.Have you ever play Wii? □ (1) Yes □ (2) No

( ) 2. How often do you play Wii in the last month?
(1) Never played Wii (2) many times in a day (3) a time per day (4) a time per 2-6 days
(5) a time per 7-13 days (6) a time per 14-29 days (7) a time 30 days
(8) a time more than 30 days

( ) 3. How longed do you play Wii in the last time?
(1) Never play Wii (2) less than one hour (3) 1- less than 2 hours
(4) 2-less than 3 hours (5) 3- less than 4 hours (6) more than 4 hours

4. Please pick out your three favorite Wii games from the following list.

The first favorite _____The second favorite _____The third favorite_____

（1） Adventure- the characters and sets in video games are cartoonish. The cartoon characters (e.g. Sonic The Hedgehog, Super Mario Bros.)
（2） Wresting or Boxing
（3） Shooting, Real-time Strategy, the theme of game is about war or destroying (e.g., Warcraft series, Age of Empires series, Command and Conquer and Dune II)
（4） Action-adventure, Action Role-playing (e.g., Resident Evil series, Grand Theft Auto series)
（5） Fighting (e.g., Super Smash Bros. Brawl, Mortal Kombat, Street Fighter series,)
（6） Puzzle game and music game (e.g., Guitar Hero, Rock Band and Sing Star)
（7） Racing game and sports game (e.g., Mario Kart, Madden NFL, NBA 2007)
（8） Simulation (construction and management simulation, life simulation) (e.g., SimCity, SimLife)

[Exposure to media violence]

How often have you watched the following TV shows and movies in summer vacation? Please select the one answer that you think is most close to your situation.

--1. Almost everyday
--2. Once in several days
--3. Once in several weeks
--4. Once in several months
--5. Never

	1	2	3	4	5
1. Police procedural? (e.g., CIS)……	__	__	__	__	__
2. Action drama? (e.g., Miami Vice)……	__	__	__	__	__
3. Martial art drama? (e.g., Savior of The Soul) ……	__	__	__	__	__
4. Boxing, Wresting? (e.g., WWE)……	__	__	__	__	__
5. Glove puppetry performances? (e.g., Pili series)……	__	__	__	__	__
6. Crime films? (e.g., series of Young and Dangerous)……..	__	__	__	__	__
7. Chinese martial art movies? (e.g., series of Wong Fei-hung)…….	__	__	__	__	__
8. Adventure/ Action movies? (e.g., Harry Potter, The ring) ……	__	__	__	__	__
9. Fighting Cartoon? (e.g., Packet Monsters; Dragon Balls)……..	__	__	__	__	__
10. Detective Cartoon? (e.g., Detective Conan)……	__	__	__	__	__
11. Silly Cartoon? (e.g., Tom and Jerry, Popeye)……..	__	__	__	__	__
12. Chinese martial art novels? (e.g., Jin Yong, Gu Long)……	__	__	__	__	__
13. Local traditional drama?……..	__	__	__	__	__

[Measure of trait aggressiveness]

There are five choices below describing the statement you may agree. For each statement, please select the one answer that you think is most close to your thinking.

--1. Strongly agree
--2. Slightly agree
--3. Neither in favor nor in disfavor
--4. Slightly disagree
--5. Strongly disagree

		1	2	3	4	5
1.	Some of my friends think I am a hot head.……	__	__	__	__	__
2.	If I have to resort to violence to protect my right. I will..……..	__	__	__	__	__
3.	When people are especially nice to me, I wonder what they want..…..	__	__	__	__	__
4.	I tell my friends openly when I disagree with them. ……..	__	__	__	__	__
5.	I have become so mad that I have broken things. ……...	__	__	__	__	__
6.	I can't help getting into argument when people disagree with me..…..	__	__	__	__	__
7.	I wonder why sometimes I feel so bitter about things..……..	__	__	__	__	__
8.	Once a while, I can't control the urge to strike another person. …….	__	__	__	__	__
9.	I am an even-tempered person. ……..….	__	__	__	__	__
10.	I am suspicious of overly friendly strangers. ……..	__	__	__	__	__
11.	I have threatened people I know. ……..……...	__	__	__	__	__
12.	I flare up quickly but get over it quickly. …..……..	__	__	__	__	__
13.	Given enough provocation, I may hit another person. …….	__	__	__	__	__
14.	When people annoy me, I may tell them what I think of them. ……..	__	__	__	__	__
15.	I am sometimes eaten up with jealously. …….	__	__	__	__	__
16.	I can think of no good reason for ever hitting a person. ……..	__	__	__	__	__
17.	At times I feel I have gotten a raw deal out of life. …….	__	__	__	__	__
18.	I have trouble controlling my temper. ……	__	__	__	__	__
19.	When frustrated, I let my irritation show. ……...	__	__	__	__	__
20.	I sometimes feel that people are laughing at me behind my back.…...	__	__	__	__	__
21.	I often find myself disagreeing with people. ……...	__	__	__	__	__
22.	If somebody hits me, I hit back. …….	__	__	__	__	__
23.	I sometimes feel like a powder keg, ready to explode. ……...	__	__	__	__	__
24.	Other people always seem to get the breaks. ……...	__	__	__	__	__
25.	There are people who pushed me so far that we came to blows..…….	__	__	__	__	__
26.	I know that "friends" talk about me behind my back. …….	__	__	__	__	__
27.	My friends say that I'm somewhat argumentative. …….	__	__	__	__	__
28.	Sometimes I fly off the handle for no good reason. …….	__	__	__	__	__
29.	I get into fights a little more that the average person. ……	__	__	__	__	__

