



Video game playing in children and the effect on self-esteem, understanding of mind and playing in groups.

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Abstract

Video games and their effect on self-esteem is a topic that has been scrutinised for a long time. There are studies which confirm the existence of an effect and others which deny it. This study aimed to look at the differences between the amount of time children spent playing video games and if more time spent playing served to boost their self-esteem. It also considered the differences in understanding a second order false belief between children who played video games more than once a week and those who did not. The study was conducted over a one-month period, with nine participants at a local After School club. The study found no significant difference between the amount of time spent playing video games and self-esteem, the amount of time spent playing video games and understanding a second order false belief, and age and self-esteem.

The study did find a significant difference in behaviour and speech when children were playing in groups depending on how often the children played video games. The results of the study are discussed in the terms of the implications for current and future research, the strengths and weaknesses of the current study, and the contribution to the field of video game playing and self-esteem. Finally, the study proposes recommendations for future research and offers conclusions.

Key words

Self-esteem, children, video games, playing, understanding mind

Table of Contents

Lists of Figures and Tables

Chapter 1: Introduction and Literature Review.....	1
Chapter 2: Method.....	15
<i>Participants.....</i>	<i>15</i>
<i>Equipment.....</i>	<i>15</i>
<i>Procedure.....</i>	<i>16</i>
<i>Analysis.....</i>	<i>17</i>
Chapter 3: Results.....	20
Chapter 4: Discussion.....	27
Chapter 5: Conclusions and Recommendations.....	37

References

Lists of Figures and Tables

Table 1:
Male and female participants in each session

Session	Male participants	Female participants
1	7	6
2	6	3

Table 2:
Measures of behaviour and speech, and how they were subdivided

Game play speech	Initiates
	Responds
Game play behaviour	Towards other children
	Inclusive to other children
Game end speech	Initiates
	Responds
Game end behaviour	On own, with 1 other or in group
	Towards other children
	Inclusive to other children
	Initiates

Table 3:
Means and standard deviations of self-esteem scores based on amount of video game play per week

Amount of Play	Self-esteem mean (2d.p)	Self-esteem standard deviation (2d.p)
Everyday	24.75	1.26
More than once a week	24.50	3.54
Less than once a week	20.33	2.52

Table 4:
***t* and *p* values of the paired samples t-test (* indicates the result is significant at .05).**

Pairing	<i>t</i>-value	<i>p</i>-value
Speech score and playing video games more than once a week or everyday	3.656	.015*
Behaviour score and playing video games more than once a week or everyday	12.649	>.0005*
Speech score and playing video games less than once a week	3.5	.073
Behaviour score and playing video games less than once a week	11	.008*
Speech score and amount of time spend playing video games	4.603	.002*
Behaviour score and amount of time spent playing video games	7.849	>.0005*

Table 5:
Mean self-esteem score by age and gender.

Age	Gender	Self-esteem mean score	Self-esteem mean score (male & female)
8	Male	22.5	21
	Female	18	
9	Male	23	24
	Female	24	
10	Male	24	24.5
	Female	26	

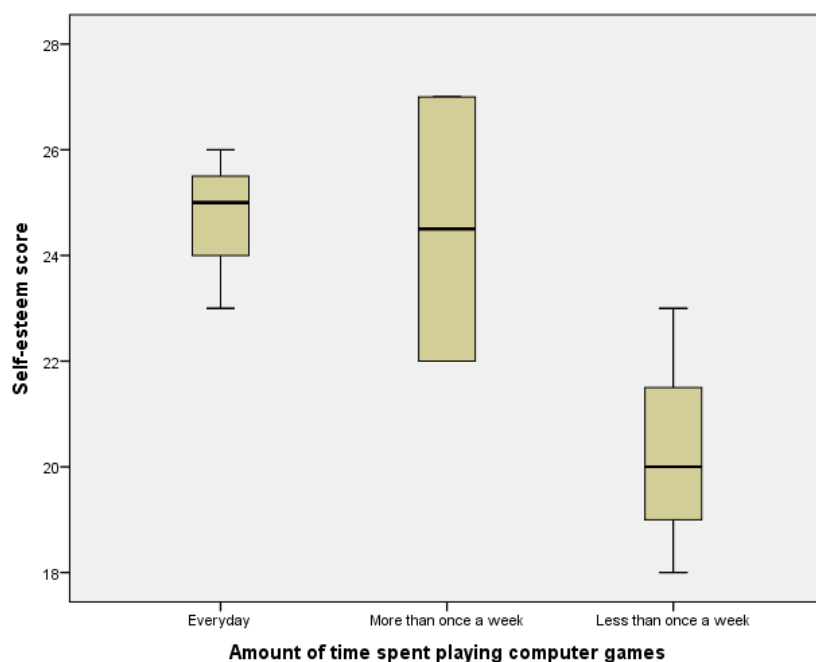


Figure 1: boxplot showing self-esteem scores depending on amount of time spent playing video games per week

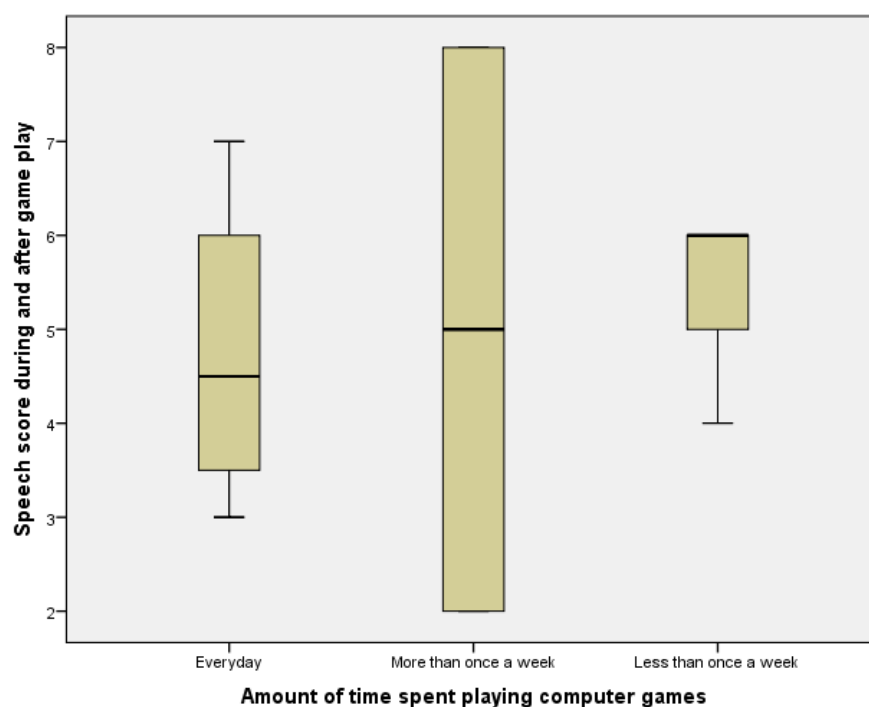


Figure 2: boxplot showing speech score during game play depending on how often the child played video games

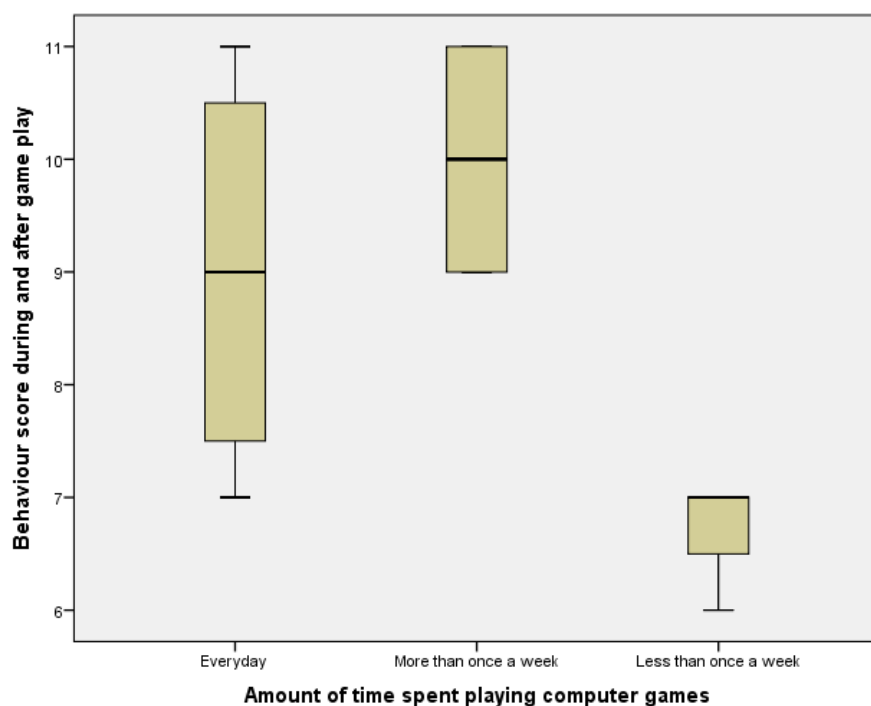


Figure 3: boxplot showing children's behaviour score during game play, depending on how often they played video games.

