CHAPTER II

REVIEW OF LITERATURE

2.1 INTRODUCTION

Literature review refers to an extensive, exhaustive, and systematic examination of publications relevant to the stated research problem. The review of literature is defined as a broad, comprehensive, in depth, systematic and critical review of scholarly publications, unpublished scholarly print materials and personal communications. A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. A well-structured literature review is characterized by a logical flow of ideas; current and relevant references with consistent, appropriate referencing style; proper use of terminology; and an unbiased and comprehensive view of the previous research on the topic (Basavanthappa, 2007).

Reviewing the existing literature related to the study is a critical step in the research process. It is essential that a researcher’s work be built upon the works of others (Kaplan, 1989). The literature consists of all written sources relevant to the topic that have been selected. The three major stages of a literature review that are delineated are searching the literature, reading the literature and writing the literature review. This chapter deals the literature review related to the effects of playing violent video games.

2.2 IMPORTANCE OF LITERATURE REVIEW

The literature review is an important component of every research project for the following reasons. According to Wood & Haber (1994) the purpose of the review of literature is

(1) To determine the extent of the theory and research that has been developed in the field of study.
(2) To determine gaps, consistencies and inconsistencies in the literature about a subject, concept or problem

(3) To identify the definition of concepts and variables which have already been established in the literature and examine the research designs, methods, scales, instruments, measures, and the techniques of data analysis.

(4) To discover what is known and what remains to be learned in the field. Many times a study can be identified that can be replicated or whose findings must be compared or contrasted with the proposed research study.

(5) To become aware of difficulties experienced by others that may save time, money, and error or identify ethical issues.

(6) To determine the need for replication of a well-designed study or refinement of a study and

(7) To limit the problem

2.3 REVIEW OF LITERATURE RELATED TO VIOLENT VIDEO GAME PLAYING AND MEDIA USAGE IN CHILDREN

Ozmert, Ince, Pektas, Ozdemir, & Uckardes (2011) studied on the behavioural effects of TV viewing in 7th and 8th grade Turkish adolescents. Television viewing is associated with psychosocial health problems including stereotypical cultivation; diminished school achievements; behavioural problems especially aggression or violent behaviour and sleep disturbances. A positive correlation was observed between parent reported TV viewing durations and aggressive behaviour ($r=0.11, P=0.012$). Adolescents watching TV for more than 4 hours per day had significantly higher attention problem and aggressive behaviour. Children watching TV longer than 2 hours had a slightly higher social problem compared to those watching less. The linear regression analysis for family reported TV viewing hours
revealed significance for socio-economic status (0.019) and aggressive problem score (P0.016). Binary logistic analysis for self reported TV viewing for more than 2 hours was associated significantly with social problem score (OR 1.17 95%)

De, De Bruijn, De Weert-van Oene, & Strivers (2010) conducted a prospective study to analyze the internet and game behaviour at secondary school children. This study investigated the internet and game use of secondary school children, the compulsiveness of their use and the relationship with other health behaviours. It also evaluated the preliminary results of a recently developed school health promotion programme, implemented at a secondary school in the Netherlands in January 2008. This programme was one of the first to combine seven health behaviours in one educational programme and was a pilot project for a case-control study. A total of 475 secondary school children completed an extensive questionnaire before and a year after starting the programme. Of these children, 367 were in first, second and third grade; the grades in which the lessons about internet and game behaviour were implemented. Questionnaires contained questions about personal information, internet and game use (Compulsive Internet Use Scale), and other health behaviours (alcohol use, physical activity, psychosocial wellbeing and body mass index).

The study findings revealed that heavy internet use was significantly associated with psychosocial problems, and heavy game use was significantly associated with psychosocial problems and less physical activity. No relationship was found with alcohol use or body mass index. The time spent on internet (hours/day) and the number of pathological internet users increased during the study. The number of game user's decreased but heavy game use increased. The study concluded that there was an association between heavy internet use and psychosocial problems and between game use and psychosocial problems and less physical
activity. They further suggested that a case-control study is needed to further assess the programme-induced changes in internet and game behaviour of school children.

Mossle, Kleimann, Rehbeing, & Pfeiffer (2010) did a work at the German Criminological Research Institute of Lower Saxony to investigate how specific inappropriate media usage patterns affect academic performance in children and adolescents. The findings were paralleled by current international research indicating a negative relationship between these two variables. Based on a cross-sectional survey of 5,529 fourth grade students and a longitudinal panel study with 1,157 primary schoolchildren, a key finding was demonstrated: the more time students spend on consuming media and the more violent its contents were, the worse were their marks at school, even when controlling for vital factors such as family, educational, or immigrant background. In particular, boys who gender-specifically were better equipped with electronic media devices, who partially have extensive media usage times and who strongly prefer violent media content, were at the risk of showing poor school performance. A decrease in academic performance of boys was also observed.

A Kaiser Family Foundation survey (2010) of more than 2000, 8- to 18-year-olds revealed that children and teenagers in the United States spend an average of more than 7 hours/day with a variety of different media. By the time today's young people reach 70 years of age, they will have spent the equivalent of 7 to 10 years of their lives watching television. The survey stated that the today's children live in an electronic environment including videogame consoles and computers. Preadolescents and adolescents can download racy videos, send sexual text messages or explicit photographs to their friends, buy cigarettes and beer on the internet, and post enticing profiles on Facebook. Time spent with media often displaces involvement in creative, active, or social activities.
Devis-Devis, Peiro-Velert, Beltran-Carrillo, & Tomas (2009) examined the screen media time usage of 12-16 year-old Spanish school adolescents (N= 323) and the effects of personal and socioeconomic factors, season and type of day. The research design adopted was a cross-sectional survey, in which an interviewer-administered recall questionnaire was used. Statistical analyses included repeated measures analyses of variance, analysis of covariance and structural equation models. Results showed an average of 2.52 hours per day of total SMTU and partial times of 1.73 hours per day in TV viewing, 0.27 hours per day in computer/videogames, and 0.52 hours per day in mobile use.

Four significant predictors of SMTU emerged. Firstly, the type of school was associated with the three media of the study, particularly students from state/public school spent more time on them than their private schools counterparts. Secondly, older adolescents (14-16 years old) were more likely to use computer/videogame and mobile phone than younger adolescents. Thirdly, the more accessibility to household technology the more probable computer/videogames and mobile phone were used. Additionally, results revealed that adolescents seemed to consume more TV and computer/videogames in autumn than in winter, and more TV and mobile phones on weekends than on weekdays, especially among state school students.

Fanti, Vanman, Henrich & Avraamides (2009) in his study investigated the desensitization to violence over a short period of time. Participants watched nine violent movie scenes and nine comedy scenes, and reported whether they enjoyed the violent or comedy scenes and whether they felt sympathetic toward the victim of violence. Using latent growth modelling, analyses were carried out to investigate how participants responded to the different scenes across time. The findings of this study suggested that repeated exposure to media violence reduces the psychological impact of media violence in the short term, therefore desensitizing viewers to
media violence. As a result, viewers tended to feel less sympathetic toward the victims of violence and actually enjoy more the violence portrayed in the media. Additionally, desensitization to media violence was better represented by a curvilinear pattern, whereas desensitization to comedy scenes was better represented by a linear pattern. Finally, trait aggression was not related to the pattern of change over time, although significant effects were found for initial reports of enjoyment and sympathy.

Frolich, Lehmkuhl, & Dopfner (2009) conducted a study on Computer games in childhood and adolescence: relations to addictive behaviour, ADHD, and aggression. This overview relied on a Medline research. Its objective was to describe motivational and developmental characteristics attributed to computer games as well as the prevalence of computer game playing in children and adolescents to better understand the risks for addictive use. They especially focused on the relations of excessive computer playing with attention-deficit hyperactivity disorder (ADHD) and aggressive behaviour. The results demonstrated that children with ADHD were especially vulnerable to addictive use of computer games due to their neuropsychological profile. Moreover excessive violent computer game playing might be a significant risk variable for aggressive behaviour in the presence of personality traits with aggressive cognitions and behaviour scripts in the consumers. They concluded that the increasing clinical meaning of addictive computer games playing urgently necessitate the development of diagnostic and therapeutic tools for clinical practice as well as the cooperation with allied disciplines.

Gentile (2009) conducted a survey among children aged 8 to 18 regarding pathological video game use. Using a national sample of 1,178 children, this study gathered information about video-gaming habits and parental involvement in gaming, to determine the percentage of children who meet clinical-style criteria for pathological gaming. About 8% of video-game
players in this sample exhibited pathological patterns of play. Pathological gamers spent twice as much time playing as non-pathological gamers and received poorer grades in school; pathological gaming also showed co-morbidity with attention problems. Pathological status significantly predicted poorer school performance even after controlling for sex, age, and weekly amount of video game play.

Hastings (2009) examined the young children's video/computer game use and its relations with school performance and behaviour. This study examined the amount and content of children's video game playing in relation with behavioural and academic outcomes. Relationships among playing context, child gender, and parental monitoring were explored. Data were obtained through parent report of child's game play, behaviour, and school performance. Results revealed that time spent playing games was related positively to aggression and negatively to school competence. Violent content was correlated positively and educational content negatively with attention problems. Educational games were related to good academic achievement. Results suggested that violent games, and a large amount of game play, were related to troublesome behavioural and academic outcomes, but educational games may be related to positive outcomes. Neither gender nor parental monitoring emerged as significant moderators of these effects.

Chen, Liou, & Wu (2008) assessed the relationship between TV/computer time and adolescents' health-promoting behaviour by a secondary data analysis. They stated that television and computers provided significant benefits for learning about the world. Some studies have linked excessive television (TV) watching or computer game playing to disadvantage of health status or some unhealthy behaviour among adolescents. This study was based on secondary data analysis from part of a health promotion project in Taiyuan County, Taiwan. A cross-sectional design was used and purposive sampling was conducted
among 660 adolescents in the original project. Findings showed the mean age of the respondents was $15.0 \pm 1.7$ years. The mean numbers of TV watching hours were 2.28 and 4.07 on weekdays and weekends respectively. The mean hours of leisure (non-academic) computer use were 1.64 and 3.38 on weekdays and weekends respectively. Results indicated that adolescents spent significant time watching TV and using the computer, which was negatively associated with adopting health-promoting behaviours such as life appreciation, health responsibility, social support and exercise behaviour. Moreover, being boys, being overweight, living in a rural area, and being middle-school students were significantly associated with spending long periods watching TV and using the computer. They have suggested that primary health care providers should record the TV and non-academic computer time of youths when conducting health promotion programs, and educate parents on how to become good and healthy electronic media users.

