CHILDREN'S AND ADULTS' PROSOCIAL BEHAVIOR IN REAL AND IMAGINARY SOCIAL INTERACTIONS

by

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DISSERTATION ABSTRACT

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In everyday life, there are many situations that elicit emotional reactions to an individual's plight, leading to empathic thoughts and helping behaviors. But what if the observed situation involves fictional characters rather than real life people? The main goal of this dissertation was to investigate the extent that empathic thoughts and helping behaviors characterize children's responses to fictional social interactions, as well as to real ones. Another goal was to develop a new measure of prosocial behavior.

In Study 1, 60 undergraduate students (36 female; M_{age} = 19.87, SD_{age} = 4.46) played two computerized ball-tossing games, one with 3 co-players who were believed to be other students and one in which a ball was tossed between 3 walls. During the second half of each game, one of the co-players/walls was excluded by the other two co-players/walls; the participant's subsequent increase in passes to the excluded co-player/wall was recorded. Participants increased their passes to the excluded real co-player more than to the excluded wall, indicating that the increase in the Real Condition were attempts to help another person, rather than simply to even out the distribution of passes.

Study 2 extended these findings to children and tested the relationship between reactions to real and fictional social interactions. Seventy-one 5- and 8-year-old children (36 females; 35 5-year-olds: M_{age} = 5 years, 8.2 months, SD_{age} = 2.4 months; 36 8-year-olds: M_{age} = 8 years, 6.5 months, SD_{age} = 2.9 months) played the computerized ball tossing game with (1) other children they believed to be real, (2) novel cartoon characters, and (3) walls. One of the co-players/walls was excluded in the second half of each game. Although children reported similar empathic reactions towards the excluded real and fictional co-players, they increased their passes to the excluded real co-player more than to the excluded fictional character or wall (controlling for individual differences in real life empathy). These results suggest that children's emotional reactions to what they experience in fiction and in real life are similar, but they take the behavioral steps to help another individual only when that individual is believed to be a real person.

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TABLE OF CONTENTS

Chapter Page

Chapter Page

Chapter Page

Chapter Page

LIST OF FIGURES

Figure Page

LIST OF TABLES

CHAPTER I

INTRODUCTION

Imagine yourself in your car stopped at a traffic light at a busy intersection. A young mother is trying to cross the street in front of you while pushing a baby in a stroller with one hand and, with her other hand, holding onto a young boy who has just dropped his teddy bear in the middle of the street. The mother is obviously anxious to get her children safely across the street before the traffic light changes, but has paused to help her child pick up the teddy bear. What do you feel and what do you do in this situation? Do you feel empathy for the struggling mother? Do you feel anxious or sad for the child who has dropped his teddy bear? Do you think about ways in which you could help them (e.g., perhaps you can quickly get out of your car to help pick up the teddy bear and get the family safely across the street before the light changes)? We frequently encounter situations in which we experience emotional reactions to an individual's plight, leading to empathy (i.e., emotional arousal and thoughts that are congruent with another's emotional state), which motivates us to develop a plan for prosocial behavior (i.e., voluntary actions that are intended to help another) (Eisenberg, Fabes, & Spinrad, 2007).

But what if the observed situation is fictional? When children and adults hear a story or create their own narratives, they have the striking capacity to be "transported" to an imagined world where they become absorbed in the mental simulation (Gerrig, 1993; Oatley, 1999). Part of this experience involves forming attachments and responding emotionally to the characters in the story (e.g., adults cry when a beloved character dies in a novel; children express love for their imaginary companions). In fictional contexts, do emotional reactions to imaginary social situations give rise to action plans or fantasies of how to help a character? If emotional responses elicit prosocial thoughts towards a fictional character, then fiction could provide a training ground for developing prosocial behavior that ultimately might contribute to altruism in social interactions in real life.

In this dissertation, I investigated the extent to which there are similarities in empathetic and prosocial reactions to real and fictional social interactions. My first step was to develop a new measure of prosocial behavior and to test it with a sample of adults (Study 1). In this initial study, the measure of prosocial behavior involved responses to a situation with real people. The second step was to adapt this measure for use with children and to add a condition that involved fictional characters (Study 2). Thus in Study 2, it was possible to compare the prosocial behavior of children (5- and 8-year-olds) in response to real and fictional social interactions. To provide context for Studies 1 and 2, I first briefly review research investigating the development of prosocial behavior and then discuss the correspondence between fictional and real experiences.

Development of Prosocial Behavior

Prosocial behavior across childhood is associated with successful peer relationships (Farver & Branstetter, 1994), high levels of social competence (Bear & Rys, 1994), mature self-regulation skills (Rothbart, Ahadi, & Hershey, 1994), advanced social problem-solving skills (Marsh, Serafica, & Barenboim, 1981), less conflict with friends (Dunn, Cutting, & Fisher, 2002), and low levels of aggression and externalizing problems (Caprara, Barbaranelli, & Pastorelli, 2001). In adulthood, prosocial behavior (e.g., engaging in volunteer work) is related to lower levels of depression (Wilson & Musick, 1999), greater life satisfaction (Wheeler, Gorey, & Greenblatt, 1998), higher self-esteem (Newman, Vasudev, & Onawola, 1986), and having quality social relationships

(Weinstein & Ryan, 2010). It is clearly important to identify the factors that are related to individual differences in the development of prosocial behavior, which is one of the goals of this dissertation.

The early precursors of prosocial behavior are observed in the rudimentary empathic responses of young infants (e.g., crying when they hear another baby crying; Martin & Clark, 1982; Sagi & Hoffman, 1976). By 8 months of age, babies engage in basic prosocial behavior, such as sharing objects (Hay & Rheingold, 1983) and by 12 months, they often provide positive contact (e.g., a hug) or verbal reassurance in reaction to another person's emotional distress (Zahn-Waxler, Robinson, Emde 1992). Infants this age also offer objects as support for others in distress, but the objects tend to be ones that the child himself or herself would find comforting (e.g., the child's pacifier or teddy bear; Eisenberg et al., 2007). Between 14- and 36- months of age, empathic concern and prosocial behavior increase in reaction to an experimenter or mother's feigned distress (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). During this time, younger toddlers are capable of instrumental helping (i.e., helping someone to complete an interrupted action), whereas older toddlers are able to engage in empathic helping (i.e., helping in order to alleviate someone else's distress). By 30 months of age, children are beginning to show signs of altruistic helping (i.e., helping someone at one's own cost) (Svetlova, Nichols, & Brownell, 2010).