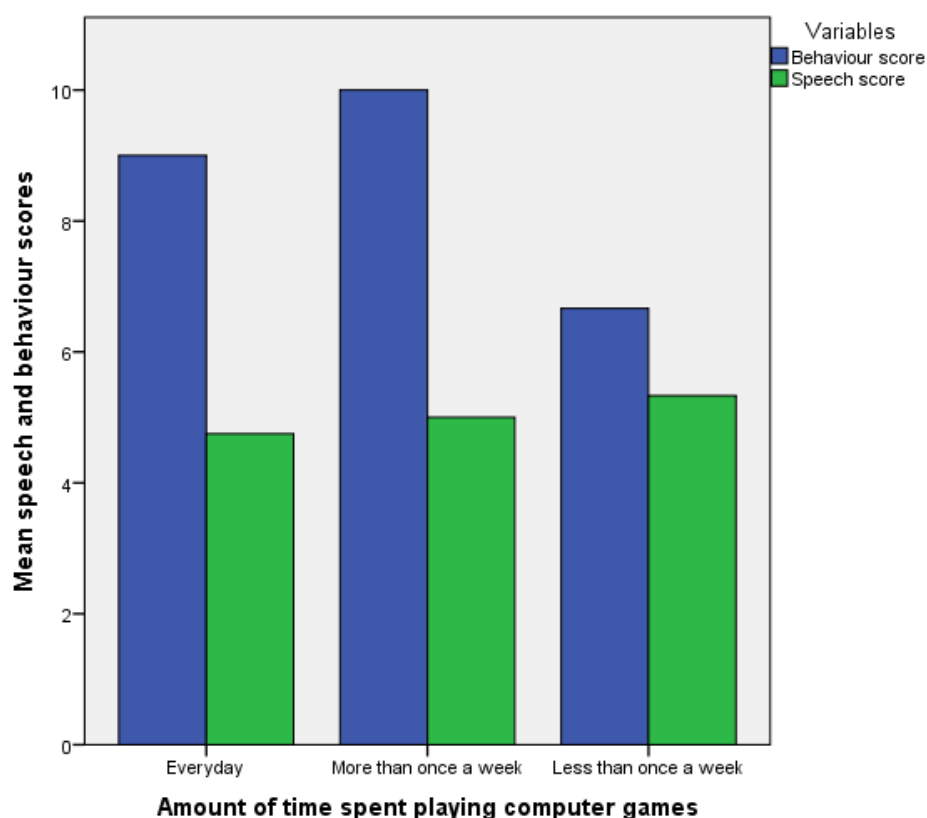


Figure 4: mean speech and behaviour score based on amount of time spent playing video games

Chapter 1: Introduction and Literature Review

Play has been found to be an extremely important part of a child's life (Bunker, 1991). Research by Colwell, Grady & Rhaiti (1995) found there was a lack of relationship between self-esteem and playing video games and few children could be described as video game addicts, yet it could also be argued that children are by turning to technology spending more time on this medium as a form of entertainment. At best, there are conflicting results on the unintended influence of internet use on a child's development. Whilst some (Bijvank, Konijn & Bushman, 2012; Colwell et al, 1995; Aydin & Sari, 2011; Thomas & Martin, 2010) report it can cause impairment in interpersonal relations, others (Mehr, Sajadian & Saiari, 2001; Othman & Said, 2012; Colwell, 2007; Sun, Ma, Bao, Chen & Zhang, 2008) argue it is beneficial for development and in particular the improvement of visiospatial skills and social skills. However, given the relative newness of this forum, the long term effects of technology on children's development remain largely unknown (Baer, Saran, Green & Hong, 2012). Further research by (Chiu, Lee & Huang, 2004) suggests video games have a broad and deep influence on children, not only in social aspects but also psychologically.

It is thought that school children aged between eleven and seventeen can spend up to three hours a day in front of a screen, be that playing video games or watching television (Baer, Saran, Green & Hogg, 2012). This is a vast amount of time, considering that children spend most of their day in school. Thus it is important to understand why children play video games and the benefits that children reap from consistent playing. Some reasons that children play video games can be as means of fitting in with their peers and to be seen as 'cool'. Furthermore, many children play video games and use it as a means of putting their troubles out of their mind and to fit in with their peers (Colwell, 2007). From this, it is clear that video game playing is an imperative part of a child's life and consequently it is important to understand the effects that video game playing has on developmental aspects of a child's life such as self-esteem and theory of mind.

Video games have become a staple part of children's lives in the 21st century with between seventy five to ninety percent of all school children playing video games (Wallenius, Rimpelä, Punamäki & Lintonen, 2009) and the average child playing over seventy three minutes worth of video games per day. Furthermore, it was found that children who played video games had a higher self-esteem and were considered to be better adjusted than those who did not play video games (Witt, Massman & Jackson, 2011). This differs from previous research findings by Colwell et al (1995); however, there are methodological differences between these studies. Although the participants in both studies were both in the same age range, the difference lay in the self-esteem questionnaires. Witt et al (2011) used the Rosenberg self-esteem inventory which has shown to have strong test retest reliability and validity. Colwell and colleagues (1995) used Battle's culture-free self-esteem inventory. This inventory measures several areas of self-esteem but is not considered as valid or reliable as the Rosenberg scale (Community-University Partnership for the Study of Children, Youth, and Families, 2011). This difference in validity and reliability could relate to the conflicting results, as the Rosenberg scale has a stronger reliability and validity, it is the main questionnaire for evaluating self-esteem in the current study.

Whilst there is no set definition of self-esteem, (Hosogi, Okada, Fujii, Noguchi & Watanabe, 2012) Slutzky & Simpkins (2009) have noted that self-esteem is hierarchical and multi-dimensional. Self-esteem is connected to the feeling of belonging, which is particularly vulnerable in adolescents. Children begin to grasp concepts of self-esteem such as belonging and feelings of inclusion and exclusion in a social situation around age seven. Children are thought to be more vulnerable to low self-esteem than adolescents and adults as they are unable to establish buffers which could influence short-term affects to their self-esteem (Abrams, Weick, Thomas, Colbe & Franklin, 2011). Furthermore, experiences during childhood play a large role in the shaping of basic self-esteem (Yaratan & Yucesoylu, 2010). As self-esteem is so important in childhood, investigating the relationship between self-esteem and video games is crucial to understand if there is a link between them. The studies above have shown that self-esteem is important in childhood and needs to be looked at in further detail. However, in this study, it is also important to look at the other factors in order to see if they are also influential in childhood.

Theory of mind is known as the ability of attributing independent mental states to self and others. The attribution of these mental states will allow an individual to explain and predict behaviour (Gallagher, Happé, Brunswick, Fletcher, Frith & Frith, 2000). Theory of mind research mostly deals with younger children's understanding of mental states and how this understanding grows as children get older. Theory of mind research mostly focuses on children's performance on false belief tasks. Children begin to understand false belief tasks around age four, however as they get older they should be able to progress to more difficult false belief tasks (Lockl & Schneider, 2007). This occurs around the same time as changes in intellect (Perner & Lang, 1999), which allows children to begin to understand false belief tasks and fully comprehend face, value and deception tasks (Pilowsky, Yirmiya, Arbelle and Mozes, 2000). Thus, their understanding of mind is growing and they are able to calculate the behaviour of others. Further research by (Gallagher et al, 2000) showed that the medial prefrontal cortex is said to be activated by theory of mind tasks. The amygdala is also thought to be an important brain area for theory of mind as it is the brain area involved in the reflection of others thoughts and emotions (Mathiak & Weber, 2006). The current study focused on a second order false belief theory of mind task, which was appropriate to the studies age range. This second order false belief task differs from a first order belief tasks in that first order belief tasks are usually tasks that involve memory and test a child's understanding of mind (Lockl & Schneider, 2007).