Bayraktar & Gun (2007) studied on the incidence and correlates of internet usage among adolescents in North Cyprus. A total of 686 adolescents (mean age of 14.4 years, range of 12-17 years) were recruited from elementary and high schools. Results showed that the internet was used primarily by male students. Adolescents used the internet generally for entertainment and communication. The quality of chat on the internet was studied, and it was found that adolescents generally introduce themselves differently while chatting. Also, the type of games on the internet and the correlation between playing these games and aggression was studied in this research. It was found that mostly violent games were played on the internet and playing these games was related to anti-social aggression and aggression toward the self. Research findings indicated that 1.1% of the students who used the internet were pathological internet users. These pathological internet users visited significantly more chat sites, mp3 sites, pornographic sites, and shopping sites than other users. Also, it was found
that students' grade point average (GPA) decreased when pathological internet usage increased.

Brady (2007) did a study on young adults' media use and attitudes toward interpersonal and institutional forms of aggression. Links between media violence exposure and favourable attitudes toward interpersonal violence were well established. In this study, undergraduate students ($N=319$) aged 18–20 years (56% male) completed a survey assessing media use (number of hours per week spent playing videogames, watching movies/TV shows, watching TV sports) and attitudes toward interpersonal violence, punitive criminal justice policies, and different types of military activities (preparedness/defence and aggressive intervention). Greater number of hours spent watching TV contact sports was associated with more favourable attitudes toward military preparedness/defence, aggressive military intervention, and punitive criminal justice policies among men independently of parental education, lifetime violence exposure within the home and community, aggressive personality, and constrained problem solving style. Greater number of hours spent watching violent movies/TV was associated with more favourable attitudes toward military preparedness/defence among men and with more favourable attitudes toward interpersonal violence and punitive criminal justice policies among women, but these associations became non-significant when adjusting for covariates.

Cummings & Vandewater (2007) studied the relation of adolescent video game playing to time spent in other activities. The objective of the study was to examine the notion that playing video games is negatively related to the time adolescents spend in more developmentally appropriate activities. A non-experimental study design was used and survey data collected from a nationally representative sample of 1491 children aged 10 to 19 years. Twenty-four-hour time-use diaries were collected on 1 weekday and 1 weekend day,
both randomly chosen. Time-use diaries were used to determine adolescents' time spent playing video games, with parents and friends, reading and doing homework, and in sports and active leisure. The differences in time spent between game players and non-players as well as the magnitude of the relationships among game time and activity time among adolescent game players were assessed. Thirty-six percent of adolescents (80% of boys and 20% of girls) played video games. On average, gamers played for an hour on the weekdays and an hour and a half on the weekends. Compared with non-gamers, adolescent gamers spent 30% less time reading and 34% less time doing homework. Among gamers, time spent playing video games without parents or friends were negatively related to time spent with parents and friends in other activities. The study concluded that although gamers and non-gamers did not differ in the amount of time they spent interacting with family and friends, concerns regarding gamers' neglect of school responsibilities are warranted. Although only a small percentage of girls played video games, the findings suggested that playing video games may have different social implications for girls than for boys.

Lampert, Sygusch & Schlack (2007) studied the use of electronic media in adolescence. The data from the German Health Interview and Examination Survey for Children and Adolescents, which were evaluated with a focus on 11-17-year-olds, confirmed the heavy use of electronic media. However, there were distinct group-specific differences. For example, boys spent more time than girls on computers, the internet and games consoles, whereas girls more often listen to music and use their mobile phones. Watching television and videos was equally popular among girls and boys. Adolescents of low social status or a low level of school education used electronic media far more frequently and for longer times, especially television and video, games consoles and mobile phones. A connection to physical activity has been established for adolescents who spent more than five hours a day using electronic
media. Moreover, this group of heavy users was more often affected by adiposity. The results of this study, which were in line with earlier research findings, thus demonstrated that the use of electronic media was also of relevance from the point of view of public health and should be included in investigations into the health of children and adolescents.

Olson, et al., (2007) studied on the factors correlated with violent video game use by adolescent boys and girls. The purpose of the study was to compare the video and computer game play patterns of young adolescent boys and girls, including factors correlated with playing violent games. Data was collected from children in grades 7 and 8 at two demographically diverse schools in Pennsylvania and South Carolina, using a detailed written self-reported survey. Of 1254 participants (53% female, 47% male), only 80 reported playing no electronic games in the previous 6 months. Of 1126 children who listed frequently played game titles, almost half (48.8%) played at least one violent (mature-rated) game regularly (67.9% of boys and 29.2% of girls). One third of boys and 10.7% of girls played games nearly every day; only 1 in 20 plays often or always with a parent. Playing M-rated games was positively correlated (p < .001) with being male, frequent game play, playing with strangers over the internet, having a game system and computer in one's bedroom, and using games to manage anger. They concluded that most young adolescent boys and many girls routinely play M-rated games. They stressed the need for identifying atypical and potentially harmful patterns of electronic game use, as well as the need for greater media literacy among parents.

Marshall, Gorely & Biddle (2006) conducted a review and critique of descriptive epidemiology of screen-based media use in youth. The purpose of this systematic review was to (i) estimate the prevalence and dose of television (TV) viewing, video game playing and computer use, and (ii) assess age-related and (iii) secular trends in TV viewing among youth
Ninety studies published in English language journals between 1949 and 2004 were included, presenting data from 539 independent samples (the unit of analysis). Results suggested that contemporary youth watched on average 1.8-2.8 hours of TV per day, depending on age and gender. Most of them (66%) were "low users" (< 2 hours/day) of TV but 28% watch more than 4 hours/day. Boys and girls with access to video games spend approximately 60 and 23 min/day respectively. Computer use accounts for an additional 30 min/day. Data suggested that "high users" of TV/computer at young ages are likely to remain high users when older.

Bercedo Sanz, et al., (2005) assessed the mass media consumption in adolescence. The objective of the study was to describe mass media use in teenagers (television, mobile phones, computers, Internet and video games) and to analyze its influence on teenagers' health and development. A cross sectional study by means of a survey of 884 teenagers aged between 14 and 18 years old who were in the third and fourth years of high school in six towns in Cantabria (Spain) was studied. The statistical analysis consisted of uni and bivariant descriptive statistics. The study results showed that all the teenagers had a television set at home and 24 % of families had four or more television sets. The presence of distinct mass media in teenagers' rooms was 52.5 % for televisions, 57.8 % for computers, 52 % for the internet and 38.7 % for game consoles. Teenagers watched television for an average of 3 hours per day on weekdays and 3.2 hours per day at weekends. They played game consoles for an average of 0.69 hours per day on weekdays (41 min) and an average of 1.09 hours per day (65 min) at weekends and used the internet on weekdays for an average of 0.83 hours per day (49 min) and an average of 1.15 hours per day (69 min) at weekends. A total of 87.2 % of the teenagers, especially girls, had a mobile phone (91.6 % of girls versus 82.4 % of boys; p < 0.001). The average age at which teenagers had the first mobile phone
was 13 years old. Most (82.1%) of them surfed the net but boys preferred surfing and downloading games and girls preferred chatting and sending e-mails. Nearly two-thirds of teenagers (71.5%) had a video console, especially boys (87% of boys versus 57.2% of girls; p < 0.001) and they started playing with them at an average age of 8.8 years. Boys preferred video games with shooting, fights, sports and driving, while girls preferred adventure video games. Nearly a quarter (22.2%) spent money on video games and with no significant differences between sexes. Thus the study concluded that the society as a whole and especially health professionals should provide health education on mass media consumption, by stimulating reasonable use of mass media and teaching teenagers to be critical. Parents should set a limit of less than 2 hours/day to the use of mass media and should avoid their presence in teenagers' bedrooms. Parents should supervise and educate teenagers about video games, internet access and e-mail usage in adolescence.

**Myths about playing violent video games (Anderson, 2003)**

**Myth 1:** Violent video game research has yielded very mixed results.

**Facts:** Some studies have yielded non-significant video game effects, just as some smoking studies failed to find a significant link to lung cancer. But when one combines all relevant empirical studies using meta-analytic techniques, five separate effects emerge with considerable consistency. Violent video games are significantly associated with: increased aggressive behaviour, thoughts, and affect; increased physiological arousal; and decreased pro-social (helping) behaviour.

**Myth 2:** The studies that find significant effects are the weakest methodologically.

**Facts:** Methodologically stronger studies have yielded the largest effects. Thus, earlier effect size estimates based on all video game studies probably underestimate the actual effect sizes.
**Myth 3:** Laboratory experiments are irrelevant (trivial measures, demand characteristics, lack external validity).

**Facts:** Arguments against laboratory experiments in behavioural sciences have been successfully debunked many times by numerous researchers over the years. Specific examinations of such issues in the aggression domain have consistently found evidence of high external validity. For example, variables known to influence real world aggression and violence have the same effects on laboratory measures of aggression.

**Myth 4:** Field experiments are irrelevant (aggression measures based either on direct imitation of video game behaviours e.g., karate kicks) or are normal play behaviours.

**Facts:** Some field experiments have used behaviours such as biting, pinching, hitting, pushing, and pulling hair, behaviours that were not modelled in the game. The fact that these aggressive behaviours occur in natural environments does not make them "normal" play behaviour, but it does increase the face validity (and some would argue the external validity) of the measures.

**Myth 5:** Co-relational studies are irrelevant.

**Facts:** The overly simplistic mantra, "Correlation is not causation," is useful when teaching introductory students the risks in too-readily drawing causal conclusions from a simple empirical correlation between two measured variables. However, co-relational studies are routinely used in modern science to test theories that are inherently causal. Whole scientific fields are based on co-relational data (e.g., astronomy). Well conducted co-relational studies provide opportunities for theory falsification. They allow examination of serious acts of aggression that would be unethical to study in experimental contexts. They allow for statistical controls of plausible alternative explanations.
**Myth 6:** There are no studies linking violent video game play to serious aggression.

**Facts:** High levels of violent video game exposure have been linked to delinquency, fighting at school and during free play periods, and violent criminal behaviour (e.g., self-reported assault, robbery).

**Myth 7:** Violent video games affect only a small fraction of players.

**Facts:** Though there are good theoretical reasons to expect some populations to be more susceptible to violent video game effects than others, the research literature has not yet substantiated this. There is some evidence that highly aggressive individuals are more affected than nonaggressive individuals, but this finding does not consistently occur. Even nonaggressive individuals are consistently affected by brief exposures. Further research will likely find some significant moderators of violent video game effects, because the much larger research literature on television violence has found such effects and the underlying processes are the same. However, even that larger literature has not identified a sizeable population that is totally immune to negative effects of media violence.