Further increases in prosocial behavior develop between the preschool and elementary school years as children gain better perspective taking skills and have more opportunities for social interactions with same-age peers (Eisenberg & Fabes, 1998). Adolescents tend to have higher levels of prosocial behavior than 7- to 12-year-olds for sharing and donating, but not for instrumental helping or comforting (Eisenberg & Fabes, 1998) and there is some evidence that during adolescence, there is a decline in helping victims of aggression (Lindeman, Harakka, & Keltikangas-Jarvinen, 1997). It is important to note that these age trends do not hold for all studies, mostly due to varying methods of data collection, but in a meta-analysis controlling for the type of method and measures used, Eisenberg and Fabes (1998) found substantial evidence that prosocial behavior increases with age from infancy through adolescence. There are also individual differences that show stability over time; children's relative levels of prosocial behavior at age 6-years were similar to their relative levels at 12 years (Côté, Tremblay, Nagin, Zoccolillo, & Vitaro, 2002).

Age-related changes in prosocial behavior are associated with sociocognitive factors, which include being able to understand and decode others' emotions (Batson, 1991; Eisenberg et al., 2007), as well as evaluative and planning processes (Krebs & Van Hesteren, 1994). These factors, associated with theory of mind (i.e., the ability to take the perspective of another person and to recognize people's behaviors in terms of their mental states) and executive function (i.e., mental skills that allow us to regulate, control and manage other cognitive processes, including planning, attention, working memory, and inhibition) develop from infancy through adolescence (Harris, 2006; Zelazo & Carlson, 2012). With development, children are increasingly able to recognize that other people are distressed, with older children being able to recognize more subtle cues. Furthermore, perspective taking and executive abilities allow children to weigh the costs and benefits of helping, with older children weighing costs to the self less and being more attuned to the social benefits than younger children (Eisenberg et al., 2007). Children's motivations to engage in prosocial behavior have also been found to change over time. Younger children are thought to be motivated to help others when they believe that they will gain material rewards or avoid punishment, whereas older children are thought to be motivated by social approval and reciprocity (i.e., they recognize that they will be more likely to be helped in the future if they help other people now) (Bar-Tal, Raviv, & Leiser, 1980).

Measurement of prosocial behavior. In adults, prosocial behavior is primarily measured with self-report questionnaires (e.g., Caprara, Steca, Zelli, & Capanna, 2005), which have the drawback that social desirability or social influence might contribute to responses. For children, the methods used to investigate the development of prosocial behavior have included: parent or teacher questionnaire (e.g., Ladd, Herald-Brown, & Andrews, 2009), child interviews, children's reports of what they might do in a hypothetical situation, requests for children to help or share with another person in a controlled setting (e.g., Eisenberg, Guthrie, Murphy, Shepard, Cumberland, & Carlo, 1999), and the recording of children's responses to altruistic opportunities (e.g., giving stickers/money/candy that children are told will be distributed to poor children; Iannotti, 1978). Other assessment techniques have been to observe children's spontaneous prosocial behavior (e.g., sharing toys, comforting a distressed peer) in a naturalistic setting (Eisenberg et al., 1999) or by setting up a scenario in which child or adult participants have the opportunity to help an experimenter or confederate (e.g., Chambers & Ascione, 1987; Greitemeyer & Osswald, 2010). This approach can provide rich information, but is laborious (even for snapshots of behavior) and often the observational data are difficult to code and interpret. A goal of this dissertation was to develop a behavioral assessment that was relatively free of social desirability influences and was easy to administer in the laboratory.

Correspondence Between Responses to Fictional and Real Life Experiences

Thus far, I have discussed prosocial behavior pertaining to real life situations. But humans have the capacity to empathize with and experience emotional reactions and attachments to fictional characters despite knowing that the fictional characters and the situations in their stories are not real (Mar & Oatley, 2008). The idea that fiction simulates real world scenarios and social interactions dates to ancient philosophers, such as Aristotle, who were fascinated by the concept of *mimesis*, or simulated representations that occurs from being exposed to fictional narratives (Halliwell, 2002). Recently there has been a surge of interest in the possibility that the simulation of emotion that is experienced in fiction provides insight into real world social interactions and thus has real life significance (Mar & Oatley, 2008; Zunshine, 2006).

In discussing this research, it is important to recognize that there are many types of fictional experiences that vary in several respects (e.g., whether they are created by the self or by others). Here I discuss the correspondence between real life and (1) internally generated mental imagery, (2) the consumption of fictional narratives in books, movies and other sources, and (3) children's pretend play.

Mental imagery. Mental imagery is the experience of a perception in the absence of immediate sensory input (e.g., being able to imagine the sound of a dog barking or an image of a dog). This ability is thought to be important for memory, spatial and abstract reasoning, learning skills, language comprehension, and other cognitive skills (Kosslyn, Behrmann, & Jeannerod, 1995). Many studies have found a correspondence between the reaction time, behavior, and brain areas associated with actual motor or perceptual experiences and mental imagery across several domains, such as motor action, vision, and audition. For example, when asked to imagine grasping and to actually grasp an object, both adults (Johnson, 2000) and young children (Sachet, Frey, Jacobson, & Taylor, under review) imagine holding and actually hold their hand in the same way. Neuroimaging research has shown that common brain areas are activated during real motor action and motor imagery (Jacobs, Danielmeier, & Frey, 2010; Johnson-Frey, Newman-Norlund, & Grafton, 2005), actual visual experience and visual imagery (Kosslyn, Gannis, and Thompson, 2001; O'Craven & Kanwisher, 2000), and real auditory perception and auditory imagery (Zatorre, Halpern, Perry, Meyer, & Evans, 1996). Single, specific neurons have also been found to fire selectively during both actual vision and visual imagery (Kreiman, Koch, Fried, 2000).

There is a large body of research examining the effects of mental practice (imagining oneself performing an action) and mental simulation in facilitating physical and cognitive performance and positive social behaviors. In the physical domain, mental practice improves real execution of actions (e.g., jumping hurdles, throwing a ball towards a target) in adults (Driskell, Cooper, & Moran, 1994) and children (Doussoulin & Rehbein, 2011). Mental practice of cognitive tasks, such as solving math problems, has also been found to promote real performance on the cognitive task in both adults (Ginns, Chandler, & Sweller, 2003) and children (Leahy & Sweller, 2004). There have also been facilitative effects of mental simulation in the social domain. Crisp and Turner (2009) suggest that imagining positive intergroup interactions leads to positive attitudes and reduced stereotyping towards an out-group, which promotes positive interactions with real out-group members (Brambilla, Ravenna, & Hewstone, 2012; Turner & West, 2012). In clinical settings, imagined interactions or situations are often used in therapy as ways to cope with issues such as trauma or anxiety (Porat & Sadeh, in press; Sheikh, 2002).