A connection has been established between theory of mind and self-esteem, particularly the social interactions of the child. As the child gets older, their ability to predict behaviour on psychological grounds becomes highly developed (de Rosnay & Hughes, 2006). This helps them not only, to understand the thoughts and needs of their peers but also helps them to understand their own needs, which could relate to boosting their self-esteem through playing video games.

Theory of mind is also related to playing video games in terms of character attachment. Character attachment is the connection felt by a video game player towards a character within the video game. To fully understand character attachment, the video game player must suspend their belief in reality, accept the character's world as real and have a feeling of guardianship over the character (Lewis, Weber & Bowman, 2008). This requires theory of mind as the video game player has to

understand the needs of the character and to fully accept the characters' world as real but recognise and understand that it does not interfere with their own life and emotions. This is yet another link that demonstrates the relationship between theory of mind and playing video games and shows why looking at the relationship between theory of mind, self-esteem and how often children played video games is important. However, character attachment was more likely to be found in those who played role-playing games (Lewis et al, 2008). Thus, an attachment to a video game character may not be found in every game but character attachment can be considered as a moderating variable in the relationship between self-esteem and video game playing, hence character attachment does have an effect on the relationship between self-esteem and video games.

Furthermore, most children who fail false belief tasks could not understand the distinction between real and apparent emotion (de Rosnay & Hughes, 2006), this in turn could relate to their addiction to video games as they understand the emotions felt throughout playing the video game to be real and affect their own lives. If they constantly win video games this could give a great boost to their self-esteem. However, de Rosnay and Hughes (2006) reported that children who were competent on false belief tasks could distinguish between real and apparent emotion. This relates to the second research question – do children who play video games have a greater understanding of mind?

Previous research conducted by Colwell (2007) found that there had been little attention on the needs that can be met through play and established that children can substitute their real friends for video games in what is known as an 'electronic friendship'. This 'electronic friendship' can be related to how well children play, not just in groups but also on their own. Furthermore, this can be related to how well children interact with other children and from this the game playing aspect of the current study was formed. The results of the study found that males played video games more frequently and for a significantly longer time than their female counterparts - the main reasons for playing being reasons of control, mastering a game and to have a feeling of success through winning a video game. Interestingly, children involved in the study also reported playing video games to feel more included with their classmates. The focus of Colwell's (2007) study was eleven to fifteen year old children but it was recognised that children between the ages of eight and eleven had access to at least one games console at home, which they played regularly. This helped to determine the age range of the current study as video games have an apparent impact on young children's lives and it is important to address this impact to establish if there is a relationship between self-esteem, understanding of mind and how children will interact with other children in a group depending on how often they play video games.

Some children find video games to be extremely addictive (Colwell, 2007). Video games are addictive because they can induce changes in the subjective experience (Thomas & Martin, 2010). Both addiction and the subjective experience have clear links to self-esteem. Video games are said to be beneficial to those with low self-esteem as they can compensate for any deficiencies and they can have the opportunity to express themselves in a way that would not be possible for them in their lives (Aydin & Sari, 2011). This research shows one of the benefits of playing video games – an increase to self-esteem – but also highlights the addictiveness of game playing. From this, the current study wanted to understand the relationship

between self-esteem and the amount of time spent playing video games, and subsequently the relationship video game playing may have with other developmental and social aspects.

A worrying statistic for the current generation involves the greater stimulation and salience effects found in new video games. The greater stimulation effects can only make games more addictive especially for children who play video games for the sole purpose of sensation seeking (Thomas & Martin, 2010). Aydin and Sari (2011) used participants aged between sixteen and eighteen to understand the relationship between self-esteem and video game playing. The current study lowers the age range of the participants to understand if the relationship between self-esteem and video game playing can be found at an earlier age.

Video games are related to spending time with friends and being social, not aggression as has been previously suggested (Durkin & Barber, 2002). Boys play video games for longer as they play with their friends as a means of inclusion, which is related to their self-esteem, it gives them a boost in self-esteem which could explain why those with low self-esteem may play for longer periods as they enjoy the boost to their self-esteem (Dominick, 1984). However, loneliness is said to be a key factor in amount of time spent playing video games and in particular, increased game playing (Jeong & Kim, 2011). Loneliness can also be linked to low self-esteem and those with exhibit low self-esteem are more prone to addictive behaviours, showing a greater risk of becoming addicted to video games. Furthermore it was found that those who were addicted to video games preferred social interactions through internet use or video game playing - showing that while the children involved in the study may believe they are interacting with peers and engaging in social activity through extreme internet use or video game playing. However, when the children are placed in a social situation they feel isolated and do not enjoy interacting with their peers (Jeong & Kim, 2011). This relates to the group game playing aspect of the study and the third research question - there will be a difference in children when playing in groups, depending on how often they play video games.

An important factor of self-esteem in young people is social inclusion; this is significant when looking at the relationship between self-esteem, video games and understanding mind. Playing video games online has boomed due to the upsurge of the internet, so this is also important to consider where and how children are playing video games. In a study by Abrams and colleagues (2011) eight and nine year olds expressed feelings of ostracism when they were excluded when playing video games online with other children and this, in turn, was effecting their self-esteem. These feelings of ostracism affected eight and nine year olds more than any other age group within Abrams and colleagues (2011) study – this was an important factor for deciding the age group for the current study. Furthermore, children who feel left out from a simple ball tossing game will have lower self-esteem than adolescents or adults in the same situation (Abrams et al, 2011). This shows clearly that there is a relationship between video games and self-esteem in children and that there is a possible effect on playing with other children from self-esteem.

Video games have also been understood to be a positive feature of a healthy adolescence as children have the ability to participate in a challenging and stimulating environment. Furthermore, those who play video games frequently spend more time with their friends outside of school and more children report positive

moods when playing video games (Durkin & Barber, 2002). Durkin and Barber (2002) found the same conclusions as Dominick (1984) and more recently a study by Colwell (2007) found similar results in regards to mood changes when playing video games. Colwell (2007) found that playing video games can change a child's mood from negative to positive and can help them to forget their worries. This can be related to self-esteem as a positive mood will mean the children are happier within themselves, which will in turn benefit their self-esteem and also, their understanding of mind, the main premises when building the hypotheses for the current study.

The relationship that a child has with their parents is also thought to have an effect on the extent that a child engages in video game playing, in that it is thought if children engage in more activities with their parents they will have less time to play video games and may not develop an addiction or reliance on the games. It was also found that playing video games had a negative effect on participation in social activities and social self-efficacy among participants (Jeong & Kim, 2012). However, the validity of questions in the study has come under fire; the questionnaire only included four questions on self-efficacy. Four questions are not enough to determine any pattern or gain valid results.

Moreover, the relationship between a parent and child may be further strained as parents and their children have been found to hold very different views on video game playing, parents believe that children's addiction to video games would disturb their normal learning (Chiu et al 2004). Furthermore, parents rated video games with scepticism when their children played them regularly (Jackson et al, 2008). This could cause conflict between families and could lead to tension, which in turn could have an effect on a child's self-esteem. This is not a key factor within the study, but the amount of time children spend playing video games is an important factor in relation to video game playing, understanding of mind and social interaction with other children.

Playing video games can help to improve visual and kinaesthetic skills (Jackson et al, 2008). Video game playing has also been found to improve attention and perception skills (Sun et al, 2008). However, it is not known if the improvement in attention skills can be related to education or more time spent playing video games. Consequently, Sun et al. (2008) point out that excessive video game playing can lead to attention deficits. It appears that there is a limit to the amount of time spent playing video games benefits attention before this turns to attention deficits. However, the authors do not point out the level at which the benefit of video game playing becomes a negative. They also argue that the negative effects of excessive game playing may be negated by the positive consequences of game playing; conversely the authors argue that it is too difficult to measure the positive and negative consequences of video game playing clearly - in essence, making their statements null and void. Furthermore, Sun et al (2008) had only male participants, meaning the findings cannot be generalised to a female population. Thus meaning, although their findings may be interesting, the apparent benefits to attention and perception are not reliable. The current study uses both male and female participants to establish the differences between amount of time spent playing video games, self-esteem score, understanding mind score and how well participants play in groups of their peers.