**Myth 8:** Unrealistic video game violence is completely safe for adolescents and older youths.

**Facts:** Cartoonish and fantasy violence is often perceived (incorrectly) by parents and public policy makers as safe even for children. However, experimental studies with college students have consistently found increased aggression after exposure to clearly unrealistic and fantasy violent video games. Indeed, at least one recent study found significant increases in aggression by college students after playing E-rated (suitable for everyone) violent video games.

**Myth 9:** The effects of violent video games are trivially small.

**Facts:** Meta-analyses reveal that violent video game effect sizes are larger than the effect of second hand tobacco smoke on lung cancer, the effect of lead exposure to I.Q. scores in
children, and calcium intake on bone mass. Furthermore, the fact that so many youths are exposed to such high levels of video game violence further increases the societal costs of this risk factor.

**Myth 10:** Arousal, not violent content, accounts for video game induced increases in aggression.

**Facts:** Arousal cannot explain the results of most co-relational studies because the measured aggression did not occur immediately after the violent video games were played. Furthermore, several experimental studies have controlled potential arousal effects, and still yielded more aggression by those who played the violent game.

**Myth 11:** If violent video games cause increases in aggression, violent crime rates in the U.S. would be increasing instead of decreasing.

**Facts:** Three assumptions must all be true for this myth to be valid: (a) exposure to violent media (including video games) is increasing; (b) youth violent crime rates are decreasing; (c) video game violence is the only (or the primary) factor contributing to societal violence. The first assumption is probably true. The second is not true, as reported by the 2001 Report of the Surgeon General on Youth Violence. The third is clearly untrue. Media violence is only one of many factors that contribute to societal violence and is certainly not the most important one. Media violence researchers have repeatedly noted this.

2.4 REVIEW OF LITERATURE RELATED TO PSYCHOLOGICAL EFFECT OF PLAYING VIOLENT VIDEO GAME

Ferguson (2011) in their prospective analysis in adolescents reported on videogames and youth violence. They said that the potential influence of violent video games on youth violence remains an issue of concern for psychologists, policymakers and the general public. Although several prospective studies of video game violence effects have been conducted,
none have employed well validated measures of youth violence, nor considered video game violence effects in context with other influences on youth violence such as family environment, peer delinquency, and depressive symptoms. This study was built upon previous research in a sample of 302 (52.3% female) mostly Hispanic youth. Results indicated that current levels of depressive symptoms were a strong predictor of serious aggression and violence across most outcome measures. Depressive symptoms also interacted with antisocial traits so that antisocial individuals with depressive symptoms were most inclined toward youth violence.

Allahverdipour, Bazargan, Farhadinabhas & Moeini (2010) analyzed the correlates of video games playing among adolescents in an Islamic country. This study described patterns and correlates of excessive video game use in a random sample of middle-school students in Iran. Specifically, they examined the relationship between video game playing and psychological well-being, aggressive behaviours, and adolescents' perceived threat of video-computer game playing. A cross-sectional study was performed with a random sample of 444 adolescents recruited from eight middle schools. A self-administered, anonymous questionnaire covered socio-demographics, video gaming behaviours, mental health status, self-reported aggressive behaviours, and perceived side effects of video game playing. The results revealed that the participants spent an average of 6.3 hours per week playing video games. Moreover, 47% of participants reported that they had played one or more intensely violent games. Both non-gamers and excessive gamers overall reported suffering poorer mental health compared to low or moderate players. Participants who initiated gaming at younger ages were more likely to score poorer in mental health measures. Participants' self-reported aggressive behaviours were associated with length of gaming. Boys, but not girls, who reported playing video games excessively showed more aggressive behaviours. A multiple binary logistic regression
shows that when controlling for other variables, older students, those who perceived less serious side effects of video gaming, and those who have personal computers, were more likely to report that they had played video games excessively. The study concluded that there was a curvilinear relationship between video game playing and mental health outcomes, with "moderate" gamers faring best and "excessive" gamers showing mild increases in problematic behaviours. Educational interventions should also be designed to educate adolescents and their parents of the possible harmful impact of excessive video game playing on their health and psychosocial functioning.

Anderson, C.A. (2010) did a meta-analytic review on violent video game effects on aggression, empathy, and pro-social behaviour in eastern and western countries. In this, meta-analytic procedures were used to test the effects of violent video games on aggressive behaviour, aggressive cognition, aggressive affect, physiological arousal, empathy/desensitization, and pro-social behaviour. Unique features of this meta-analytic review include (a) more restrictive methodological quality inclusion criteria than in past meta-analyses; (b) cross-cultural comparisons; (c) longitudinal studies for all outcomes except physiological arousal; (d) conservative statistical controls; (e) multiple moderator analyses; and (f) sensitivity analyses. Social-cognitive models and cultural differences between Japan and Western countries were used to generate theory-based predictions. Meta-analyses yielded significant effects for all 6 outcome variables. The pattern of results for different outcomes and research designs (experimental, cross-sectional, longitudinal) fit theoretical predictions well. The evidence strongly suggests that exposure to violent video games is a causal risk factor for increased aggressive behaviour, aggressive cognition, and aggressive affect and for decreased empathy and pro-social behaviour. Moderator analyses revealed significant research design effects, weak evidence of cultural differences in
susceptibility and type of measurement effects, and no evidence of sex differences in susceptibility. Results of various sensitivity analyses revealed these effects to be robust, with little evidence of selection (publication) bias.

Huesmann (2010) commented on the work of Anderson et al. (2010). He stated that over the past half century the mass media, including video games, have become important socialisers of children. Observational learning theory has evolved into social-cognitive information processing models that explain that what a child observes in any venue has both short-term and long-term influences on the child's behaviours and cognitions.

Anderson, et al., (2010) in their extensive meta-analysis of the effects of violent video games confirms what these theories predict and what prior research about other violent mass media has found that violent video games stimulate aggression in the players in the short run and increase the risk for aggressive behaviours by the players later in life. The effects occur for males and females and for children growing up in Eastern or Western cultures.

Bluemke, Friedrich & Zumbach (2010) examined the influence of violent and nonviolent computer games on implicit measures of aggressiveness. They examined the causal relationship between playing violent video games and increases in aggressiveness by using implicit measures of aggressiveness. Ninety-six adults were randomly assigned to play one of three versions of a computer game that differed only with regard to game content (violent, peaceful, or abstract game), or to work on a reading task. In the games the environmental context, mouse gestures, and physiological arousal-as indicated by heart rate and skin conductance-were kept constant. In the violent game soldiers had to be shot, in the peaceful game sunflowers had to be watered, and the abstract game simply required clicking coloured triangles. Five minutes of play did not alter trait aggressiveness, yet an Implicit Association
Test detected a change in implicit aggressive self-concept. Playing a violent game produced a significant increase in implicit aggressive self-concept relative to playing a peaceful game. The well-controlled study closes a gap in the research on the causality of the link between violence exposure in computer games and aggressiveness with specific regard to implicit measures. They discussed the significance of importing recent social-cognitive theory into aggression research and stress the need for further development of aggression-related implicit measures.

Bushman & Gibson (2010) in their study on violent video game tested that if ruminating about the game would extend the games' effect. Results showed that at least for men, ruminating about the game can increase the potency of the game's tendency to lead to aggression long after the game has been turned off. The researchers randomly assigned college students to play one of six different video games for 20 minutes. Half the games were violent (e.g., Mortal Combat) and half were non violent (e.g., Guitar Hero). To test if ruminating about the game would extend the games' effect, half of the players were told over "the next 24 hours, think about your play of the game, and try to identify ways your game play could improve when you play again."

Bushman and Gibson had the participants return the next day to test their aggressiveness. For men who didn't think about the game, the violent video game players tested no more aggressive than men who had played non-violent games. But the violent video game playing men who thought about the game in the interim were more aggressive than the other groups. The researchers also found that women who played the violent video games and thought about the games did not experience increased aggression 24 hours later.

This study was the first laboratory experiment to show that violent video games can stimulate aggression for an extended period of time. The researchers noted that it was "reasonable to
assume that the lab results will generalize to the 'real world.' Violent gamers usually play longer than 20 minutes, and probably ruminate about their game play in a habitual manner."

Coyne, Padilla-Walker, Stockdale & Day (2010) studied on associations between co-playing and adolescent behavioural and family outcomes in girls. They said that video game use has been associated with several behavioural and health outcomes for adolescents. The aim of the study was to assess the relationship between parental co-play of video games and behavioural and family outcomes. Participants consisted of 287 adolescents and their parents who completed a number of video game, behavioural, and family related questionnaires as part of a wider study. Most constructs included child, mother, and father reports. The results showed that at the bivariate level, time spent playing video games was associated with several negative outcomes, including heightened internalizing and aggressive behaviour and lowered pro-social behaviour. However, co-playing video games with parents was associated with decreased levels of internalizing and aggressive behaviours, and heightened pro-social behaviour for girls only. Co-playing video games was also marginally related to parent–child connectedness for girls, even after controlling for age-inappropriate games played with parents. This was the first study to show positive associations for co-playing video games between girls and their parents.

Lemmens, Valkenburg & Peter (2010) studied on the effects of pathological gaming on aggressive behaviour. The aim for this study was to longitudinally examine if pathological gaming leads to increasingly excessive gaming habits, and how pathological gaming may cause an increase in physical aggression. For this purpose, they conducted a two-wave panel study among 851 Dutch adolescents (49% female) of which 540 played games (30% female). Analyses indicated that higher levels of pathological gaming predicted an increase in time spent playing games 6 months later. Time spent playing violent games specifically, and not
just games per se, increased physical aggression. Furthermore, higher levels of pathological gaming, regardless of violent content, predicted an increase in physical aggression among boys. That this effect only applies to boys does not diminish its importance, because adolescent boys are generally the heaviest players of violent games and most susceptible to pathological involvement.