Fictional narratives in books, movies, and other sources. Several studies have found a relationship between experiencing fictional narratives and real situations. Some authors have argued that this correspondence is what makes fiction so interesting and engaging (e.g., Zunshine, 2011). Fiction (experienced in the form of novels, movies, television, theater, comic books, etc.) parallels real life thoughts, desires, and emotions, providing deep insight into the human experience (Saunders, 2011; Zunshine, 2011). For example, the emotional reactions that we experience in response to fiction are similar to the emotional reactions we have toward real life situations (e.g., we laugh when something funny happens to our favorite character in a novel just as we laugh when something funny happens to our best friend in real life) (Harris, 2000; Oatley, 1999). The emotions that we experience in reaction to fiction are often powerful and long lasting, just as they are in reaction to real life events (Mar, Oatley, Djikic, Mullin, 2010). The processing that takes place while reading fictional narratives also parallels that of the processing that occurs during real social interactions (Mar, Oatley, Hirsh, dela Paz, & Peterson, 2006). When adults read and when children are read to, they take the perspective of the characters in the story, mentally representing the characters' emotions and mental states (Ozyurek & Trabasso, 1997; Rall & Harris, 2000), much like we do when interacting with other people (Harris, 2006). For example, adult readers create mental models of the characters, which they update as new information become available

(Rapp, Gerrig, & Prentice, 2001). Without the ability to interpret protagonists' behaviors in terms of certain mental states, reading fiction would not be understandable, much less enjoyable (Zunshine, 2006, 2008, 2011). In fact, there is evidence that people with autism, who have deficits in theory of mind ability (Baron-Cohen, 1995), have difficulty understanding fictional narrative (Barnes, Lombardo, Wheelright, Baron-Cohen, 2009) and thus, find more enjoyment in reading expository nonfiction than fictional narratives (Zunshine, 2011).

Because of these processing similarities, it is not surprising that the brain areas that are activated while reading narratives, primarily those associated with mentalizing (i.e., seeking to understand the minds of others), are similar to those that are activated during real social interactions (Mar, 2004). People also exhibit similar physiological responses (e.g., heart rate, galvanic skin response, startle response) when reading about emotional content in fiction as when experiencing the same emotion in real life (Harris, 2000). Furthermore, when reading certain action words (e.g., 'to kick'), the brain areas associated with the body part used for that action are activated (e.g., the leg) (Pulvermüller, Härle, Hummel, 2001).

Although there is some research suggesting that reading fiction can positively influence our real world attitudes (Appel & Richter, 2007, Green, 2004; Green & Brock, 2000; Prentice, Gerrig, & Bailis, 1997; Strange & Leung, 1999), much of the research about the effects of exposure to fiction has focused on the *negative* behavioral consequences of television and videogames. In a classic study by Bandura, Ross, and Ross (1963), children who watched a movie of an adult playing aggressively with a Bobo doll were more aggressive towards the doll themselves when they were given a chance to play with the doll. Several other studies have shown that being exposed to violent television and videogames increases children's relational and physical aggression in real social interactions (Anderson et al., 2003; Bushman & Anderson, 2002).

Although there is substantial research showing the negative effects of viewing media, there is also research showing the children can learn *positive* behaviors and skills from television and videogames. Children can learn new vocabulary words in their native language (Rice & Woodsmall, 1988) and a second language (Linebarger & Walker, 2005) by watching shows such as *Sesame Street* and *Dora the Explorer;* however, there are limits to this and some studies have shown that infants learn better from a real model rather than one on television (DeLoache et al., 2010; Kuhl, Tsao, & Liu, 2003; Robb, Richert, & Wartella, 2009).

Most relevant to this dissertation, prosocial abilities can be learned from exposure to prosocial content in television and videogames. Specifically, watching television shows with prosocial content leads to positive behaviors and attitudes (e.g., altruism, positive social interactions, reduced stereotyping) in children (Mares & Woodard, 2005; Ostrov, Gentile, & Crick, 2006). Furthermore, when adult participants played videogames in which they helped characters in the game solve problems, they had increased prosocial thoughts (Greitemeyer & Osswald, 2011), empathy (Greitemeyer, Osswald, & Brauer, 2010), and helpful behavior towards a real peer (Gentile et al., 2009; Greitemeyer & Osswald, 2010), as well as decreased pleasure at other people's misfortunes (i.e., *schadenfreude*; Greitemeyer et al., 2010). With one exception (Chambers & Ascione, 1987), the effects of children's engagement with prosocial content in videogames specifically have not been investigated. Therefore, it has not been established whether the emotional reactions elicited by interactions with fictional players in a videogame would give rise to action plans of prosocial behavior towards fictional characters and how this might relate to prosocial behavior towards real people in young children. Study 2 of this dissertation addresses this issue.

Pretend play. Children can have intense emotional reactions while engrossed in pretend play (Harris, 2000). For example, children can appear to become genuinely afraid when they engage in scary pretend play (e.g., Bourchier & Davis, 2000a; DiLalla & Watson, 1988; Golomb & Galasso, 1995; Harris, Brown, Marriott, Whittall, & Harmer, 1991; Kavanaugh & Harris, 1999; Woolley, 1997). Furthermore, in addition to reporting feelings of love towards their imaginary companions, some children discuss feelings of anger and annoyance with the behavior of their imaginary companions, much like they would in reaction to a real play partner's unruly behavior (Taylor, Carlson, & Shawber, 2007). Children also become absorbed in the fantasy and often have special requirements for their imaginary companions (e.g., insisting that a place be set at the family dinner table; making sure that the TV is turned on whenever the family goes out so that the imaginary companion will not be lonely when nobody is home; having a separate car seat in the family car so that the imaginary companion would be safe while driving) (Taylor, 1999). In addition, children with imaginary companions engage in imaginary conversations and have face-to-face interactions with their imaginary companions, just as they would with a real play partner (Taylor, Shawber, & Mannering, 2008). These results suggest that children's emotional and behavioral reactions to imagined situations are similar to their real-world reactions.

It is important to point out that these results do not suggest that children are confused about the difference between fantasy and reality. In fact, young children are surprisingly adept in their ability to negotiate the boundary between fantasy and reality. For example, by the time children are 4 years old, they are proficient in their ability to classify and answer questions about the differences between real and pretend entities, understanding that imagining is a private mental process occurring in a person's mind, that knowledge reflects reality more accurately than imagination, and that objects they have been asked to imagine do not really exist (Bourchier & Davis, 2000b; Bretherton & Beeghley, 1982; Estes, Wellman, & Woolley, 1989; Flavell, Flavell, & Green, 1987; Harris, Brown, Marriott, Whittall, & Harmer, 1991; Sharon & Woolley, 2004; Wellman & Estes, 1986; Woolley & Wellman, 1993). Children's strong emotional responses to fiction and their absorption in pretend play has been interpreted as evidence that they are confused about the difference between fantasy and reality. However, it has been pointed out that children's reactions are not altogether different from adults' experiences of becoming immersed and responding emotionally to fictional worlds in books, movies, and other media (Harris, 2000; Taylor, 1999; Woolley, 1997).