Three motivational reasons to play video games can be positively related to boosting self-esteem, these are challenge – to beat the game, competition – to be the best

player and fantasy – to do things you would not do in real life (Bijvank et al, 2012). This also relates back to Colwell's (2007) study where children's incentives for playing video games were the same. The reality of three motivational reasons to play video games correlating with self-esteem indicates a relationship between self-esteem and playing video games.

Winning has long been associated with an increased motivation to play video games. Video games allow a child to put a direct input into the game and so when a child wins they take pride in the win and enjoy the positive associations that come with winning, thus generating a boost to their self-esteem. The ego enhancement scale is generic and similar to other self-report scales. This allows the scale to be generalised and have high validity as the tendency to 'bask in reflected glory' (BIRGing) functions as an enhancement to the video game player's ego (Downs, & Sundar, 2011). This shows that there is a connection between self-esteem and video game playing, especially concerning winning a video game. However, the study found that when a player could not achieve a "win" whilst playing a video game they would distance themselves from the game as a means of preserving their own self-esteem. This was the inclination to 'cut off reflected failures' or 'CORFing'. The study found that all of the video game players within the study showed either BIRGing or CORFing depending on the outcome of the game they were playing (Downs & Sundar, 2011). This is particularly interesting when thinking of children who play video games in groups or against other children and the effect it can have on their self-esteem causing children to blame erroneous factors such as the game itself (Downs & Sundar, 2011). As such, it was considered worthwhile assessing if children who played video games also played well with other children in groups; this was the basis of the third hypothesis.

It is also important to note that there is a gender difference in technology use (Jackson, Fitzgerald, Zhao, Koleni, von Eye & Harold, 2008). It was found that boys tend to play more sport-based video games whereas girls lean towards more educational games (Chiu, Lee & Huang, 2004). Whilst both sexes participated in video game playing (Colwell et al, 1995) boys were more likely to play video games for a longer period of time than girls however, the amount of playing, in both sexes, declined as they got older (Wallenius et al, 2009). The decline in video game playing with age contributed to the formulation of the age range for the current study. The selected participants in the current study were old enough to play video games and understand relationships with their peers and other people but were not too young so they could not comprehend a second order false belief task of understanding mind.

Accordingly, this study will also investigate how children interact when playing in a group and relate this to their self-esteem. Participation in physical games, such as sports, is beneficial in developing self-esteem because peers place a high value on physical ability. Participation in physical activity may also lead to positive self-evaluations which in turn boost a child's self-esteem (Slutzky & Simpkins, 2009). Gender differences are not restricted to video game playing, they also occur in group game play. When girls play in groups, they tend to be more inclusive and cooperative whereas boys play is more impulsive, aggressive and competitive (Harten, Olds & Dollman, 2008). The competitive element of boy's physical play could also be potentially problematic for young boys who are weaker and not good at traditional playground games such as football and rugby. This may lead to some young boys having lower self-esteem and in turn, favouring video games as it is

more of a solo activity. This indicates there could be potential relationship between sport participation, self-esteem and video game playing. This further relates to the third research question - are children who play video games more reclusive when playing with a group of other children?

However, different studies offer different explanations on the relationship between self-esteem and video games, some researchers find that there is no relationship between self-esteem and game playing (Fling, Smith, Rodriguez, Thornton, Atkins & Nixon, 1992; Jackson, von Eye, Fitzgerald, Witt & Zhao, 2011). However it should be recognised that, Fling et al (1992) used the Coopersmith inventory, which was developed to re-evaluate self-esteem in those who were already considered to have low self-esteem and the inventory is negatively skewed. Furthermore, researchers have also suggested that influences other than self-esteem contribute to Coopersmith self-esteem scores (Blascovich & Tomaka, 1991).

The Rosenberg self-esteem scale was invented to measure an adolescent's levels of self-esteem and so has contributed to its widespread use in research focussed on self-esteem and video games. The Rosenberg scale also has excellent validity and test retest reliability (Blascovich & Tomaka, 1991). Furthermore, the Rosenberg self-esteem scale consists only of ten questions which will help to keep the participants focussed on the questions, whereas with a longer scale they may be diverted by their attention. It has also been used in previous research which shows it is widely accepted and well validated (Jackson, von Eye, Fitzgerald, Zhao & Witt, 2010). Studies linking self-esteem and video game playing have produced a diverse set of findings showing that there is a relationship between video game playing and self-esteem. The relationship was determined through using the Rosenberg self-esteem scale on participants aged 12 – 20 and found that video game playing was associated with low self-esteem in adolescents (Jackson et al, 2010). This study also modified the Rosenberg's self-esteem scale to allow the adolescents to understand the questionnaire, which was a factor in the current study. The current study was interested in this relationship but importantly, if the relationship could be applied to a younger age group. This could potentially determine the age at which children become involved in video game playing and be useful for helping children to understand their video game playing and when it may be at dangerous levels. The study also found that there was clear links between video game playing, low self-esteem and academic achievement. This study did not focus on academic achievement, as it was being conducted in an after school club, it did not seem relevant to ask the children about their schoolwork.

Consideration of the relationship between self-esteem, video games and understanding of mind is undoubtedly one which could be investigated further. Previous research had a big impact on the formation of the research questions for the current study and it was important to analyse the relationship between self-esteem and video game playing but introducing another dimension into the current study. From the previously mentioned research questions the following four hypotheses were formed.

Hypothesis 1: Children who play video games more than once a week will not have a higher self-esteem than those who play video games less than once a week.

Hypothesis 2: Children who play video games more than once a week will have a greater understanding of mind.

Hypothesis 3: There will be a difference in children when playing in groups, depending on how often they play video games.

Hypothesis 4: Children who are older (aged 10-11) will be more likely to be affected by self-esteem issues than younger children.

By investigating the above hypotheses, it is hoped that the present study will allow more to be understood about the differences between amount of time spent playing video games, self-esteem, theory of mind and playing in groups in children. The present study focuses on the widely researched relationship between video game playing and self-esteem but also incorporates theory of mind, in order to understand if there is a relationship between all three of the variables. By using children aged between 8-11 it will be interesting to see if the above-mentioned differences are found in younger children and determine the age at which self-esteem does begin to have a relationship with video game playing.

Chapter 2: Methods

Participants

The children involved in the study all attended a local after school club and most attended both of the sessions. The age range of the participants was 8 – 10; this was based on previous research conducted by Harten et al (2008), Colwell (2007) and Ott & Pozzi (2012). At the first session there were thirteen participants. At the second session, due to child absence and an unwillingness to participate, there were seven participants who participated in both aspects of the study, see table 1 for full breakdown of participants. Two children joined at the filming stage of the second session. Overall, there were a total of nine participants, three of which were female. Four of the participants were aged 10; the other five were aged 8 and 9.

Table 1:
Male and female participants in each session

Session	Male participants	Female participants
1	7	6
2	6	3

Equipment

A video camera and a tripod were used to film the first session of the study; the children got into groups of three and threw a basketball between them. In the second session, the children again were filmed playing in groups with balls.

The children were given two questionnaires, the first being the Rosenberg self-esteem questionnaire (Rosenberg, 1979). The questionnaire was slightly adapted to allow the children to better understand the questions and to ensure they were able to answer accurately with no ambiguity (see appendix 3). The second questionnaire asked the participants about their video game habits, how often they played, whether they played with friends and questions regarding their age and gender. Two of the questions asking the participants to rank their preferences of certain activities later had to be removed because of lack of understanding from the younger participants aged between 8 and 9 (see appendix 3). The final part of the study was a task which tested the participants second order false belief. This involved a storyboard which was presented a second order false belief task and had four pictures of an ice cream van at different locations. Whilst the children were being presented with this, at the same time they were being told a short story about the ice-cream van and two children (see appendix 4). This story was utilized from Baron-Cohen (1989) and was to test the children's understanding of mind. Following this story, the children were asked to answer four brief questions relating to the story such as where the van was going and where one of the children in the story thought the ice cream van was. Thus testing their second order false belief.