Anderson, et al., (2009) did a study on longitudinal effects of violent video games on aggression in Japan and the United States. They tested whether high exposure to violent video games increases physical aggression over time in both high- (United States) and low- (Japan) violence cultures. They hypothesized that the amount of exposure to violent video games early in a school year would predict changes in physical aggressiveness assessed later in the school year, even after statistically controlling for gender and previous physical aggressiveness. In three independent samples, participants' video game habits and physically aggressive behaviour tendencies were assessed at 2 points in time, separated by 3 to 6 months. One sample consisted of 181 Japanese junior high students ranging in age from 12 to 15 years. A second Japanese sample consisted of 1050 students ranging in age from 13 to 18 years. The third sample consisted of 364 United States 3rd-, 4th-, and 5th-graders ranging in age from 9 to 12 years. Results revealed that habitual violent video game play early in the school year predicted later aggression, even after controlling for gender and previous aggressiveness in each sample. Those who played a lot of violent video games became relatively more physically aggressive. Multi sample structure equation modelling revealed that this longitudinal effect was of a similar magnitude in the United States and Japan for similar-aged youth and was smaller (but still significant) in the sample that included older youth. They concluded that these longitudinal results confirm earlier experimental and cross-sectional studies that had suggested that playing violent video games is a significant risk
factor for later physically aggressive behaviour and that this violent video game effect on youth generalizes across very different cultures. As a whole, the research strongly suggests reducing the exposure of youth to this risk factor.

Moljord, Moksnes, Eriksen & Espnes (2010) conducted a cross-sectional study to investigate associations between physical activity, stress, and happiness, as well as possible sex and age differences on these variables in a survey of 1,508 adolescent pupils (13 to 18 years) in middle Norway. Adolescents who reported they participated in physical activity 2 to 3 times per week or more scored significantly lower on stress and higher on happiness than those who participated in physical activity 1 day per week or less. There was no significant difference on stress and happiness between those being physically active 2 or 3 times a week and those being active almost every day. There was no sex difference in physical activity frequency. Girls had higher mean scores on stress, and boys scored higher on happiness. Adolescents 15 to 16 years old showed higher stress scores than those 17 to 18 years old, but there were no significant differences between the different age groups when looking at happiness and physical activity. A statistically significant two-way interaction of sex by age was found on both stress and happiness.

Barlett & Rodeheffer (2009) examined the effects of realism on extended violent and nonviolent video game play on aggressive thoughts, feelings, and physiological arousal. Previous research has shown that playing violent video game exposure can increase aggressive thoughts, aggressive feelings, and physiological arousal. This study compared the effects that playing a realistic violent, unrealistic violent, or nonviolent video game for 45 minutes has on such variables. For the purpose of this study, realism was defined as the probability of seeing an event in real life. Participants (N=74; 39 male, 35 female) played either a realistic violent, unrealistic violent, or nonviolent video game for 45 minutes.
Aggressive thoughts and aggressive feelings were measured four times (every 15 minutes), whereas arousal was measured continuously. The results showed that, though playing any violent game stimulated aggressive thoughts, playing a more realistic violent game stimulated significantly more aggressive feelings and arousal over the course of play.

Bushman & Anderson (2009) wrote on comfortably numb: desensitizing effects of violent media on helping others. It was based on two studies which tested the hypothesis that exposure to violent media reduces aid offered to people in pain. In study 1, participants played a violent or nonviolent video game for 20 minutes. After game play, while completing a lengthy questionnaire, they heard a loud fight, in which one person was injured, outside the lab. Participants who played violent games took longer to help the injured victim, rated the fight as less serious, and were less likely to "hear" the fight in comparison to participants who played nonviolent games. In Study 2, violent- and nonviolent-movie attendees witnessed a young woman with an injured ankle struggle to pick up her crutches outside the theatre either before or after the movie. Participants who had just watched a violent movie took longer to help than participants in the other three conditions. The findings from both studies suggest that violent media make people numb to the pain and suffering of others.

Gentile, et al., (2009) in their article on the effects of pro-social video games on pro-social behaviours: international evidence from co-relational, longitudinal, and experimental studies reported the following.

Study 1 was a cross-sectional co-relational study of video game habits and pro-social behaviours with Singaporean secondary school children. They hypothesized a positive association between amount of time spent playing pro-social video games and the amount of pro-social behaviour, even when controlling for other factors related to pro-social behaviour. They surveyed 727 Singaporean secondary school children (N = 446 S1--7th grade equivalent;
They measured both video game habits and pro-social behaviours. Each pro-social behaviour or trait was regressed onto pro-social game exposure after controlling for sex, age, violent game exposure, and weekly amount of time spent playing video games. As predicted, pro-social game exposure was positively related to pro-social behaviours and traits after controlling for total amount of gaming, violent game exposure, sex, and age. The standardized regression coefficients were: $\beta = .49 \ (p < .001)$ for helping behaviour, $\beta = .18 \ (p < .001)$ for cooperation and sharing, $\beta = .48 \ (p < .001)$ for empathy and $\beta = .19 \ (p < .06)$ for emotional awareness. In contrast, the opposite effects were found for violent game exposure. Violent game play was negatively related to the pro-social behaviours and traits. Although pro-social and violent game exposure was highly correlated, most likely because of the way they were measured, multi-collinearity did not unduly influence the regression coefficients (i.e., variance inflation factors were less than 10). After controlling for the four theoretically relevant predictor variables, pro-social game exposure was negatively related to both aggressive cognition variables (approval of aggression $\beta = -.28, \ p < .01$, hostile attribution bias $\beta = -.32, \ p < .001$). Violent game exposure was positively related to both, also as expected (approval of aggression $\beta = .26, \ p < .01$, hostile attribution bias $\beta = .34, \ p < .01$).

In study 2, they more directly tested the hypothesis that habitual playing of pro-social video games would increase pro-social behaviour assessed months later. In each of two separate samples, Japanese children's video game habits and pro-social behaviours were assessed twice with a three to four month time span between the two assessments. Structural equation analyses were conducted simultaneously on the two correlation matrices from these samples. They hypothesized that exposure to pro-social video games would predict subsequent pro-social behaviour. Sample 1 consisted of 780 5th graders (384 boys, 396 girls, mean age 10.9, $SD = .31$). Sample 2 consisted of 1050 8th and 11th graders (540 boys, 510 girls; $Ms = 13.6$ &
16.6, $SDs = 0.48$ & $0.50$ years). As predicted, the causal path from amount of pro-social game playing at time 1 to amount of pro-social behaviour at time 2 (3-4 months later) was significant. In addition, the causal path from pro-social behaviour at time 1 to pro-social gaming at time 2 was significant. Thus, there was a bi-directional relationship between pro-social gaming and pro-social behaviour. This pattern of findings supports an “upward spiral” of pro-social gaming and behaviour, in contrast to the “downward spiral” involving violent video gaming and aggression. Study 2 provides additional (and stronger) evidence for a causal long-term relation between pro-social game play and pro-social behaviour.

Study 3 used an experiment designed to test the short-term causal hypothesis that playing pro-social video games would increase pro-social behaviour in the immediate situation, whereas playing matched violent games would increase aggressive behaviour. Neutral video games were also included in the design as a control. To increase generalizability, two games of each type were used; all were rated E (appropriate for everyone) by the Entertainment Software Ratings Board. After playing one type of video game for 20 minutes, participants completed a task where they could either help or harm another participant. Pro-social games were expected to increase helpful, pro-social behaviour, whereas violent games were expected to increase unhelpful, aggressive behaviour. Participants were 161 college students (64 men, 95 women, 1 unidentified; mean age = 19.2 years, $SD = 1.8$) who received course credit in exchange for their voluntary participation.

A planned contrast revealed that those who had just played a pro-social game were significantly more helpful than those who had not played a pro-social game, $F (1, 155) = 8.94$, $p < .005$, $d = 0.48$. More specific comparisons found that participants who played a pro-social game helped their partners significantly more than either those who had played a violent game, $F(1, 155) = 9.91$, $p < .005$, $d = 0.63$, or those who had played a neutral game, $F (1,
The latter two groups did not differ, $F(1, 155) = 1.45, p < .25, d = 0.24$. Also as expected, participants who had played a violent game were significantly more hurtful than those who had played any of the other games, $F(1, 155) = 8.35, p < .005, d = 0.46$. More specific comparisons found that the violent gamers hurt their partners significantly more than either those who had played a pro-social game, $F(1, 155) = 8.93, p < .005, d = 0.59$, or those who had played a neutral game, $F(1, 155) = 4.23, p < .05, d = 0.41$. The latter two groups did not differ, $F(1, 155) = 0.91, p < .40, d = 0.19$. The amount of violent content in the assigned game was positively related to hurting behaviour towards the partner, $F(1, 155) = 6.25, p < .02, b = .41, r = .20$. Amount of pro-social content in the assigned game was negatively (but not significantly) related to hurting behaviour, $F(1, 155) = 1.93, p < .20, b = - .24, r = -.11$.

The results from study 3 showed that playing video games with pro-social content causes people to be more helpful after playing. In contrast, playing games with violent content causes people to be less helpful and more hurtful after the game is turned off. The experimental effects of violent content replicate prior work as shown in early and recent (Anderson et al, under review) meta-analyses. However, the positive effect of pro-social content on helping behaviour in an experimental setting is unique in the video game research domain. They concluded that video games are not inherently good or bad, just as any tool is not inherently good or bad. Video games can have both positive and negative effects. Content matters, and games are excellent teachers. Violent content in video games can lead people to behave more aggressively. Pro-social content, in contrast, can lead people to behave in a more cooperative and helpful manner.
Arriaga, Esteves, Carneiro & Monteiro (2008) conducted a study to find the answer for the research question: Are the effects of unreal violent video games pronounced when playing with a virtual reality system? This study was conducted to analyze the short-term effects of violent electronic games, played with or without a virtual reality (VR) device, on the instigation of aggressive behaviour. Physiological arousal (heart rate (HR)), priming of aggressive thoughts, and state hostility were also measured to test their possible mediation on the relationship between playing the violent game (VG) and aggression. The participants, 148 undergraduate students were randomly assigned to four treatment conditions: two groups played a violent computer game (Unreal Tournament), and the other two a non-violent game (Motocross Madness), half with a VR device and the remaining participants on the computer screen. In order to assess the game effects the following instruments were used: a BIOPAC System MP100 to measure HR, an Emotional Strop task to analyze the priming of aggressive and fear thoughts, a self-report State Hostility Scale to measure hostility, and a competitive reaction-time task to assess aggressive behaviour. The main results indicated that the violent computer game had effects on state hostility and aggression. Although no significant mediation effect could be detected, regression analyses showed an indirect effect of state hostility between playing a video game and aggression.