In children, pretend play, especially role play, which involves imagining and acting out the part of another person or creature, is widely believed to contribute to children's understanding of the real world (e.g., Bretherton, 1984; Harris, 2000). Children's real world knowledge influences the content of their pretend play (Engle, in press), but children have also been found to learn real world knowledge via pretend play (Sutherland & Friedman, 2012). Furthermore, play therapy, which is a common therapeutic technique used with young children, relies on the premise that real world problems can be ameliorated by engaging in pretend play (Russ & Fehr, in press). However, this positive view of pretend play has recently been challenged. According to Lillard and colleagues (2012), pretend play might just be one possible contributor or even merely a byproduct of other variables related to healthy development. In addition, there is some empirical evidence that children do not always transfer what they learn in a fictional context to a real world situation (Richert, Shawber, Hoffman, & Taylor, 2009). Thus, the correspondence between pretend play and real life is currently a controversial issue; more research is needed to identify the ways that pretend play might facilitate real life social understanding.

Overview of Dissertation Research

The research suggesting a correspondence between real and fictional/imagined situations, as well as the facilitative effects of exposure to fiction and the use of mental imagery on real life behavior are consistent with the possibility that the simulation of prosocial interactions could facilitate prosocial behavior in real life situations. Learning about the manifestations of prosocial behavior in real and imaginary social interactions in adults is interesting, but might be particularly beneficial for children because childhood is when prosocial behavior and imagination are emerging and developing.

To begin this project, it was important to identify a measure of prosocial behavior that could be set up to involve either real people or fictional characters. For this purpose, I adapted a version of an existing task called Cyberball, a computer program developed by Williams and colleagues (Williams, Cheung, & Choi, 2000; Williams, Govan, Croker, Tynan, Cruickshank, & Lam, 2002; Williams & Jarvis, 2006) that simulates a real, interactive social experience. Participants played a virtual game of catch (i.e., a simple ball tossing game) with co-players who are represented on a computer screen.

In most previous research, the co-players in the game are described to the participants as real people connected over the Internet, although unbeknownst to the participants, the co-players are actually part of the computer program. Williams and colleagues have used Cyberball to simulate the experience of social rejection by excluding the participant in the game of catch (e.g., Williams et al., 2000; Williams, 2007). Exclusion from the game elicits negative feelings, such as distress, social isolation, having less control, and losing a sense of belonging. In other versions of Cyberball, participants observe one of the other players being socially excluded. The results of these studies show that observing social exclusion elicits strong emotional empathic reactions towards the ostracized player in adults (Wesselmann, Bagg, & Williams, 2009) and adolescents (Masten, Eisenberger, Pfeifer, & Dapretto, 2010; Masten, Morelli, & Eisenberger, 2011). Importantly, for adolescents the task also elicited thoughts about prosocial behavior towards the excluded player (Masten et al., 2010; Masten et al., 2011).

In my dissertation, the Cyberball program was used to simulate the experience of engaging in a social interaction in which someone other than the participant was being socially excluded. Participants played games of catch with three co-players. At the beginning of the game (Baseline), the ball was tossed back and forth among three peers and the participant. The three co-players passed equally (but randomly) to the other co-players in the game, including the participant. During the subsequent social exclusion part of the game, two of the co-players passed only to each other or to the participant.

Thus, in this version of Cyberball, it was someone other than the participant who was being socially excluded. By recording the time course of a participant's increases in passes to the excluded player, as well as the size of the increase, it was possible to index the participant's prosocial responses to another person's social exclusion.

Although Cyberball has been used to study prosocial thoughts and empathic reactions to observing another person's social exclusion (e.g., Masten et al, 2010), it has not been used in this way as a behavioral index of prosocial behavior. I investigated the extent that adults noticed the exclusion of a co-player and reacted to it emotionally and/or behaviorally. Their responses to the exclusion of a co-player were compared to responses to a nonsocial version of the game, in which the ball bounced between three walls. This nonsocial Control Condition was perceptually similar, but it lacked the social content present in the condition in which participants play catch with co-players.

Study 2 extended Study 1 to see if the Cyberball task could be used as a behavioral index of prosocial behavior in young children as well as to investigate the extent that prosocial behavior is elicited even when children are told that the co-players are fictional. Based on previous research about the correspondence between the emotional and behavioral responses to fictional and real life experiences, I was interested in the relationship between children's reactions to real and fictional social interactions.

CHAPTER II

STUDY 1

Introduction

The Cyberball paradigm has typically been used to investigate participants' reactions to their own social exclusion. In these studies, there is a baseline period in which the participant and other players throw around a virtual ball on a computer screen, followed by a period in which the other players begin to pass amongst themselves, excluding the participant. This method of inducing the experience of social rejection has been used with adults (e.g., Zadro, Williams, & Richardson, 2004), adolescents (e.g., Sebastian et al., 2011), and with children (e.g., Bolling et al., 2011; Moor et al., 2012). In these studies, participants experience negative emotions, such as distress, social isolation, having less control, and losing a sense of belonging (e.g., Williams et al., 2000; Williams, 2007). In addition, the experience of social exclusion in Cyberball is associated with brain activation in areas that are associated with physical pain (Eisenberger, Lieberman, & Williams, 2003).

In Study 1, I used the Cyberball paradigm as a measure of prosocial reactions to *another person's* social exclusion. In the few studies that have used Cyberball to investigate participants' responses to another person's social exclusion, participants witnessed another person's social exclusion without taking part in the game themselves (i.e., the participants watched other people's game of Cyberball on a computer screen) (Beeney, Franklin, Levy, & Adams, 2011; Masten et al., 2010, 2011; Wesselmann, Bagg, & Williams, 2009). This method allows for investigating the neural responses to another person's social exclusion, and have shown that areas of the brain associated with mentalizing (i.e., seeking to understand the minds of others) and experiencing physical pain (i.e., “feeling the pain” of the other person who had been socially rejected) were activated when observing another person’s social rejection.

Study 1 differs from previous research because participants were given the opportunity to respond behaviorally during the game instead of merely observing another’s social exclusion. Although some studies have included behavioral measures of prosocial behavior (Masten et al., 2010, 2011), the participants themselves were not involved in the Cyberball game. For example, Masten and colleagues (Masten et al., 2010, 2011) measured prosocial behavior by asking participants to write emails to the people they watched play Cyberball. These emails were later coded for prosocial content that was (1) directed towards the excluded player, (2) related to social exclusion, and (3) realistic in the context of the email. Prosocial responses in these emails were related to increases in neural activity associated with empathy for another person’s social exclusion in brain regions associated with mentalizing and experiencing social pain.

Although coding the content of emails written to the co-players after the Cyberball game provided an assessment of prosocial behavior, it would be interesting to determine what participants might do to alleviate the other person’s social exclusion during the game. A goal of Study 1 was to develop a behavioral measure of prosocial behavior that would provide an index of attempts to include the excluded player in Cyberball. To do this, participants played Cyberball with three co-players, one of which was excluded by two of the co-players halfway through the game. Measuring the participants’ increase in passes to the excluded co-player provided a behavioral index of prosocial behavior during the game.