Procedure

Once the research was approved by the University Ethics Committee, a consent and information was given to the parents and guardians of the children involved (see appendix 1). Once parents had given consent for their children to participate and be filmed, a consent form was also given to the children at the beginning of the first

session so they could indicate that they were happy to proceed (see appendix 2). A participant number was given to each of the children so their questionnaires could be matched to the play on the video tape. The children played a well-known childhood game of 'piggy in the middle' in groups of threes. This session was filmed for approximately 20 minutes. After ten minutes, the children began to break away from their groups of threes and play either individually or in groups. In the second session, the children were once again filmed playing with basketballs, some of the children opting to play in a larger group and others in threes; this session again lasted for twenty minutes. The game playing session was conducted again to avoid any experimental bias from the first session and to counter for any absences. After the game playing session, the children were then asked to fill out Rosenberg's self-esteem questionnaire (Rosenberg, 1979). Following the Rosenberg questionnaire, the children were given another questionnaire asking them six questions about their game playing habits, how often they played and whether they played with friends, and questions regarding their age and gender. The questions were designed by the researcher, to keep the children's interest whilst gaining all the information needed. Once all the children had completed the questionnaires they were then shown the storyboard and told the ice-cream van story. They were then asked to answer four questions on the story, testing their second order false belief.

After the experiment a debrief was issued to the children giving them the number for *ChildLine* in case the experiment had caused them any sort of distress (see appendix 6). *ChildLine* is a confidential contact that would allow the children to express any concerns they had, not only with the experiment but with any problems they may experience in their life. A debrief was also issued to the parents and guardians of the children giving them the full information of the study and contact details for the researcher, supervisor and independent advisor (see appendix 7).

Analysis

The analysis of the video recording was done based on four different measures, speech during game play, speech after game play, behaviour during game play and behaviour after game play. These measures were then subdivided and the children were marked depending on these arranged measures (see appendix 8 for scoring sheet). The split measures for speech were initiation of speech and response to speech. Table 2 demonstrates how the behaviour and speech items were subdivided. The children were given a score of 0 if the action was absent or rare, 1 if the action occurred some of the time or 2 if the action occurred all or most of the time. The subdivided measures for behaviour during game play were directions, if they were towards or away from other children and body movements, if the body movements were inclusive or reclusive. Behaviour after game play was subdivided into reconfiguration; the participants were scored on whether they played on their own, with 1 other or in a group after game play, whether their body movements were towards or away from other children, whether their body movements were reclusive or closed and whether or not they initiated play.

Table 2:
Measures of behaviour and speech, and how they were subdivided

Game play speech	Initiates
	Responds
Game play behaviour	Towards other children
	Inclusive to other children
Game end speech	Initiates
	Responds
Game end behaviour	On own, with 1 other or in group
	Towards other children
	Inclusive to other children
	Initiates

For the participants who had taken part in both of the video game sessions, an average of their scores from both was taken. Two participants joined at the second session and they were scored solely on their play during this session. The self-esteem questionnaire was scored using the Rosenberg scoring system (1979) to give a self-esteem score for each of the children. The second part of the questionnaire was marked based on the answers that the children gave, they were marked for how many video games they had and how often they played, thus the higher score each child received the more video games they had and more often they played.

As the study is looking at a difference between children with high and low self-esteem, children who play video games regularly and those who do not and the differences in understanding of mind. A test of differences was conducted on the data using SPSS 20.

Chapter 3: Results

To test the first hypothesis children who play video games more than once a week will have a higher self-esteem than those who do not play video games, descriptive statistics were analysed to ensure equal distribution amongst the data. Figure 1 shows the boxplot, confirming the equal distribution of the data.

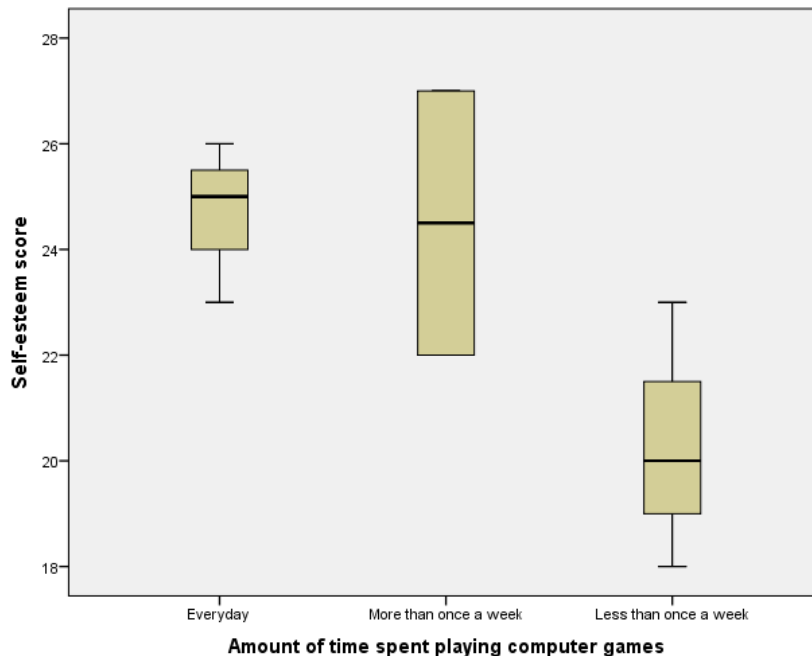


Figure 1: boxplot showing self-esteem scores depending on amount of time spent playing video games per week

Table 3 shows the means and standard deviations of self-esteem scores based on the amount of game play but it shows that children who play video games less than once a week have a lower mean self-esteem score.

Table 3:
Means and standard deviations of self-esteem scores based on amount of video game play per week

Amount of Play	Self-esteem mean (2d.p)	Self-esteem standard deviation (2d.p)
Everyday	24.75	1.26
More than once a week	24.50	3.54
Less than once a week	20.33	2.52

Following on from the descriptive statistics; a one way between groups ANOVA was then conducted. This was chosen as the independent variable, how often the children played video games was split into three levels – everyday, more than once a week and less than once a week. The results of the one-way ANOVA were as follows $F(2, 8) = 3.77$ (2d.p), $p = .087$. A p value of .087 is not significant at .05 level and suggests that there is no significant difference between amount of time spent

play video games and self-esteem score. Thus, the first hypothesis is rejected and the null hypothesis – there is no difference in self-esteem scores depending on how often children play video games – is accepted.

To test the second hypothesis children who play video games more than once a week will have a greater understanding of mind than those who do not, descriptive statistics were computed to understand the data. Descriptive statistics gave the means and standard deviations for each condition and found no outliers. Again, a one way between subjects ANOVA was conducted to test this hypothesis. The results of the one-way ANOVA were as follows: $F(2, 8) = 1.63$, $p = .272$. The p value of .272 is, once again, not significant at .05 level and indicates that there is no significant difference between theory of mind scores and the amount of time spent playing video games per week. This finding is confirmed by the descriptive statistics, particularly the mean, standard deviations and box plots. From this we can reject the hypothesis and accept the null hypothesis – that there is no difference in understanding mind when looking at the amount a child plays video games per week.

The third hypothesis predicted that there would be a difference in children when playing in groups, depending on how often they play video games. Descriptive statistics for this confirmed that there were no outliers however, the data was interestingly distributed, figure 2 shows the boxplot detailing the amount of time spent playing video games and speech score, the box showing the speech scores of those who played video games less than once a week is not as spread as the other conditions. This can be attributed to the number of participants in this condition as there were only three, and their scores were not as equally spread as the other two conditions.