Becker-Blease, Finkelhor & Turner (2008) examined reactions to 3 news events (September 11 terrorist attacks, Summer 2002 kidnappings, and Fall 2002 sniper shootings) in a national, representative sample of children aged 2 to 17. Media exposure was related to increased worry and changes in activities, with September 11 creating the most concern and shootings the least. More signs of stress were apparent among 10 to 13 year olds, minority children and those of low socioeconomic status.
Polman, Castro & Van Aken (2008) conducted an experimental study of the differential effects of playing versus watching violent video games on children's aggressive behaviour. There is great concern about the effects of playing violent video games on aggressive behaviour. The present experimental study aimed at investigating the differential effects of actively playing vs. passively watching the same violent video game on subsequent aggressive behaviour. Fifty-seven children aged 10-13 either played a violent video game (active violent condition), watched the same violent video game (passive violent condition), or played a non-violent video game (active non-violent condition). Aggression was measured through peer nominations of real-life aggressive incidents during a free play session at school. After the active participation of actually playing the violent video game, boys behaved more aggressively than did the boys in the passive game condition. For girls, game condition was not related to aggression. These findings indicate that, specifically for boys, playing a violent video game should lead to more aggression than watching television violence.

Grusser, Thalemann & Griffiths (2007) studied on excessive computer game playing: evidence for addiction and aggression. The aim of the present study was the investigation of the addictive potential of gaming as well as the relationship between excessive gaming and aggressive attitudes and behaviour. A sample comprising of 7069 gamers answered two questionnaires online. Data revealed that 11.9% of participants (840 gamers) fulfilled diagnostic criteria of addiction concerning their gaming behaviour, while there was only weak evidence for the assumption that aggressive behaviour was interrelated with excessive gaming in general. Results of this study contribute to the assumption that also playing games without monetary reward meets criteria of addiction. Hence, an addictive potential of gaming should be taken into consideration regarding prevention and intervention.
Lemmens, Bushman & Konijn (2007) conducted a study on the appeal of violent video games to lower educated aggressive adolescent boys from two countries. The objective of this study was to test the effect of individual differences on appeal and use of video games. Participants were 299 adolescent boys from lower and higher secondary schools in the Netherlands and Belgium. In general, boys were most attracted to violent video games. Boys who scored higher in trait aggressiveness and lower in empathy were especially attracted to violent games and spent more time playing video games than did boys lower in trait aggressiveness. Lower educated boys showed more appreciation for both violent and nonviolent games and spent more time playing them than did higher educated boys. The present study showed that aggressive and less empathic boys were most attracted to violent games. The fact that heavy users of violent games show less empathy and higher aggressiveness suggests the possibility of desensitization. Other studies have shown that playing violent games increases aggressiveness and decreases empathy. These results combined suggest the possibility of a violence cycle. Aggressive individuals are attracted to violent games. Playing violent games increases aggressiveness and decreases empathy, which in turn leads to increased appreciation and use of violent games.

Barlett, Harris & Baldassaro (2007) investigated the effects of video game play on aggression. Using the General Aggression Model, as applied to video games by Anderson and Bushman, [2002] this study measured physiological arousal, state hostility, and how aggressively participants would respond to three hypothetical scenarios. Results showed a significant increase from baseline in hostility and aggression (based on two of the three story stems), which is consistent with the General Aggression Model. This study adds to the existing literature on video games and aggression by showing that increased play of a violent first person shooter video game can significantly increase aggression from baseline.
Bushman & Huesmann (2006) did a meta-analysis on short-term and long-term effects of violent media on aggression in children and adults. The objective of the study was to test whether the results of the accumulated studies on media violence and aggressive behaviour are consistent with the theories that have evolved to explain the effects. They tested for the existence of both short-term and long-term effects for aggressive behaviour. They also tested the theory-driven hypothesis that short-term effects should be greater for adults and long-term effects should be greater for children. Children younger than 18 years and adults were the participants. Violent media, including TV, movies, video games, music, and comic books were taken as the main exposures. Measures of aggressive behaviour, aggressive thoughts, angry feelings, physiological arousal (e.g., heart rate, blood pressure), and helping behaviour were measured. Effect size estimates were combined using meta-analytic procedures. As expected, the short-term effects of violent media were greater for adults than for children whereas the long-term effects were greater for children than for adults. The results also showed that there were overall modest but significant effect sizes for exposure to media violence on aggressive behaviours, aggressive thoughts, angry feelings, arousal levels, and helping behaviour.

They have concluded that results are consistent with the theory that short-term effects are mostly due to the priming of existing well-encoded scripts, schemas, or beliefs, which adults have had more time to encode. In contrast, long-term effects require the learning (encoding) of scripts, schemas, or beliefs. Children can encode new scripts, schemas, and beliefs via observational learning with less interference and effort than adults.

Gentile, Lynch, Linder & Walsh (2006) studied on the effects of violent video game habits on adolescent hostility, aggressive behaviours, and school performance. The first goal of this study was to document the video games habits of adolescents and the level of parental
monitoring of adolescent video game use. The second goal was to examine associations among violent video game exposure, hostility, arguments with teachers, school grades, and physical fights. In addition, path analyses were conducted to test mediational pathways from video game habits to outcomes. Six hundred and seven 8th- and 9th-grade students from four schools participated. Adolescents who expose themselves to greater amounts of video game violence were more hostile, reported getting into arguments with teachers more frequently, were more likely to be involved in physical fights, and performed more poorly in school. Mediational pathways were found such that hostility mediated the relationship between violent video game exposure and outcomes. Results are interpreted within and support the framework of the General Aggression Model.

Arriaga, Esteves, Carneiro, & Monteiro (2006) did an experimental study to investigate the impact of violent computer games on state hostility, state anxiety and arousal. Participants were undergraduate students, aged from 18 to 21 years old. Before the experimental sessions, participants filled in self-report measures concerning their video game habits and were also pre-tested for aggressiveness and trait anxiety. Physiological responses (heart rate and skin conductance) were measured during the experiment. After playing, information about state hostility and state anxiety was collected. The results showed that participants who played the violent game reported significantly higher state hostility and support the assumption that an aggressive personality moderates the effect of playing a violent game on state hostility.

Shekhar, Shekhar & Nazar (2006) conducted a study among adolescents in Tirunelveli to examine whether there was any significant relationship between frequency of exposure to violent video games and aggression. This study involved 45 adolescents between 14 and 17 years of age randomly from Tirunelveli city from private schools who answered positively to the screening question on the use of video games as a hobby and played an average of five
hours of video games a week. The correlation between frequency of exposure to video games and aggression was found to be 0.5168. For 43 df at 5% level of significance the table value of ‘r’ = 0.288. This indicated significance and showed relationship between the two variables. They concluded that there was a relationship between exposure to video games and aggression.

Kronenberger, et al., (2005) conducted a study with the purpose to investigate differences in media violence exposure between groups of adolescents with and without disruptive behaviour disorders with aggressive features, using a case-controlled design and multi-method assessment. Samples of 27 adolescents aged 13-17 with disruptive behaviour disorder with aggressive features and 27 age-gender-IQ matched controls completed a semi structured interview about exposure to violence on television and video games; parents completed a corresponding questionnaire measure. Moderate inter correlations were found between most self- and parent-report television and video game violence exposure measures. Compared to control adolescents, adolescents with disruptive behaviour disorder with aggressive features had higher aggregate media violence exposure, higher exposure to video game violence, and higher parent-reported exposure to television violence. Results showed that adolescents and parents agree about the adolescent's level of media violence exposure, that exposure to violence on television tends to be accompanied by exposure to violence in video games, and that the association between media violence exposure and disruptive behaviour disorder with aggressive features was not due to a spurious effect of gender or IQ.

Sheese & Graziano (2005) examined the effect of video-game violence on cooperative decision making. Participants (N= 48) were randomly assigned to play either a violent or a nonviolent version of the video game Doom in dyads. Following the video-game task, participants were separated and given an opportunity to choose to cooperate with their partner
for mutual gain, withdraw from the interaction, or exploit their partner for their own benefit. Participants in the violent condition were significantly more likely to choose to exploit their partners than participants in the nonviolent condition. These findings suggest that playing violent video games may undermine pro-social motivation and promote exploitive behaviour in social interactions.

Kuntsche (2004) studied on hostility among adolescents in Switzerland and multivariate relations between excessive media use and forms of violence. The purpose of the study was to determine what kind of violence-related behaviour or opinion was directly related to excessive media use among adolescents in Switzerland. A national representative sample of 4222 schoolchildren (7th- and 8th-graders; mean age 13.9 years) answered questions on the frequency of television-viewing, electronic game-playing, feeling unsafe at school, bullying others, hitting others, and fighting with others, as part of the Health Behaviour in School-Aged Children (HBSC) international collaborative study protocol. The chi-square tests and multiple logistic regression analyses were applied to high-risk groups of adolescents. For the total sample, all bivariate relationships between television-viewing/electronic game-playing and each violence-related variable were significant. In the multivariate comparison, physical violence among boys ceases to be significant. For girls, only television-viewing was linked to indirect violence. Against the hypothesis, females' electronic game-playing only had a bearing on hitting others. They concluded that experimental designs were needed that take into account gender, different forms of media, and violence to answer the question of whether excessive media use leads to violent behaviour. With the exception of excessive electronic game-playing among girls, this study found that electronic media were not thought to lead directly to real-life violence but to hostility and indirect violence.
Deselms & Altman (2003) did a study on immediate and prolonged effects of videogame violence. This study examined the relationship between playing violent videogames and sensitivity to aggressive acts. In 2 experiments, college students were randomly assigned to play violent or less violent video games. They then read a series of criminal vignettes and assigned prison sentences to violent criminals. In the second experiment, participants returned 1 hour later and completed a second series of vignettes. A significant interaction between gender and videogame was found in both experiments. Men who played the violent game gave more lenient sentences to criminals than did those who played the less violent game. In the second experiment, women, unlike men, assigned harsher sentences after playing the violent game. The effects were found to persist for at least 1 hour.

Uhlmann & Swanson (2003) conducted a study to find out whether exposure to violent video games increases automatic aggressiveness. The effects of exposure to violent video games on automatic associations with the self were investigated in a sample of 121 students. Playing violent video game Doom led participants to associate themselves with aggressive traits and actions on the Implicit Association Test. In addition, self-reported prior exposure to violent video games predicted automatic aggressive self-concept, above and beyond self-reported aggression. Results suggested that playing violent video games can lead to the automatic learning of aggressive self-view. They have concluded that despite the misleading debate in the news media over whether exposure to violent television, movies and video games leads to an increase in aggressive behaviour, the empirical evidence that it does so has become overwhelming. Decades of co-relational, experimental, longitudinal and demographic studies converge in indicating that exposure to violent media is a cause of aggressive behaviour (Bushman & Anderson, 2001; Singer & Singer, 1983). The current task for researchers was to better understand the mechanisms via which violent media exert their effects. One
important way was the deliberative learning of aggressive values (Bandura, 1978). Another was the priming of aggressive thoughts and actions (Anderson & Dill, 2000; Berkowitz, 1990; Bushman, 1998). The results of this study provided initial evidence that violent media may also exert their effects through changes in automatic associations with the self.