Another goal of Study 1 was to develop a nonsocial Control Condition to use in comparison to the social condition in an effort to determine whether participants' behavioral responses were truly prosocial (i.e., attempting to help another person) rather than an attempt to even out the passes. Previous studies using Cyberball have only used social conditions. In most studies, participants were explicitly told they were playing with other people (e.g., Williams et al., 2000; Berstein & Claypool, 2012); this is the case for studies examining the participants' own social exclusion, as well as another person's social exclusion. Although in some studies, participants were told that the game was controlled by a computer program (e.g., Tang & Richardson, 2013; Zadro et al., 2004), the co-players were depicted as animated people and the game might have been experienced as involving social interaction. In fact, even when participants were told that the game was controlled by the computer, they had negative responses to being excluded (e.g., lowered levels of self-esteem) that were comparable to the reactions of participants who believed that they were playing with other people (Tang & Richardson, 2013; Zadro et al., 2004). Zadro et al. (2004) interpreted this finding as evidence that humans have an innate, adaptive sensitivity to any type of social exclusion, even if participants know the exclusion is controlled by a computer. However, it is possible that participants experienced the game as involving social interaction because the co-players were depicted as animated people. It is also unclear whether participants react negatively to exclusion (either their own or another player's) due to social factors (e.g., feeling bad because other people are leaving them or another person out of the game) or due to other factors, such as boredom or dissatisfaction with an uneven number of turns for each player. In Study 1, a truly nonsocial Control Condition that was perceptually similar to the social condition with “real” co-players was created by using walls in place of the animated co-players.

I also assessed participants’ self-reports of real life prosocial behavior, empathy, emotional reactions to the Cyberball task, social desirability, tendency to anthropomorphize, and traits related to Autism, including social skills, communication, imagination, attention switching, and attention to detail. The self-reported real life prosocial behavior, empathy, social skills, and reactions to the Cyberball task measures were included to determine if prosocial responses on the adapted Cyberball task are related to real life prosocial behavior and empathy. The reactions to the Cyberball task, the anthropomorphism measure, and the attention to detail subscale of the Autism Quotient were included to help clarify individual differences in participants’ behavior during the Cyberball task. For example, previous research has shown that children and adults often attribute mental states and social intentions to non-human agents (i.e., anthropomorphism) (Waytz, Cacioppo, & Epley, 2010). Therefore, it is possible that some participants will interpret the nonsocial Control Condition as involving entities that care about being excluded. For this reason, it will be important to see if participants’ reactions to each condition of the Cyberball game differ and if individual differences in anthropomorphism relate to individual differences in prosocial behavior during the nonsocial Control Condition. It is also possible that participants will attempt to even out the passes during both conditions, not because they want to include an excluded co-player or wall, but rather to systematize the passes. Previous research has suggested that the tendency to systematize – to notice structure and rules – is related to the capacity to pay attention to detail (Baron-Cohen, 2010); therefore, a measure of individual differences in participants' attention to detail was also included.

Hypotheses. It was hypothesized that the Cyberball task would elicit prosocial behavior in the social condition involving social interactions with real people, but not the nonsocial control condition. Specifically, participants would attempt to include (i.e., pass the ball more often to) the excluded co-player in the Real Condition more often than passing the ball to the excluded wall in the Control Condition. It was also hypothesized that individual differences in prosocial behavior during the Cyberball task would be related to individual differences in self-reports of real life prosocial behavior, empathy, and social skills (controlling for social desirability), as well as anthropomorphism, and attention to detail. Specifically, it was expected that participants' attempts to include the excluded player in the Real Condition would be related to individual differences in everyday prosocial behavior, empathy, and social skills; whereas participants' attempts to even out the passes to the excluded wall were expected to be related to individual differences in self-reports of anthropomorphism; attempts to include the excluded co-player/wall in both conditions might relate to individual differences in attention to detail.

Method

Participants. Participants were 60 college students recruited from the University of Oregon Psychology Department's Human Subject's Pool (36 females and 24 males; M_{age} = 19.87, SD_{age} = 4.46; 18 to 52 years). The majority of participants identified themselves as White (n = 37; 61.7%); there were nine participants who identified themselves as Asian, four as a mix of ethnicities/races, three as Hispanic, Latino, or Spanish, two as Black or African American, two as "other", and one each as Asian

Indian, Pacific Islander, and Middle Eastern. There were 31 Freshmen, 15 Sophomores, 5 Juniors, 1 Senior, and 2 Post Baccalaureates. Participants were compensated with class credit.

Materials.

Cyberball task. Participants engaged in two conditions of Cyberball (version 3) on a 996 MHz Dell PC with an Intel Pentium III processor and 512 MB of RAM on Microsoft Windows XP Professional platform (Version 2002 with Service Pack 3). In one condition, participants believed they were playing with other students (Real Condition) and in the other condition, participants bounced the ball around between walls (Control Condition); the conditions were counterbalanced across participants. For each condition, Cyberball was set to play with four total locations (the participant, plus three co-players or three walls). The participant was always in the position at the bottom of the screen; the co-players in the Real Condition or the walls in the Control Condition were in locations at the top of the screen, to the right of the screen, and to the left of the screen - see Appendix A.

Photographs of the participants were taken at the beginning of the behavioral session and were then uploaded into the Cyberball program to be used for each condition; the participants' names were also programmed into Cyberball. In the Real Condition, there were black and white animated drawings of people in each of the co-player positions that would throw and catch the ball, and next to each animated person were photographs and names of other people. In the location of the participant, there was a black and white animated drawing of a hand that would catch and throw the ball above the photograph and name of the participant. The co-players always matched the gender of the participants. Photographs of the co-players were of students from other Universities who gave their permission for their photograph to be used in the study. These students' real names were not used. Instead, the females were given the pseudonyms Suzanne, Phoebe, and Melinda and the males were given the pseudonyms Randy, Joel, and Kevin. The location order of the co-players' pictures was counterbalanced. In the Control Condition, there were black and white drawings of walls in each of the three "co-player" positions, and in the bottom position was a black and white animated drawing of a hand that would throw and catch the ball, as well as the photograph and name of the participant.