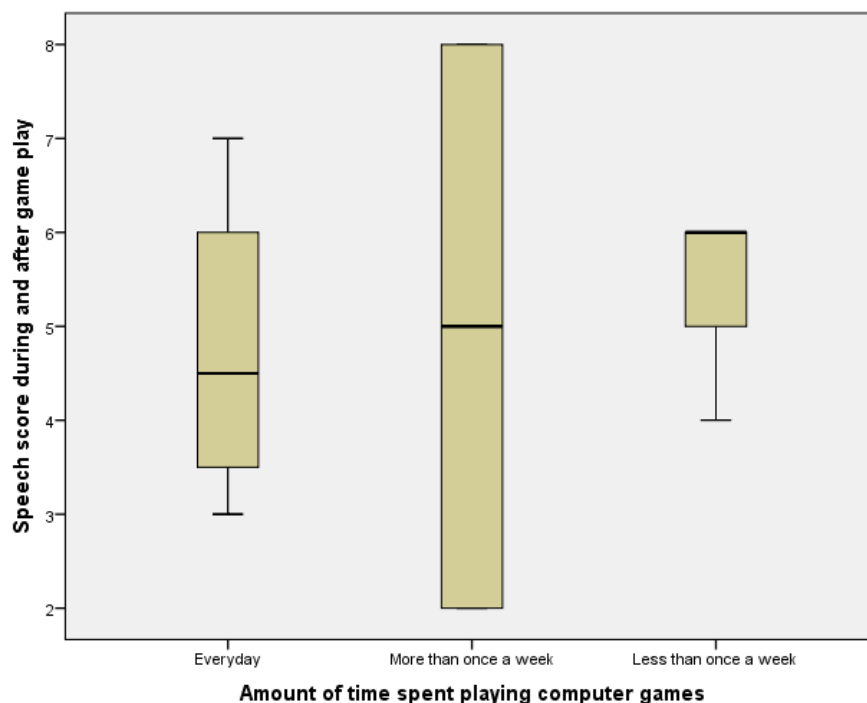


Figure 2: boxplot showing speech score during game play depending on how often the child played video games

The box plot (figure 3) looking at behaviour scores and amount of time spent playing video games shows the same distribution. From this, the data was deemed to be equally distributed and so a paired samples t-test was conducted on the following pairs – speech score and amount of time spent playing, behaviour score and amount of time spent playing and finally speech score and behaviour score. The variable of amount of time spent playing was analysed as a whole and also in the conditions of more than once a week and everyday, and less than once a week.

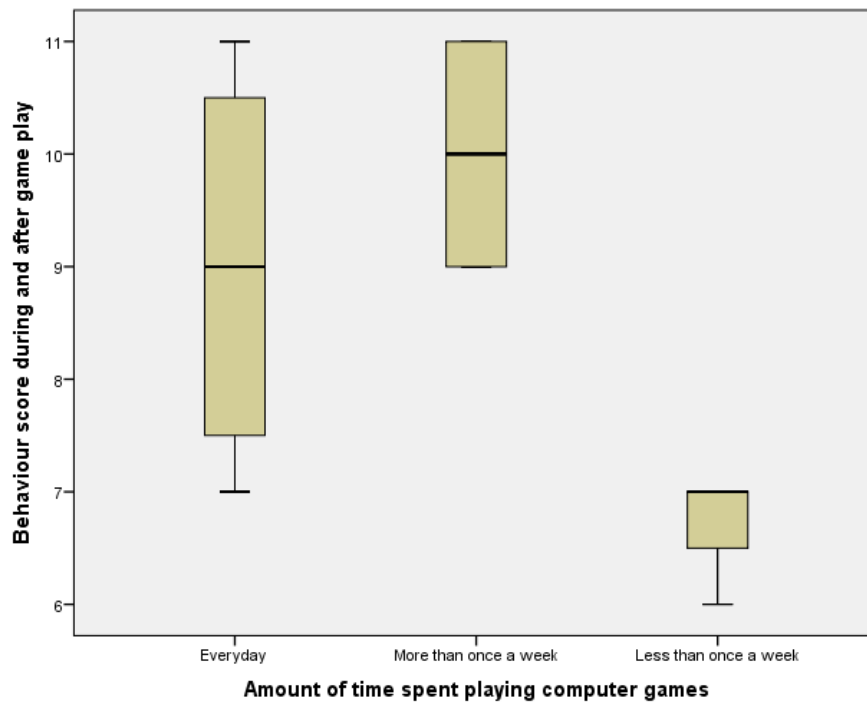


Figure 3: boxplot showing children's behaviour score during game play, depending on how often they played video games.

A bar chart shows the mean score of behaviour and speech during game play and the amount of time spent playing video games (figure 4). This shows the mean scores for each condition depending on amount of time spent playing video games are fairly consistent. The mean behaviour scores for children who played video games less than once a week are lower than the children who played more than once a week or everyday but interestingly, the mean speech scores are slightly higher.

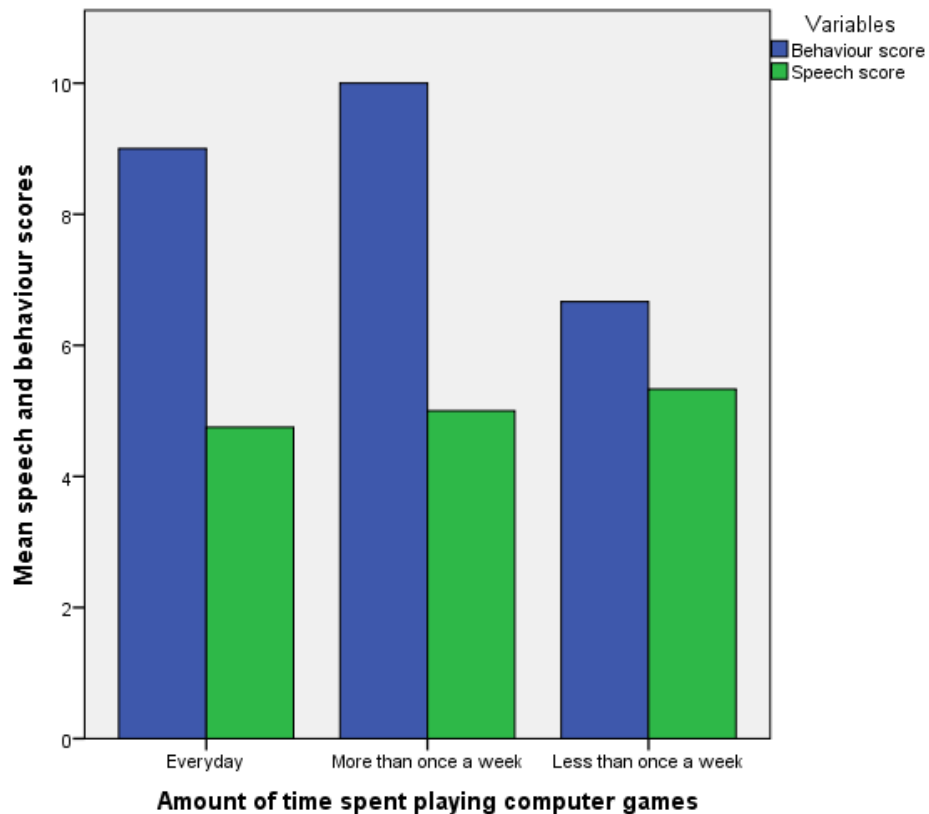


Figure 4: mean speech and behaviour score based on amount of time spent playing video games

Table 4 shows the *t* and *p* values of each pair and illustrates where the main significances lie. All of the *p* values given are at the one-tailed level as the hypothesis is predicting a specific difference.

Table 4:

t and *p* values of the paired samples t-test (* indicates the result is significant at .05).

Pairing	<i>t</i> -value	<i>p</i> -value
Speech score and playing video games more than once a week or everyday	3.656	.015*
Behaviour score and playing video games more than once a week or everyday	12.649	>.0005*
Speech score and playing video games less than once a week	3.5	.073
Behaviour score and playing video games less than once a week	11	.008*
Speech score and amount of time spend playing video games	4.603	.002*
Behaviour score and amount of time spent playing video games	7.849	>.0005*

As table 4 shows, all of the results are significant at the .05 level. Results of particular interest are the highly significant difference between behaviour score and playing video games either more than once than a week or everyday ($p = .000055$). There is still a significant difference when looking at behaviour and playing video games less than once a week ($p = .008$) but this is not as highly significant as playing games more than once a week and everyday. There is also a significant difference between speech score and playing video games more than once a week or everyday ($p = .015$), however, the same is not true when looking at speech score and playing video games less than once a week ($p = .073$). When looking at the amount of time spent playing video games per week as whole, the table shows that there is a significant difference, both in behaviour score and speech score, with the difference between behaviour score and amount of time spent playing video games per week being highly significant. From this we can accept the hypothesis – there will be a difference in children when playing in groups, depending on how often they play video games.