[Participant's Self-rated Aggression]

In the following you can see 10 items on specific behaviors. We want to know if you had ever engaged in any of these behaviors in school or at the home during the past month. Please check the appropriate answer on any behavior that you had committed during this period. For example, if you committed the specific behavior very often, please check the box represented the "very often". If you never do that behavior, please check “never”.

--1. Almost everyday
--2. Once in several days
--3. Once in several weeks
--4. Once in several months
--5. Never

	1	2	3	4	5
1. say mean things or dirty words to other students……..……	__	__	__	__	__
2. engage in a verbal quarrel with other students……..……	__	__	__	__	__
3. tease other students……	__	__	__	__	__
4. push and shove other students……...	__	__	__	__	__
5. beat other students with objects (e.g. stick, book,)……	__	__	__	__	__
6. destroy objects of others……	__	__	__	__	__
7. Instigate other students to hurt someone……	__	__	__	__	__
8. spank or kick other students……	__	__	__	__	__
9. take things of others by force……	__	__	__	__	__
10. verbally threaten other students……	__	__	__	__	__

[Peers of Participants]

Please name three students in your class with whom you are in company most frequently in school _____ _____ _____

[Parental Punishment and Family Conflict]

In the following you can see 10 items on specific behaviors. We want you to tell us how often these events occurred between you and your family members during the past month. Please check the appropriate answer on any behavior that you had committed during this period. For example, if you committed the specific behavior very often, please check the box represented the "very often". If you never do that behavior, please check “never”.

--1. Almost everyday
--2. Once in several days
--3. Once in several weeks
--4. Once in several months
--5. Never

	1	2	3	4	5
1. be spank with hands by parent(s)/ guardian(s) ? ……	__	__	__	__	__
2. be beaten with stick or something by parent(s)/ guardian(s) ……..……	__	__	__	__	__
3. be scolded by parent(s)/ guardian(s) ……	__	__	__	__	__
4. fighting between parents/ guardians……	__	__	__	__	__
5. scolding between parents/ guardians……	__	__	__	__	__
6. beating between parents/ guardians……	__	__	__	__	__
If you have no siblings, please check “never”□					
7. be scolded by siblings……	__	__	__	__	__
8. fighting with siblings……	__	__	__	__	__
9. scolding among siblings (you did not engage in) ……	__	__	__	__	__
10. fighting among siblings (you did not engage in) ……	__	__	__	__	__

[Attitudes toward Aggression]

There are five choices below describing the statement you may agree. For each statement, please select the one answer that you think is most close to your thinking.

--1. Strongly agree
--2. Slightly agree
--3. Neither in favor nor in disfavor
--4. Slightly disagree
--5. Strongly disagree

.

	1	2	3	4	5
1. If fighting can resolve conflict among friends, it is not big deal……	__	__	__	__	__
2. In order to achieve a goal or resolve conflict, sometimes aggressive behavior is necessary……	__	__	__	__	__
3. If someone hit me first, it is acceptable to hit him back..……	__	__	__	__	__
4. If someone hurts you, he or she deserves to be hurt as well in order to pay the price. ……	__	__	__	__	__
5. No matter what the reason is, fighting with others is wrong.…….……...	__	__	__	__	__
6. Using aggression is the best way to teach a lesson to someone who offends you. ……	__	__	__	__	__
7. To teach a lesson to someone who likes to say things behind one's back, beating him will be an affective way.……	__	__	__	__	__
8. In order to be a leader in a group, it is helpful to use physical force…….	__	__	__	__	__
9. If you want disobedient children to follow your rules, using aggression is the most affective way……	__	__	__	__	__
10. If you use violence to intimidate someone, they will not disrespect you..	__	__	__	__	__

[Gender]

( ) Are you a boy or girl? (1) Boy, (2) Girl,