The total number of passes of the ball in each condition was set to 105 and the speed of the game was set so that each pass from the co-players or walls ranged from 2 to 5 seconds (the timing was random). Each condition was divided into a Baseline portion (average of 57.58 passes, $SD = 3.46$) and an Exclusion portion (average of 47.42 passes, $SD = 3.46$) – this proportion was used so that participants would receive the ball approximately an equal number of times during Baseline ($M = 14.23$, $SD = 1.13$) and Exclusion ($M = 14.90$, $SD = 1.24$). During the Baseline portion of the game, all of the co-players (or walls), including the participants, received the ball roughly an equal number of times in a randomized order. After the Baseline portion, the Exclusion portion of the game began, during which one of the co-players (or walls) did not receive the ball from the other two co-players (or walls); the only time that the excluded co-player or wall received the ball was if the participants chose to pass it there. The two co-players (or walls) that were excluding the other co-player (or wall) tossed the ball to each other or to the participants roughly an equal number of times, in a randomized order. If the excluded co-player (or wall) received the ball from the participants, it tossed the ball to the other co-players (or walls) or the participant in a randomized order. The location of the co-player (or wall) that was excluded was counterbalanced across participants.

When participants received the ball, they chose where to pass it by pressing the 1 (to pass to the co-player or wall on the left of the screen), 2 (to pass to the co-player or the wall at the top of the screen) or 3 (to pass to the co-player or wall on the right of the screen) key on a numeric computer keyboard. An example of the layout used for each condition of Cyberball was reproduced and printed on a sheet of paper to illustrate the game for participants.

Self-report measures. In addition to the Cyberball behavioral assessment of prosocial behavior, participants were asked to fill out questionnaires to assess real life empathy, prosocial behavior, social skills, anthropomorphism, social desirability, demographic information, reactions to the Cyberball behavioral task, and whether the manipulation used in the Cyberball behavioral task was effective. Each of these measures is described in turn.

Real life empathy. Real life empathy was measured using the Interpersonal Reactivity Index (IRI), which is the most widely used adult empathy assessment (Davis, 1983; Litvack-Miller, McDougall, & Romney, 1997). It consists of 28 items and assesses four components of real life empathy: (a) Empathic Concern – experiencing sympathy and related positive emotions oriented towards others (e.g., “I feel sad when I see a lonely stranger in a group”); (b) Personal Distress - experiencing anxiety and related negative self-oriented emotions in empathy-arousing situations (e.g., “It occasionally embarrasses me when someone tells me their problems”); (c) Perspective Taking - adopting the point of view of another individual (e.g., “I try to look at everybody's side of a disagreement before I make a decision”); and (d) Fantasy - respond with empathy towards the emotions or actions of fictitious characters (e.g., “I really get involved with the feelings of the characters in a novel”). Participants answered the questions using a 5-point Likert scale ranging from 1 (Does not describe me at all) to 5 (Describes me very well). Nine of the items were reverse scored. The IRI was scored by averaging the items for each of the 5 subscales (for the Total score, all of the items were averaged); possible scores could range from 1 to 5.

Real life prosocial behavior. Real life prosocial behavior was measured using Caprara, Steca, Zelli, & Capanna’s (2005) Prosocialness Scale for Adults, which is a validated scale, consisting of 16 items that assesses adults rating of their own sharing, helping, taking care of, and feeling empathic towards others (e.g., “I try to help others”). Participants answered each question on a 5-point Likert scale ranging from 1 (never or almost never true) to 5 (almost always or always true). The Prosocialness Scale for Adults was scored by averaging all of the items. Possible scores could range from 1 to 5.

Autism Quotient. Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley’s (2001) Autism Quotient (AQ) questionnaire, which consists of 50 items, was used to measure five components: (a) social skills (e.g., “I find it easy to work out what someone is thinking or feeling just by looking at their face”); (b) attention switching (e.g., “If there is an interruption, I can switch back to what I was doing very quickly”); (c) attention to detail (e.g., “I notice patterns in things all the time”); (d) communication (e.g., “In a social group, I can easily keep track of several different people’s conversations”); and (e) imagination (e.g., “When I’m reading a story, I can easily imagine what the characters might look like"). Participants responded by indicating whether they definitely agreed, slightly agreed, slightly disagreed, or definitely disagreed with each item. The AQ was scored by summing the items for each of the 5 subscales; possible scores could range from 1 to 10.

Anthropomorphism. Anthropomorphism is the tendency to attribute human characteristics to non-human agents. For example, some adults attribute mental states and social intentionality to the movements of geometric shapes (e.g., Abell, Happe, & Frith, 2000). Although the wall locations themselves were not moving in the Cyberball Control Condition, the ball bounced between, which might have been interpreted as intentional actions. Therefore, the Individual Differences in Anthropomorphism Questionnaire (IDAQ; Waytz et al., 2010) was included. This is a questionnaire that consists of 30 items (e.g., "To what extent does a television set experience emotions.") that participants answered using a 10-point Likert scale ranging from 0 (not at all) to 10 (very much). The IDAQ was scored by summing the items related to anthropomorphism (i.e., not including the filler items); possible scores could range from 1 to 150.

Social desirability. Social desirability is a bias in self-report questionnaires due to the tendency for participants to respond in ways in which they believe will be favorable to others (i.e., by over-reporting positive behavior and/or under-reporting negative behavior). Because empathy and prosocial behavior are socially desirable traits, the Reynolds Short Form A of the Marlowe-Crowne Social Desirability Scale (Reynolds, 1982) was included. This questionnaire consists of 11 True/False items (e.g., "I am sometimes irritated by people who ask favors of me"). The Social Desirability Scale was scored by averaging the total items; possible scores could range from 0 to 1.

Demographic information. Basic demographic information, including gender, age, ethnicity, religion, education level, marital status, occupation, etc. was measured using a questionnaire developed for this study. These data were collected in order to describe the sample and, with the exception of gender, were not evaluated in relation to performance on Cyberball.

Reactions to Cyberball and manipulation check. Participants were asked about their reactions to each condition of the Cyberball task after completing the entire game using an 8-item questionnaire to measure different aspects of the Cyberball game: (1) whether participants noticed that a co-player/wall was excluded from the game (e.g., "When I was doing the calibration check, I thought all of the walls were included equally"), (2) whether participants had a preference for one of the co-players/walls (e.g., "When I was playing with the other students, I had a favorite player"), (3) if participants had an empathic reaction to the real co-player being excluded (e.g., "When I was playing with the other students, I thought one of the players was treated unfairly"). Participants answered the questions with a 5-point Likert scale ranging from 1 (never or almost never true) to 5 (almost always or always true); some of the questions had open-ended follow-up questions for participants to elaborate about their previous response (see Appendix B).

Additionally, participants were asked about the extent to which they believed the deception used in the Cyberball game with a 7-item questionnaire (e.g., "Did you think anything was unusual about the other students?" "To what extent did you think you were playing with real students?"). Five of the questions were yes-no questions with an additional follow-up question if participants answered yes; the two remaining questions were answered on a percentage scale from 0% to 100% (see Appendix C).