The final hypothesis predicted that older children (aged 10 and 11) would have lower self-esteem than younger children (aged 8 and 9). A table of means (table 5) shows the mean self-esteem scores for each age group, dependent on gender, within the study. A boxplot also showed the data was of equal distribution.

Table 5:
Mean self-esteem score by age and gender.

Age	Gender	Self-esteem mean score	Self-esteem mean score (male & female)
8	Male	22.5	21
	Female	18	
9	Male	23	24
	Female	24	
10	Male	24	24.5
	Female	26	

An independent samples t-test was conducted on the data, instead of grouping the age variable, the cut-off point was changed to 10 and thus all the data was included. The Levene's test for equality of variances gave a significance of .679, this is not significant and so equal variances are assumed. The results of the t-test were as following $t = 1.21$, $p = .132$ (one tailed). The p value is not significant at the .05 level and so we can conclude there is no significant difference between age and self-esteem. The final hypothesis is rejected and the null hypothesis – there will be no difference between age and self-esteem score – is accepted.

Chapter 4: Discussion

The main expected findings were first of all, that children who play video games more than once a week will not have a higher self-esteem than those who do not play video games more than once a week. Secondly, that children who play video games at least once a week will have a greater understanding of mind. Thirdly, there will be a difference in children when playing in groups, depending on how often they play video games, and finally, children who are older (those aged between 10 and 11) will have lower self-esteem scores than children who are younger (aged between 8 and 9).

A one-way, between-subjects ANOVA was used to determine the first hypothesis; the between subjects factor for this part was the amount of time the participants spent per week playing video games. The p value was .087 which was not considered to be significant. From this, we can conclude that this study concluded there was no significant difference between the amount of time spent playing video games and self-esteem score. This was an unexpected finding and was not in line with previous research (Jackson et al, 2011; Colwell, 2007 and Jeong & Kim, 2011). A reason for this unexpected finding could be related to the small number of participants that were included in this study; the reasons for this will be discussed later.

The second hypothesis predicted that children who played video games more than once a week would have greater understanding of mind than those who did not play more than once a week. Again, a one way between subjects was used, for the same reasons as mentioned previously. The ANOVA gave a p value of .272; this again is not significant at .05 level. Thus showing, there is no significant difference between amount of video games per week and understanding mind score. This does not conform to previous research where video game playing was found to effect understanding of mind. fMRI studies have previously found that the amygdala is activated when playing video games, and is also a key component in the structure of theory of mind (Mathiak & Weber, 2006). From this, it was thought that there would be an effect on theory of mind understanding when playing video games.

There are several reasons why a significant difference was not found between amount of time spent playing video games and theory of mind score. When conducting the analysis for this question, it was noted that only three of the participants stated that they played video games less than once a week, this makes the data quite uneven but is also an interesting factor from the study; so few of the participants played video games less than once a week, and remarkably, the fourth level of "hardly ever" was removed from the analysis because no participants had indicated this as their preference. A second, potential problem was when conducting the theory of mind task, it was the last task and the children had become distracted and were shouting out both correct and incorrect answers when they received their questionnaire. This could have had a detrimental effect on the study, with other children being influenced by the answers that they heard. However, the main explanation regarding non-significant results is the small number of participants.

The third hypothesis predicted that there would be a difference in children when playing in groups, depending on how often they play video games. This hypothesis was accepted. Table 2 shows that when watching the children take part in a game

with their peers, there is a highly significant difference between behaviour scores and amount of time spent playing video games per week. When this was investigated further, it was found that there was a highly significant difference between behaviour scores and playing video games more than once a week. However, there was also a significant difference between behaviour scores and playing video games less than once a week. This shows that there is a significant difference ($p = >.0005$) between behaviour when playing in a group and amount of time spent playing video games per week.

Furthermore, the paired samples t-test showed that there was also a significant difference ($p = .002$) between speech score during game play and amount of time spent playing video games per week. On further analysis, it was found that there was a significant difference between speech score and playing video games more than once a week yet no significant difference on speech score when playing video games less than once a week. From this, it can be concluded that there is a variation between amount of time spent a week playing video games and game play in groups. As the t-tests can only find differences and do not find a direction for the difference, the results can be related to both positive and negative aspects of previous research. Firstly, Lewis et al. (2008) who related character attachment to low social self-esteem and Dorman (1997) who argued that children become socially maladjusted when they play video games. Secondly, it could be argued that the relationship between playing video games and playing in groups is a positive experience as Slutzky & Simpkins (2009) found that children who play games in groups will have higher self-evaluations which could lead to higher self-esteem. This can be associated with social learning theory, which suggests children behave in a way which is reinforced by an important person in their life (Dorman, 1997). This could suggest that children who play video games play well in groups not because of their self-esteem but due to the fact that they have been influenced to play well.

The final hypothesis predicted that as the participants got older they would have lower self-esteem scores than those younger than them. This hypothesis was based on previous research that found as children got older, they played more video games and thus had lower self-esteem than younger children (Thomas & Martin, 2010; Chiu et al, 2004; Jackson et al, 2010). From the table of means (table 3) in the results section it is clear that this is not the case. The mean difference in self-esteem scores between nine year olds and ten year olds was 0.5; this is not a great difference at all. Conversely, the mean self-esteem scores of eight year olds was 21, this is a difference of 3 and 3.5 when comparing to eight and nine year olds. However, when looking at the mean self-esteem scores of eight year olds when they are split into male and female, the mean self-esteem score is 18 for females and 22.5 for males, thus contributing to the apparent difference between eight, nine and ten year olds. Following this, an independent samples t-test was conducted and this shows there was no significant difference between age and self-esteem. Once again, this does not conform to previous research (Thomas & Martin, 2010; Chiu et al, 2004; Jackson et al, 2010) and there are several reasons for this difference.

The study originally aimed to include four different age groups; 8, 9, 10 and 11 year olds and as previously mentioned, the after school club in which the study took place, did have children within these age group. However, when the study was taking place, some of the children did not want to take part. Some eleven year olds took part in the first session of the study but they did not want to take part again or fill in the

questionnaire, this left the study with several participants dropping out and not fulfilling the desired age ranges. The children aged ten were now placed into the oldest group and the eight and nine year olds into the younger group, by doing this, it assured that the number of participants in each age group was as equal as it possibly could be. However, an explanation for the t-test finding no significant results could be that as the three age groups were too close and children aged ten are still relatively quite young, the participants in the older group have not experienced any significant threats to their self-esteem.

The study did not compare to previous research which found a link between playing video games and age (Witt et al, 2011) but could be related to certain parts of Colwell et al. (1995), who found that there was no link between self-esteem and playing video games. However, this could be due to low participant numbers and future research with more participants could potentially find a link between self-esteem and playing video games. Furthermore, this study briefly touched on the children's behaviour when in a group, but future research could place more of an emphasis on a child's relationship with their peers; it would be noteworthy to distinguish if there was an effect here.

In relation to children's self-esteem and age, although it would appear from the study that there is no real difference in self-esteem between nine and ten year olds but there was a difference in the scores of eight year olds compared to the scores of nine and ten year olds. Whilst not significantly different, eight year olds did demonstrate lower self-esteem scores, this finding could be the basis for future research which could scrutinise this further to understand whether it is a result that is unique to this study or an issue that may need extra examining. A child's environment is known to contribute vastly to self-esteem (Hosogi et al, 2012), this could partly relate to the findings of this study, some of the children may have been in a negative mood from events prior to the study beginning and so this affected the answers they gave.