Bushman & Anderson (2002) conducted a study on violent video games and hostile expectations: A test of the General Aggression Model. The present research tested whether violent video games produce a hostile expectation bias—the tendency to expect others to react to potential conflicts with aggression. Participants (N = 224) played either a violent or nonviolent video game. Next, they read ambiguous story stems about potential interpersonal conflicts. They were asked what the main character will do, say, think, and feel as the story continues. People who played a violent video game described the main character as behaving more aggressively, thinking more aggressive thoughts, and feeling angrier than did people who played a nonviolent video game. These results are consistent with the General Aggression Model. To complete the story stems, participants listed what they thought the main character would do or say, think, and feel next. To increase reliability, responses from the three story stems were combined in the analyses. The alpha coefficients were .86, .88, and .87 for aggressive behaviours, thoughts, and feelings, respectively. These alpha coefficients are very high, especially because there were only three story stems for each dependent measure people who played violent video games expected more aggressive responses from the main characters in the stories than did people who played the nonviolent video games, F(1, 220) = 7.40, p < .007. People who played a violent video game were more likely to expect the main characters to say or do something aggressive, F(1, 220) = 8.14, p < .005, d = 0.38. People who played a violent video game were more likely to expect the main characters to have aggressive thoughts and ideas, although the effect was not quite significant, F (1, 220)
Escobar-Chaves, Kelder & Orpinas (2002) found the relationship between violent video games, acculturation, and aggression among Latino adolescents. Multiple factors are involved in the occurrence of aggressive behaviour. The purpose of this study was to evaluate the hypotheses that Latino middle school children exposed to higher levels of video game playing will exhibit a higher level of aggression and fighting compared to children exposed to lower levels and that the more acculturated middle school Latino children will play more video games and will prefer more violent video games compared to less acculturated middle school Latino children. This study involved 5,831 students attending eight public schools in Texas. A linear relationship was observed between the time spent playing video games and aggression scores. Higher aggression scores were significantly associated with heavier video playing for boys and girls (p < 0.0001). The more students played video games, the more they fought at school (p < 0.0001). As Latino middle school students were more acculturated, their preference for violent video game playing increased, as well as the amount of time they played video games. Students who reported speaking more Spanish at home and with their friends were less likely to spend large amounts of time playing video games and less likely to prefer violent video games (p < 0.05).

Funk, et al., (2002) examined the associations between a preference for violent electronic games and adolescents’ self-perceptions of problem behaviours and emotions. It was predicted that a preference for violent games would be associated with negative externalizing characteristics, in particular aggressive emotions and behaviours, on the Youth Self-Report (YSR), a standardized self-report measure of adolescent problem behaviours. Thirty-two 11-through 15-year-olds (17 girls) listed and categorized favourite electronic games into one of
six predetermined categories and completed the YSR. MANOVA revealed significant relationships between a preference for violent games and the Thought Problems subscale ($P < .01$) and YSR Total Score ($P < .05$), with trends noted for the Internalizing ($P < .06$) and Anxious-Depressed ($P < .08$) subscales. Expected relationships with externalizing behaviours, including aggression, were not found. However, across all YSR subscales, children with higher preference for violent games had more clinically significant elevations than those with low preference for violent games. It is possible that individuals with a preference for violent games may have high exposure to all forms of media violence. Their perceptions of their own behaviour, in comparison, may not seem sufficiently aggressive to justify endorsement of problems in this area. Or, playing violent electronic games may promote a disconnection between the emotions normally associated with violence and violent acts. These explanations are consistent with a desensitization model where exposure to media violence decreases sensitivity to aggression.

Garbarino, Bradshaw & Vorrasi (2002) in their article on mitigating the effects of gun violence on children and youth stated that countless children and youth were exposed to gun violence each year, at home, at school, in their communities, or through the media. Gun violence can leave lasting emotional scars on these children. They reviewed research regarding the psychological effects of gun violence on children and youth, and offered suggestions for how parents, school administrators, and mental health workers can mitigate these negative effects. Children exposed to gun violence may experience negative short- and long-term psychological effects, including anger, withdrawal, posttraumatic stress, and desensitization to violence. All of these outcomes can feed into a continuing cycle of violence. Certain children may be at higher risk for negative outcomes if they are exposed to gun violence. Groups at risk include children injured in gun violence, those who witness
violent acts at close proximity, those exposed to high levels of violence in their communities
or schools, and those exposed to violent media. Parents, school administrators, and mental
health workers all can play key roles in protecting children from gun violence and helping
them overcome the effects of gun-related trauma. They recommend a number of strategies
that adults can adopt to help children cope with gun violence, such as increasing parental
monitoring, targeting services to youth at risk of violent activity, and developing therapeutic
interventions to help traumatized young people.

Krahe & Moller (2002) studied on playing violent electronic games, hostile attribution style,
and aggression-related norms in German adolescents. The relationship was examined
between exposure to and preference for violent electronic games and aggressive norms as
well as hostile attribution style. Following a pilot study to sample widely used electronic
games varying in violent content, 231 eighth-grade adolescents in Germany reported their use
of and attraction to violent electronic games. They also completed measures of hostile
attribution style and endorsement of aggressive norms. There were significant gender
differences in usage and attraction to violent electronic games, with boys scoring higher than
girls. Significant relationships were found between attraction to violent electronic games and
the acceptance of norms condoning physical aggression. Violent electronic games were
linked indirectly to hostile attribution style through aggressive norms.

Anderson & Karen (2000) studied on video games and aggressive thoughts, feelings, and
behaviour in the laboratory and in life. Computer games have become an ever-increasing part
of many adolescents' day-to-day lives. Coupled with this phenomenon, reports of excessive
gaming (computer game playing) denominated as "computer/video game addiction" have
been discussed in the popular press as well as in recent scientific research. The aim of the
present study was the investigation of the addictive potential of gaming as well as the
relationship between excessive gaming and aggressive attitudes and behaviour. A sample comprising of 7069 gamers answered two questionnaires online. Data revealed that 11.9% of participants (840 gamers) fulfilled diagnostic criteria of addiction concerning their gaming behaviour, while there is only weak evidence for the assumption that aggressive behaviour is interrelated with excessive gaming in general.

The present research demonstrated that in both a co-relational investigation using self-reports of real-world aggressive behaviours and an experimental investigation using a standard, objective laboratory measure of aggression, violent video game play was positively related to increases in aggressive behaviour. In the laboratory, college students who played a violent video game behaved more aggressively toward an opponent than did students who had played a nonviolent video game. Outside the laboratory, students who reported playing more violent video games over a period of years also engaged in more aggressive behaviour in their own lives. Both types of studies–co-relational—real delinquent behaviours and experimental—laboratory aggressive behaviours have their strengths and weaknesses. The convergence of findings across such disparate methods lends considerable strength to the main hypothesis that exposure to violent video games can increase aggressive behaviour.

2.5 REVIEW OF LITERATURE RELATED TO PHYSIOLOGICAL EFFECT OF PLAYING VIOLENT VIDEO GAME

Garrison, Liekweg & Christakis (2011) conducted a study on media use and child sleep: the impact of content, timing and environment. They had collected data by the baseline survey and media diary of a randomized controlled trial on media use in children aged 3 to 5 years. Sleep measures were derived from the Children's Sleep Habits Questionnaire. Media diaries captured time, content title, and co-use of television, video-game, and computer usage; titles were coded for ratings, violence, scariness, and pacing. Nested linear regression models were
built to examine the impact of timing, content, and co-use on the sleep problem score. They reported that on average, children consumed 72.9 minutes of media screen time daily, with 14.1 minutes occurring after 7:00 pm. Eighteen percent of parents reported at least 1 sleep problem; children with a bedroom television consumed more media and were more likely to have a sleep problem. In regression models, each additional hour of evening media use was associated with a significant increase in the sleep problem score (0.743 [95% confidence interval: 0.373-1.114]), as was daytime use with violent content (0.398 [95% confidence interval: 0.121-0.676]). There was a trend toward greater impact of daytime violent use in the context of a bedroom television (P = .098) and in low-income children (P = .07). They concluded that violent content and evening media use were associated with increased sleep problems.

Barlett, Branch, Rodeheffer & Harris (2009) conducted a study with the research question, “How long do the effects of the initial short-term increase in aggression and physiological arousal last after violent video game play?” Study 1 (N=91) had participants complete pre- and post video game measures of aggressive thoughts, aggressive feelings, and heart rate. Then, participants completed Time 3 measures after 4 minute or 9 minute of delay. Study 2 employed a similar procedure, but had participants (N=91) complete the hot sauce paradigm to assess aggressive behaviour after a 0, 5, or 10 min delay. First, results indicated that aggressive feelings, aggressive thoughts, aggressive behaviour, and heart rate initially increased after violent video game play. Second, results of the delay condition revealed that the increase in aggressive feelings and aggressive thoughts lasted less than 4 minute, whereas heart rate and aggressive behaviour lasted 4–9 minute.

Ivarsson, Anderson, Akerstedt & Lindblad (2009) conducted a study to investigate how playing a violent/nonviolent television game during the evening affects sympathetic and
parasympathetic reactions during and after playing as well as sleep quality during the night after playing. In total, 19 boys, 12-15 years of age, played television games on two occasions in their homes and participated once without gaming. Heart rate, heart rate variability (HRV) and physical activity were measured during gaming/participating and the night to follow using a portable combined heart rate and movement sensor. A sleep diary and questionnaires about gaming experiences and session-specific experiences were filled in. During violent (vs. nonviolent) gaming, there was significantly higher activity of the very low frequency component of the HRV and total power. During the night after playing, very low frequency, low frequency and high frequency components were significantly higher during the violent (vs. nonviolent) condition, just as total power. They concluded that violent gaming induces different autonomic responses in boys compared to nonviolent gaming—during playing and during the following night suggesting different emotional responses. They suggested for future studies which should address the development of the autonomic balance after gaming over longer time than a night, physiological adaptation to frequent gaming and potential gender differences.