Procedure. Participants completed the questionnaires to measure real life empathy, prosocial behavior, social skills, anthropomorphism, and social desirability online prior to participating in the behavioral Cyberball task. It took participants approximately 30 minutes to complete these questionnaires online. Forty-one participants completed the questionnaires as part of a general survey, which was a prerequisite for participating in the behavioral Cyberball portion of the study. These participants were unaware that their questionnaire data would be connected to their participation in the Cyberball task until *after* they participated in the behavioral portion of the study. A different method was used for recruiting the last 19 participants. For this method, nineteen participants signed up for the study with knowledge that it had two components (i.e., an online component that consisted of the questionnaires and a behavioral component); therefore, these participants were aware that their questionnaire data would be connected to data from the behavioral session *before* they participated in the behavioral portion of the study. In preliminary analyses, I found no differences between participants who were aware that their questionnaire data would be connected to their data from the behavioral session before and after they participated in the behavioral portion of the study; therefore, the data for all participants were combined.

Upon arrival to the lab, participants were introduced to two experimenters (Experimenter 1 was in charge of the participant and Experimenter 2 was in charge of setting up the computer). Then they were asked to read and sign the consent form and were given the cover story for the Real Condition (i.e., that they would be playing a virtual ball-tossing game with three people who would be connected over the Internet). In past research with adults, this cover story was accepted and the participants were convinced that the co-players were real people (Williams et al., 2000). The following script was used:

> It was really important that we were able to schedule you for this time today because we are coordinating with other participants at other schools from around the country – it's been a bit of a scheduling nightmare, but it worked out today just fine. I'm really glad you could come in during this time! The other schools that we are collaborating on this study with are CU Boulder, UCLA, and UW up in Seattle. You'll see pictures of the students from these schools who will be playing the game with you. They'll also get to see a picture of you. You probably noticed in the consent form that we asked your permission to take your picture – that's why. Did you say that's ok on the consent form? [Experimenter 1 checked the consent form to see if the participant signed 'yes' in the photo consent section at end of consent form.] Your picture will only be used for this one game and the only people who will see it are the researchers in this lab and in the labs at the other universities, and participants playing the game with you. Your first name will be connected with your photo, but not your last name or any other identifying info about you. We will delete the picture of you after your participation today. Is it still okay with you that we take your picture?

Experimenter 2 then took the participants' photographs with a digital camera and went into the testing room to upload them into the Cyberball program. Before Experimenter 2 went into the testing room, Experimenter 1 asked Experimenter 2 to "double check that the other sites are ready because the last time I looked, not all participants were there yet." While Experimenter 2 set up the Cyberball program, Experimenter 1 explained the cover story for the Control Condition by saying to participants:

> Because you'll be connected with the other participants over the Internet, it is important for us to get a calibration of each participant's reaction time – this is because Internet connections vary and sometimes there is a lag time. We need to calibrate participants' reaction times with the Internet connections at each site, so we can get an accurate measure for each person. In order to calibrate your reaction time with the Internet connection, we need you to play a version of the ball tossing game where you will be playing with nobody at all. It's just a calibration check of your reaction time.

Participants were then given the demographic questionnaire while waiting for Experimenter 2 to set up the Cyberball game. During this time, Experimenter 2 continued the cover story for the Real Condition by calling "Dave," one of the other researchers with whom we were supposedly collaborating, to ask if the other participants were ready. This conversation took place in a room adjacent to where the participants and Experimenter 1 were sitting, but Experimenter 2 spoke loudly, so that participants could easily hear the conversation. If the Real Condition was first, "Dave" told Experimenter 2 that the other participants were ready, but if the Control Condition was first, "Dave" told Experimenter 2 that the other participants were not ready yet and that the calibration check should be done while they were waiting. After the call to "Dave," Experimenter 2 returned to the waiting room to tell Experimenter 1 and the participants the names of the other participants and whether they would be playing with the other participants first or whether they would be completing the calibration check first.

Experimenter 1 took the participants into the testing room and gave them instructions for how to play the Cyberball game using the instructions in Appendix D depending on which condition came first. While participants played the game, both Experimenters stayed in the waiting room. After the participants completed the first condition of Cyberball, Experimenter 1 took them back into the waiting room while Experimenter 2 set up the Cyberball program for condition 2. Once the computer was ready for condition 2, Experimenter 1 took the participants back into the testing room and gave them instructions for condition 2 (i.e., the condition that was not used during condition 1). During condition 2, both Experimenters stayed in the waiting room.

Including the cover stories and set-up time, it took approximately 40 minutes to complete the Cyberball task. After the participants were finished with condition 2 of Cyberball, Experimenter 1 returned to the testing room to give them the reaction to Cyberball questionnaire followed by the manipulation check questionnaire. It took participants approximately 10 minutes to complete these questionnaires. Because deception was used for the Cyberball task, participants were fully debriefed following completion of the questionnaires.

Results

Cyberball. The Cyberball game was divided into the Baseline period (i.e., from the beginning of the game until the onset of a co-player/wall being excluded) and the

Exclusion period (i.e., from the onset of a co-player/wall being excluded until the end of the game). In addition, the Baseline and Exclusion periods were further sub-divided for comparisons between the first and second halves of both the Baseline and Exclusion portions of the game. I compared the first and second half of the Inclusion period because participants might have needed time to become accustomed to the game during the Baseline period. I compared the first and second half of the Exclusion period because there might have been a latency in noticing that someone was left out of the game. The percentage of passes from the participant to the excluded player/wall was calculated for each half of each period of the game (the number of times the participant passed the ball to the excluded player/wall divided by the total number of passes to all three players/walls, multiplied by 100).

There were no significant differences between the percentage of passes to the player/wall to be excluded during the first half of the Baseline period and the second half of the Baseline period for either the Real Condition, $t(59) = .063$, $p = .950$, or the Control Condition, $t(59) = -.299$, $p = .766$ (see Table 1 for means and standard deviations). Likewise, there were no significant differences between the percentage of passes to the excluded player/wall during the first half of the Exclusion period and the second half of the Exclusion period for either the Real Condition, $t(59) = -.068$, $p = .946$, or the Control Condition, $t(59) = -.209$, $p = .835$ (see Table 1 for means and standard deviations). Therefore, the entire Baseline and entire Exclusion periods for both the Real and Control Conditions were used in the analyses.