The study originally wanted to capture, on camera, the children playing a game of "piggy in the middle" in groups of three; this was to understand how well the children played in groups, especially when it was not a group consisting of an even number of children. By asking the children to play a game like "piggy in the middle" which notoriously leaves one child in the middle trying to catch a ball whilst the other two children throw the ball between them, it is thought to be a reliable cohort of how children played may be produced. This was based on previous research by Abrams et al. (2011). During the first session, the children began by playing "piggy in the middle" but after around 10 minutes, they began to grow weary of the game. This led to perhaps the most interesting part of the video analysis; the children broke off into pairs or played by themselves with the balls that had been used in the previous game. By capturing children freely playing, the research was able to evaluate their behaviour and speech not only when playing in a group but also when they were freely playing on their own. This was particularly beneficial when examining the third hypothesis, as it provided a well rounded picture of how the participants played, not only in groups, but on their own too.

As previously mentioned, the study had a particularly low turnout, much lower than was originally expected. This was partly due to policy of the after school club. The after school club has set a principle to be an inclusion after school club where the

children can choose which activities they would like to do during the course of their stay. The research was conducted in the after school club on a Friday and given that this was a long afternoon for some of the children, they were given plenty of alternative activities. As such, the children were given a choice between the research project or one of the many other activities available to them. This was detrimental to the study as this led to a low participant turn out, as the children turned to other activities such as art or even playing video games! The same procedure followed for the second session and the children who had participated in the first session were asked if they would like to participate again, they were not encouraged by the after school club leaders to complete the study, which could inadvertently discourage the children. Once they had been given the option to complete the study, the children were also told of many other activities that could take part in, at the same time as the study. This, from a research perspective, was challenging, as children will tend to go for the most exciting activity – which would not be filling out questionnaires!

A further shortcoming of this study arose when marking the questionnaires, the questionnaires originally included two questions asking the participants to rank their preference between 1 and 5 on activities related to video game playing and the way they preferred to play games. Whilst the questionnaires were being completed, the children were actively encouraged to ask questions when they did not understand. However, when the questionnaires were being marked, it was found that two thirds of the participants had not ranked their preferences correctly, and had instead put a number 1 beside all the activities that they liked to do. This was a drawback to the study, as further information about how children liked to play video games may have been helpful in developing a fuller understanding of the video game habits of children and if this was related to their self-esteem in any way.

The design of the study was a further handicap of the study. It was presumed that most, if not all of the children, from the after school would want to take part in the study and that the children who participated in the first session, would want to participate in the second session. This however, was not the case, and some of the participants from the first session refused to take part in the second session, preferring instead to play video games on the games consoles within the after school club. This was mainly due to the experimenter's inexperience for not considering that some children would not want to partake in both sessions of the study, due to the age of the participants and the developmental stage that they were in. In hindsight, this study may have benefitted from a pilot study to establish if there was enough interest from the children in the after school club.

The questionnaire, also asked children how often they played video games and gave them four options to choose from – everyday, more than once a week, less than once a week or hardly ever – the final variable of hardly ever was not used as no participant had chosen it as their option. This was an attention-grabbing factor, every participant played video games frequently, and the only difference became the frequency of playing. Originally, it was hoped that some of the participants did not play video games as this would enable a clear difference between the behaviours of those who do play video games and those who do not, to be fully analysed.

A positive aspect of this study relates to the inclusion of a game playing factor. Previous studies have shown that children who play in groups will develop high self-esteem, self-confidence and self-awareness through play. It is thought that

encouraging children to play with one another will promote increased social skills, which are highly valuable throughout life (Othman & Said, 2012). This study filmed the children playing games in groups to understand their speech and behaviours within the groups; this could be a significant factor for future research to better understand if playing in groups can boost self-esteem and if there is any relationship. Future research could also focus on the speech and behaviour scores from the filmed sessions, it would be interesting to understand if there is an effect of speech and behaviour in areas other than playing in groups and amount of time spent playing video games.

Understanding theory of mind was tested in terms of the children's answers to the Baron-Cohen (1989) story testing second order false belief, but it would have been useful to understand theory of mind development concerning children who are on the autistic spectrum, as they are thought to have specific impairments when understanding theory of mind (Perner & Lang, 1999). The participants in this study all scored between two and four – with four being the maximum score. This is in line with previous research conducted by Pilowsky et al (2000), who found that normally developing children of different ages could pass theory of mind tasks. McAllister and Peterson (2007) also confirmed this finding; however they attributed higher theory of mind scores in younger children to the presence of an older sibling. This could be an interesting addition to the research, to understand if the children aged 8 who scored on par with a 10 year old, had older siblings.

Further to this, de Rosnay and Hughes (2006) have argued that there are flaws within false belief testing children at one single point throughout a study. This leads to the argument of testing the children longitudinally to see if their scores change at any during the study. Longitudinal testing is something that this study may have benefited from and may have led to a significant result in terms of understanding mind and amount of time spent playing video games.

There are also a growing number of studies expressing concerns with false belief testing in general. Lockl & Schneider (2007) found false belief tasks did not correlate with appearance and reality tasks – another way to test of theory of mind, invalidating their findings. Moreover, it has been argued that false belief tasks are difficult for children to understand, which is why many children fail such a task. Bloom and German (2000) argued that researchers focus on false belief tasks because it is an area of theory of mind research that children persistently fail in, whereas they do not find other tasks as difficult. They further argue that, false belief tasks are just one aspect when understanding theory of mind and children should be tested on several different tasks. This is an interesting factor for future research, which could include several tasks to test theory of mind and understand if theory of mind scores can affect children's self-esteem and subsequently amount of time spent playing video games.

Ott and Pozzi (2012) looked at children's video game behaviours longitudinally to understand how this affected their creative thinking. As previously mentioned, in terms of self-esteem, understanding mind and video game playing, it may also be useful to conduct longitudinal work to understand the effect that increasing age would have on a child's self-esteem and playing of video games. This could result in many benefits to the study, mainly, understanding changes that a child may go through whilst making the transition to their teens.

In addition to this, it may be useful to include a video game playing aspect and score the children's behaviours and speech whilst they are playing a video game with other children. The results of video game playing behaviour and speech could then be compared to those taken when the children are playing in groups to see if there is a difference in the interactions.

Chapter 5: Conclusions & Recommendations

Potential considerations for future research are mostly related to the video games questionnaire, this was designed by the researcher to cover everything important within the research. However, in future, this could be done as has been in previous studies where a tested and validated questionnaire was adapted to suit the current age group (Sun et al, 2008; Jeong & Kim, 2011 and Thomas & Martin, 2010). Whilst it is noted that the self-esteem questionnaire was already valid and reliable, due to it being an adaptation of Rosenberg but to have the other valid and reliable questions too, could make the study more robust. This would also assist, as it would not be necessary to remove questions from the data set.

A further aspect of this would be to conduct between subject's research where participants play different video games and games with other children in groups. It could be enlightening to see how the different aspects of physical play and video game play affects self-esteem scores and subsequent theory of mind scores.

Another consideration for future research would be the option of carrying out the research within a primary school, which could generate higher participant numbers, as the children would be expected to take part during class time. As previously discussed, this was considered to be extremely detrimental in the context of the current research and affected the outcome of the study.

As video games are becoming increasingly more popular, especially among younger children, it is extremely important to understand the salient effects that extensive playing could incur (Thomas & Martin, 2010) and how this can relate to playing in groups and in turn affect developmental aspects such as self-esteem and understanding mind. Some companies have been accused of targeting young children with their appealing video games and attractive packaging (Thomas & Martin, 2010); providing a sense of achievement which could lead to a severe addiction and in some cases the child becomes ostracised from their peers (Abrams et al, 2011). There is no doubt that this would have a profound effect on a child's development, both socially and cognitively, hence there seems to be a sense of urgency to understand the full implications of video game playing. There is no denying that video games are more popular now than ever before, this was evidenced in the current study with most of the children owning at least one video games console, with some stating in the questionnaire that they own all seven. Whilst this research did not find any significant differences between the amount a child played video games concerning understanding mind and self-esteem, it did find a significant difference with regard to children's behaviours and speech when playing with other children. These findings require longitudinal investigation to ensure that there is complete validity and reliability. It would be wrong to solely concentrate on the weaknesses of the current study and not focus on the strengths which showed there was a significant difference between amount of time spent playing video games and behaviour and speech during game play with other children.

Overall, while the study did not conform to previous research and confirm the existence of the relationship between self-esteem and video games; it did bring up the importance of the amount of time spent playing video games and this subsequent effect on behaviour and speech when playing in a group with other children.

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