Arriaga, Esteves, Carneiro & Monteiro (2008) conducted a study to analyze the short-term effects of violent electronic games, played with or without a virtual reality (VR) device, on the instigation of aggressive behaviour. Physiological arousal (heart rate (HR)), priming of aggressive thoughts, and state hostility were also measured to test their possible mediation on the relationship between playing the violent game (VG) and aggression. The participants—148 undergraduate students—were randomly assigned to four treatment conditions: two groups played a violent computer game (Unreal Tournament), and the other two a non-violent game (Motocross Madness), half with a VR device and the remaining participants on the computer screen. In order to assess the game effects the following instruments were used: a
BIOPAC System MP100 to measure HR, an Emotional Stroop task to analyze the priming of aggressive and fear thoughts, a self-report State Hostility Scale to measure hostility, and a competitive reaction-time task to assess aggressive behaviour. The main results indicated that the violent computer game had effects on state hostility and aggression. Although no significant mediation effect could be detected, regression analyses showed an indirect effect of state hostility between playing a VG and aggression.

Borusiak, Bouikidis, Liersch, & Russell (2008) studied on the cardiovascular effects in adolescents while they are playing video games. They analyzed heart rate (HR), systolic and diastolic blood pressure (SBP, DBP), oxygen consumption, and carbon dioxide production in 17 male adolescents during a racing simulation video game (VG) and compared to resting state (RS) and exercise testing (ET) measures. They were able to demonstrate a significant (p<.005) increase from RS to VG concerning HR (+13.1 bpm), SBP (+20.8 mmHg), and DBP (+12.1 mmHg) with SBP and DBP elevations exceeding 2 SD in all children and 14/17 children, respectively. The energy consumption during VG (max 1.71 kcal/min) was unaltered compared to RS and significantly lower compared to ET even at the starting strain of 25 W (1.94 kcal/min). Hemodynamic parameters tested demonstrated lower HR, unchanged SBP, and higher DBP during the VG compared with ET.

A research conducted by Stockholm University in 2008 stated the effect of playing violent videogame on the physiological parameters of the children. Swedish Researchers have found that heart rate and sleep in boys are affected by violent video games. In the study, boys (12-15) were asked to play two different video games at home in the evening. The boys’ heart rate was registered, among other parameters. It turned out that the heart rate variability was affected to a higher degree when the boys were playing games focusing on violence compared with games without violent features. Differences in heart rate variability were
registered both while the boys were playing the games and when they were sleeping that night. The boys themselves did not feel that they had slept poorly after having played violent games. The results showed that the autonomous nerve system, and thereby central physiological systems in the body, can be affected when children play violent games, without them being aware of it.

Heins, et al., (2007) assessed the bedtime, television and computer habits of primary school children in Germany. Paediatricians recommend daily sleep of at least ten hours for children aged 9 and 10 years. Sufficient sleep is necessary for maintaining the body's homeostasis, as well as for fixing memories and learning. Lack of sleep in children has been associated with a diminished school performance, reduced attention span, and obesity. Adulthood is influenced by childhood lifestyle habits. Data from 4th graders in 34 schools in Mainz and its surroundings were analysed in order to determine negative health lifestyle factors in German primary school children, such as lack of sleep and increased leisure time spent watching television and computer gaming. Data from a cross-sectional study regarding cellular phone use in fourth-graders in Mainz were used for this analysis. Bedtime, television and computer use habits, as well as other factors were explored. A total of 1933 children from 34 schools participated by answering a questionnaire in the 2002-2003 school years (participation rate: 88%). Complete data for the secondary analysis were available from 1889 students (51% male, median age 10 years). The results revealed that overall, 28% of the children reported going to bed after 9 pm on week nights, 16% reported watching television more than three hours daily, and 11% played computer or video games more than three hours daily. In the adjusted binary logistic regression model, being older, male, having older siblings, watching television (OR 1.82, 95% CI 1.28-2.61) and playing computer games (OR 3.23; 95% CI 2.24-4.67) for more than three hours daily, owning a mobile phone, and being in a school in the city were associated with going to bed after 9 pm.
Thus the study concludes that every fourth child does not obtain sleep duration of 10 hours, under the assumption that primary schoolchildren need to be awake at 7 am on weekdays. Lifestyle factors that may negatively influence a child's development determine their actual and future habits. Sufficient sleep and less television and computer leisure times should be assertively emphasized to parents and carers of primary school students, in order to prevent the negative consequences of lack of sleep, such as diminished school performance. Developing sex-specific prevention programs, which take into account the complex lifestyles and habits of schoolchildren, seems to be relevant.

Burke, et al., (2006) conducted a study to examine sedentary behaviours (including television viewing, playing computer games and computer use), diet, exercise and fitness in relation to overweight/obesity in Australian adolescents. Questionnaires elicited food frequency data, time spent in TV-viewing, using computers, other sedentary occupations and physical activity recall. Weight, height and fitness were measured. The results revealed that among 281 boys and 321 girls, mean age 12 years (SD 0.9), 56 boys (20.0%) and 70 girls (23.3%) were overweight/obese. Greater fitness was associated with decreased risk of overweight/obesity in boys (Odds ratio [OR] 0.74; 95% CI 0.55, 0.99) and girls (OR 0.93; 95% CI 0.91, 0.99). TV-viewing predicted increased risk in boys (OR 1.04; 95% CI 1.01, 1.06) and decreased risk in girls (OR 0.99; 95% CI 0.96, 0.99). Computer use, video games, and other sedentary behaviours were not significantly related to risk of overweight/obesity. The study concluded that among these adolescents, fitness was negatively related to risk for overweight/obesity in boys and girls. TV-viewing was a positive predictor in boys and a negative predictor in girls but the effect size was small.

Brady & Matthews (2006) studied on the effects of media violence on health-related outcomes among young men. The objective of the study was to test the effects of media
violence exposure on blood pressure, negative affect, hostile social information processing, uncooperative behaviour, and attitudes toward health risk behaviours among young men varying in lifetime violence exposure within the home and community.

They conducted a laboratory experiment in a university campus situated within an urban environment. One hundred male undergraduates aged 18 to 21 years were chosen for the study. Men who had previously reported differing amounts of lifetime home and community violence were randomly assigned to play The Simpsons: Hit and Run (low-violence condition) or Grand Theft Auto III (high-violence condition). Systolic and diastolic blood pressure; negative affect; hostile social information processing; uncooperative behaviour; and permissive attitudes toward violence, alcohol use, marijuana use, and sexual activity without condom use were measured. Men randomly assigned to play Grand Theft Auto III exhibited greater increases in diastolic blood pressure from a baseline rest period to game play, greater negative affect, more permissive attitudes toward using alcohol and marijuana, and more uncooperative behaviour in comparison with men randomly assigned to play The Simpsons. Only among participants with greater exposure to home and community violence, play of Grand Theft Auto III led to elevated systolic blood pressure in comparison with play of The Simpsons (mean, 13 vs 5 mm Hg). They concluded that media violence exposure may play a role in the development of negative attitudes and behaviours related to health. Although youth growing up in violent homes and communities may become more physiologically aroused by media violence exposure, all youth appear to be at risk for potentially negative outcomes.

Mathews, et al., (2006) did a study among adolescents. This study has found that adolescents who play violent video games may exhibit lingering effects on brain function, including increased activity in the region of the brain that governs emotional arousal and decreased
activity in the brain's executive function, which is associated with control, focus and concentration. Dr. Mathews and colleagues randomly assigned 44 adolescents to play either a violent video game or a nonviolent video game for 30 minutes. The researchers then used functional magnetic resonance imaging (fMRI) to study brain function during a series of tasks measuring inhibition and concentration. One test used emotional stimuli and one did not. fMRI measures the tiny metabolic changes that occur when a part of the brain is active. These changes will appear as a brightly coloured area on the MR image, indicating the part of the brain that is being used to process the task. The two groups did not differ in accuracy or reaction time for the tasks, but analysis of the fMRI data showed differences in brain activation.

Compared with the group that played the nonviolent game, the group that played the violent video game demonstrated less activation in the prefrontal portions of the brain, which are involved in inhibition, concentration and self-control, and more activation in the amygdala, which is involved in emotional arousal. During tasks requiring concentration and processing of emotional stimuli, the adolescents who had played the violent video game showed distinct differences in brain activation than the adolescents who played an equally exciting and fun but nonviolent game.

Kautiainen, Koivusilta, Lintonen, Virtanen & Rimpela (2005) studied on the use of information and communication technology and prevalence of overweight and obesity among adolescents. The background of the study revealed that the prevalence of overweight and obesity has increased among children and adolescents, as well as among adults, and television viewing has been suggested as one cause. Playing digital games (video, computer and console games), or using computer may be other sedentary behaviours related to the development of overweight and obesity. The objective of the study was to study the
relationships of time spent on viewing television, playing digital games and using computer to overweight among Finnish adolescents. The study design used was mailed cross-sectional survey. The samples of the study were nationally representative samples of 14 to 18 year old (N=6515, response rate 70%) in 2001. Overweight and obesity were assessed by body mass index (BMI). The respondents reported time spent daily on viewing television, playing digital games (video, computer and console games) and using computer (for e-mail, writing and surfing). Data on timing of biological maturation, intensity of weekly physical activity and family's socio economic status were taken into account in the statistical analyses.

The study results revealed that the increased times spent on viewing television and using computer were associated with increased prevalence of overweight (obesity inclusive) among girls: compared to girls viewing television <1 hour daily, the adjusted odds ratio (OR) for being overweight was 1.4 when spending 1-3 hour, and 2.0 when spending > or =4 hour daily on viewing television. In girls using computer > or =1 hour daily, the OR for being overweight was 1.5 compared to girls using computer <1 hour daily. The results were similar in boys, although not statistically significant. Time spent on playing digital games was not associated with overweight. Thus, the study concludes that overweight was associated with using information and communication technology (ICT), but only with certain forms of ICT. Increased use of ICT may be one factor explaining the increased prevalence of overweight and obesity at the population level, at least in girls. Playing digital games was not related to overweight, perhaps by virtue of game playing being less sedentary or related to a different lifestyle than viewing television and using computer.

Baldissera (2004) conducted a study on aggressive and non-violent videogames: short-term psychological and cardiovascular effects on habitual players. The purpose of this study was to evaluate the short-term effects on several physiological (arterial pressure and heart rate) and
psychological (anxiety and aggressiveness) indexes of playing violent and non-violent videogames in 22 young male adults. Subjects invited to participate in the study were recruited from a videogame leisure club. Before and during playing either a violent or non-violent computer game, blood pressure and heart rate were measured. Before and after the game session, the subjects completed the State-Anxiety Inventory-Y (STAI-Y) and the Buss–Durkee Hostility Inventory. The results of the study showed a range of short-term effects of playing violent and non-violent videogames on arterial pressure and on the state anxiety of subjects, but not on hostility measurements. More specifically, the group that played the violent videogames showed a significant increase in the state anxiety score at the end of the game, as compared to the pre-game self-evaluation, and an increase in the systolic blood pressure while the subjects were playing as compared to pre- and post-game values. A decrease in diastolic blood pressure after playing any game was also found.

Marshall, Biddle, Gorely, Cameron & Murdey (2004) compared the relationships between media use, body fatness and physical activity in children and youth. The objective of the study was to review the empirical evidence of associations between television (TV) viewing, video/computer game use and (a) body fatness, and (b) physical activity. Published English-language studies were located from computerized literature searches, bibliographies of primary studies and narrative reviews, and manual searches of personal archives. They included studies presented at least one empirical association between TV viewing, video/computer game use and body fatness or physical activity among samples of children and youth aged 3-18 years. The study results showed that based on data from 52 independent samples, the mean sample-weighted effect size between TV viewing and body fatness was 0.066 (95% CI=0.056-0.078; total N=44,707). The sample-weighted fully corrected effect size was 0.084. Based on data from six independent samples, the mean sample-weighted
effect size between video/computer game use and body fatness was 0.070 (95% CI=−0.048 to 0.188; total N=1,722). The sample-weighted fully corrected effect size was 0.128. Based on data from 39 independent samples, the mean sample-weighted effect size between TV viewing and physical activity was -0.096 (95% CI=−0.080 to -0.112; total N=141,505). The sample-weighted fully corrected effect size was -0.129. Based on data from 10 independent samples, the mean sample-weighted effect size between video/computer game use and physical activity was -0.104 (95% CI=−0.080 to -0.128; total N=119,942). The sample-weighted fully corrected effect size was -0.141.

The study concluded that a statistically significant relationship exists between TV viewing and body fatness among children and youth although it was likely to be too small to be of substantial clinical relevance. The relationship between TV viewing and physical activity was small but negative. While the total amount of time per day engaged in sedentary behaviour was inevitably prohibitive of physical activity, media-based inactivity may be unfairly implicated in recent epidemiologic trends of overweight and obesity among children and youth. They concluded that relationships between sedentary behaviour and health were unlikely to be explained using single markers of inactivity, such as TV viewing or video/computer game use.

Van den Bulck (2004) assessed the relationship between television viewing, computer game playing, and internet use and self-reported time to bed and time out of bed in secondary-school children. The objective of the study was to investigate the relationship between the presence of a television set, a gaming computer, and/or an internet connection in the room of adolescents and television viewing, computer game playing, and internet use on the one hand, and time to bed, time up, time spent in bed, and overall tiredness in first- and fourth-year secondary-school children on the other hand. A random sample of students from 15 schools
in Flanders, Belgium, yielded 2546 children who completed a questionnaire with questions about media presence in bedrooms; volume of television viewing, computer game playing, and internet use; time to bed and time up on average weekdays and average weekend days; and questions regarding the level of tiredness in the morning, at school, after a day at school, and after the weekend.

The results revealed that the children with a television set in their rooms went to bed significantly later on weekdays and weekend days and got up significantly later on weekend days. Overall, they spent less time in bed on weekdays. Children with a gaming computer in their rooms went to bed significantly later on weekdays. On weekdays, they spent significantly less time in bed. They reported higher overall levels of being tired. Children who spent more time playing computer games went to bed later on weekdays and weekend days and got up later on weekend days. On weekdays, they actually got up significantly earlier. They spent less time in bed on weekdays and reported higher levels of tiredness. Children who spent more time using the Internet went to bed significantly later during the week and during the weekend. They got up later on weekend days. They spent less time in bed during the week and reported higher levels of tiredness. The study concluded that the concerns about media use should not be limited to television. Computer game playing and internet use are related to sleep behaviour as well. Leisure activities that are unstructured seem to be negatively related to good sleep patterns.

Anderson & Bushman (2001) assessed the effects of violent video games on aggressive behaviour, aggressive cognition, aggressive affect, physiological arousal, and pro-social behaviour. Research on exposure to television and movie violence suggested that playing violent video games will increase aggressive behaviour. Experimental and non experimental studies with males and females in laboratory and field settings support this conclusion.
Analyses also reveal that exposure to violent video games increases physiological arousal and aggression-related thoughts and feelings. Playing violent video games also decreases pro-social behaviour.

2.6 REVIEW OF LITERATURE RELATED TO VIDEO GAME RATINGS AND ADOLESCENTS

Babu, Koteshwaramma, Keerthana & Ahu (2011) conducted a study among adolescents in West Godavari district, Andhra Pradesh. This study was conducted among 1520 school children. They concluded that prevalence of undernourishment was observed to be more among low socio economic group adolescents and prevalence of overweight and obesity was observed to more among higher socio economic status adolescents. This observed difference was statistically highly significant with p value <0.0001.

Mitra & Chatterjee (2011) conducted a study to analyze the effect of socio-demographic variables like family characteristics, residence, parental education, socio economic status and peer group influence on violent behaviour in adolescents. A prospective cross sectional study was conducted among 767 adolescents between 10 to 19 years of age of both sexes. High risk violent behaviour was found to be significantly associated with nuclear family and single parents compared to joint family. Adolescent street dwellers and urban slum dwellers were at a significantly higher risk compared to those having proper houses. Poor maternal educational status was also found to have a significant influence. Lastly, a negative peer group impact was found to adversely affect the violent behaviour.

Sharma (2011) studied to highlight the influence of coaching pressure for achievement impact on mental health and various problem and outcome among 150 children in the age group of 15 to 21 years. 60% of the children had behavioural problem such as aggressive,
violent and change in language. 10% of children had verbal labelling, 8% had anxiety, fear and phobias and 8% had lower academic performance. 70% of the children had changed eating pattern, 40% had sleep disturbances and 10% had pro-social behaviours.

Miller (2010) had done a study to explore the relationship between video game ratings implementation and changes in game content as represented by game magazine. Video game regulation is intended to lessen the potentially negative effects of games by limiting children's access to age-inappropriate games. Self-regulations, such as the current rating system, could also encourage manufacturers to reduce sexual and violent content in an attempt to avoid ratings that would limit their potential buyers. The purpose of this study was to determine if the implementation of the Entertainment Software Rating Board (ESRB) was associated with changes in game content. A content analysis of video game magazine articles released before and after the establishment of the ESRB ratings determined that violent content and some sexual content increased non-significantly until 2004, when these elements became significantly more extreme. Other sexual content increased in early years but was stable after the adoption of the rating system. Because manufacturers did not dramatically alter game content after the 1994 rating system came into effect, they may also be unlikely to change the content if the ratings system is modified in the future.

Bijyank, Konijin, Bushman & Roelofsma (2009) tested the hypothesis that the Pan European Game Information classification system for video games (eg, 18+) may actually increase the attractiveness of games for children younger than the age rating. The study was conducted among 310 Dutch youth. The design was a 3 (age group: 7-8, 12-13, and 16-17 years) x 2 (participant gender) x 7 (label: 7+, 12+, 16+, 18+, violence, no violence, or no label control) x 2 (game description: violent or nonviolent) mixed factorial. The first 2 factors were between subjects, whereas the last 2 factors were within subjects. Three personality traits (ie,
reactance, trait aggressiveness, and sensation seeking) were also included in the analyses. Participants read fictitious video game descriptions and rated how much they wanted to play each game. Results revealed that restrictive age labels and violent-content labels increased the attractiveness of video games for all of the age groups (even 7- to 8-year-olds and girls).

CONCLUSION

Children live in an electronic environment including videogame consoles and computers. It is evident from the above review of literature that playing violent video game has physiological and psychological effects. Various research designs including experimental, co-relational and longitudinal studies on playing violent video games among children confirms that playing and exposure to violent video game can increase aggressive thoughts, aggressive feelings, and physiological arousal. Research on exposure to television and movie violence suggested that playing violent video games will increase aggressive behaviour. Experimental and non experimental studies with males and females in laboratory and field settings support this conclusion. Analyses also reveal that exposure to violent video games increases physiological arousal and aggression-related thoughts and feelings. Playing violent video games also decreases pro-social behaviour.

Most young adolescent boys and many girls routinely play M-rated games. Large amount of game play, were related to troublesome behavioural and academic outcomes. Time spent playing violent games specifically, and not just games per se, increased physical aggression. Furthermore, higher levels of pathological gaming, regardless of violent content, predicted an increase in physical aggression among boys and those who played a lot of violent video games became relatively more physically aggressive. Specifically for boys, playing a violent video game should lead to more aggression than watching television violence. Excessive violent computer game playing might be a significant risk variable for aggressive behaviour.
in the presence of personality traits with aggressive cognitions and behaviour scripts in the consumers. Media violence exposure may play a role in the development of negative attitudes and behaviours related to health. Although youth growing up in violent homes and communities may become more physiologically aroused by media violence exposure, all youth appear to be at risk for potentially negative outcomes.

Research findings confirmed that aggressive and less empathic boys were most attracted to violent games. The fact that heavy users of violent games show less empathy and higher aggressiveness suggests the possibility of desensitization. Repeated exposure to media violence reduces the psychological impact of media violence in the short term, therefore desensitizing viewers to media violence. As a result, viewers tended to feel less sympathetic toward the victims of violence and actually enjoy more the violence portrayed in the media. Thus violent media make people numb to the pain and suffering of others. Other studies have shown that playing violent games increases aggressiveness and decreases empathy. These results combined suggest the possibility of a violence cycle. Aggressive individuals are attracted to violent games. It is possible that individuals with a preference for violent games may have high exposure to all forms of media violence. Playing violent games increases aggressiveness and decreases empathy, which in turn leads to increased appreciation and use of violent games. The findings of the research study confirmed the General Aggression Model and the Displacement theory. Playing violent electronic games may promote a disconnection between the emotions normally associated with violence and violent acts. These explanations are also consistent with a desensitization model where exposure to media violence decreases sensitivity to aggression.

Violent video game playing stimulates autonomous nerve system, and thereby central physiological systems in the body can be affected in children, without them being aware of it.
It causes physiological arousal such as variation in heart rate, blood pressure and sleep. Children playing games went to bed late on weekdays and weekends and they slept less. Increased times spent on playing video games were associated with increased prevalence of overweight and obesity.

It is concluded that video games are not inherently good or bad, just as any tool is not inherently good or bad. Video games can have both positive and negative effects. Content matters, and games are excellent teachers. Violent content in video games can lead people to behave more aggressively. Pro-social content, in contrast, can lead people to behave in a more cooperative and helpful manner.