Table 1

Means and Standard Deviations (in Parentheses) of Percentage of Passes to the Excluded Co-Player/Wall During the First and Second Half of the Baseline and Exclusion Periods for the Real and Control Conditions

		First half	Second half
Baseline	Real	32.36 (8.88)	32.24 (10.74)
	Control	34.91 (10.26)	35.53 (12.50)
Exclusion	Real	38.99 (11.70)*	39.12 (15.05)**
	Control	41.21 (12.13)*	41.70 (15.37)*

*Significantly higher than chance at $p < .001$
**Significantly higher than chance at $p < .005$

The percentage of passes from the participant to the excluded player/wall was calculated for each entire period of the game [the number of times the participant passed the ball to the excluded player/wall divided by the total number of passes to all three players/walls, multiplied by 100]. These percentages were used to create two change scores that were used as an index of the percent increase of passes to the excluded player from Baseline to Exclusion (percentage of passes to the excluded player/wall during Exclusion minus the percentage of passes to the excluded player/wall during Baseline). Positive change scores (increase in the percent of passes from Baseline to Exclusion) were interpreted as attempts to include the excluded player/wall. Negative change scores (decrease in the percent of passes from Baseline to Exclusion) were interpreted as attempts to exclude the excluded player/wall, a pattern that might indicate the participant was attempting to affiliate with the two included players/walls (answers from the reactions to Cyberball items in the questionnaire were used to help identify this possibility). Change scores near zero were interpreted as no attempt to either exclude or include the excluded player/wall, a pattern that might indicate that the participant did not notice that one of the players/walls was being excluded (again, answers from the reactions to Cyberball items in the questionnaire were used to help identify this possibility).

A 2 X 2 mixed factorial ANOVA was conducted with condition (Real vs. Control) as a within-subjects factor and order (Real Condition first and Control Condition second vs. Control Condition first and Real Condition second) as a between-subjects factor (see Table 2 for means, standard deviations, and minimum and maximum scores); change scores were the dependent variable. There was no significant main effect of condition, F (1, 58) = .056, p = .814, but there was a significant main effect of order, F (1, 58) = 4.44, p = .039, *partial* η^2 = .071; participants who completed the Real Condition first had significantly higher change scores compared to participants who completed the Control Condition first, regardless of condition. There was also a marginally significant interaction between condition and order, F (1, 58) = 3.83, p = .055, *partial* η^2 = .062. For the Control Condition, there were no differences between participants who completed the Real or Control Condition first, t (58) = .199, p = .843, but for the Real Condition, participants who completed the Real Condition first had higher change scores than those who completed the Control Condition first, t (58) = 2.51, p = .015, *Cohen's d* = .76 (see Figure 1).

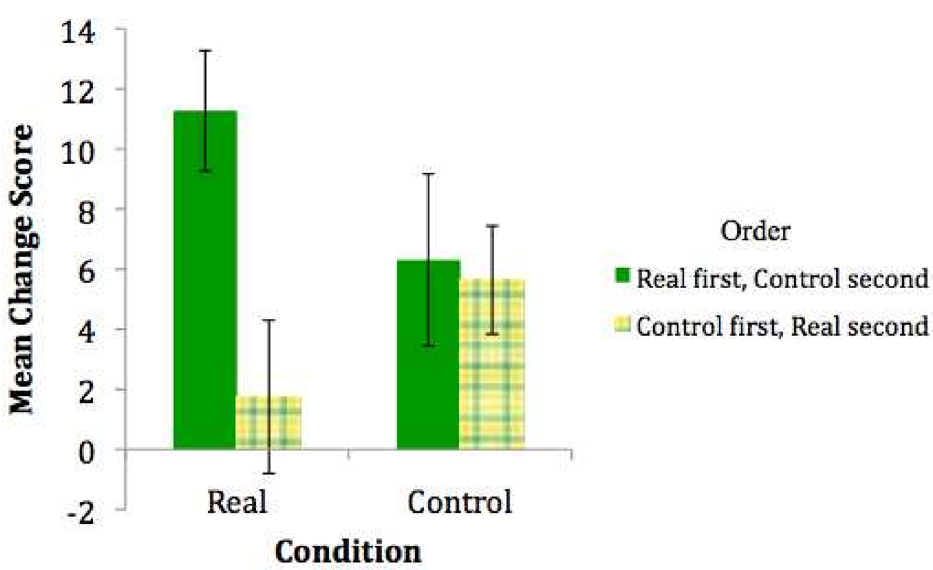
An independent samples t-test showed a significant difference between the change scores for the Real Condition for the 30 participants who completed the Real Condition first (M = 11.27, SD = 11.00) and the change scores for the Control Condition for the 30 participants who completed the Control Condition first (M = 5.64, SD = 9.85), t (58) =

2.09, p = .041, *Cohen's d* = .54 (see Figure 1 – comparing the bar on the left for the Real Condition to the bar on the right for the Control Condition).

Table 2
Means, Standard Deviations (in Parentheses), and Minimum and Maximum Scores of Change Scores for Real and Control Conditions by Condition Order (Within Subjects; N = 60)

Condition order	Real	Control	Total
Real first and Control second	11.27 (11.00) Min = -7.14; Max = 38.10	6.31 (15.64) Min = -36.67; Max = 26.92	8.79 (SE = 1.7) Min = -36.67; Max = 38.10
Control first and Real second	1.75 (13.96) Min = -46.67; Max = 26.67	5.64 (9.85) Min = -11.54; Max = 29.17	3.70 (SE = 1.7) Min = -46.67; Max = 29.17
Total	6.51 (13.35) Min = -46.67; Max = 38.10	5.98 (12.96) Min = -36.67; Max = 29.17	

Figure 1. Mean Change Scores by Condition and Condition Order.



Individual differences. Gender was unrelated to change scores, t (58) = -.825, p = .413. Due to experimenter error, it was not possible to connect the online questionnaire data to the data from the behavioral session for two of the participants; therefore, there are self-report data for 58 participants. See Table 3 for the descriptive statistics (i.e., Mean, Standard Deviation, Minimum and Maximum scores, number of items, and Cronbach's Alpha) for these online questionnaires. Cyberball change scores for the Real Condition for the 30 participants who completed the Real Condition first were not significantly correlated with any of the individual differences measures from the online questionnaires after controlling for social desirability (*ps* > .10) (see Table 4 for correlations).

Change scores for the Control Condition for the 30 participants who completed the Control Condition first were significantly positively correlated with Autism Quotient Attention to Detail scores such that higher change scores were associated with higher Attention to Detail scores, r (29) = .533, p = .003. Because 13 correlations were conducted, a Bonferroni correction would require a significance level of .0038; therefore, the correlation between Control Condition change scores and Attention to Detail scores was considered significant. The correlation remained marginally significant after controlling for social desirability, r (24) = .49, p = .008. There were no other significant correlations between change scores for the Control Condition and individual differences from the questionnaires (see Table 4 for correlations).

Table 3

Mean, Standard Deviations (in Parentheses), Minimum and Maximum Scores, Number of Items, and Cronbach's Alphas for Real Life Empathy, Prosocial Behavior, Autism Quotient, Anthropomorphism, and Social Desirability

Questionnaire	Subscale	Number of items	Mean (SD)	Min - Max scores	Cronbach's Alpha
Interpersonal Reactivity Index	Fantasy	7	3.39 (.66)	2 – 4.71	.761
	Perspective Taking	7	3.36 (.56)	1.71 – 4.43	.711
	Empathic Concern	7	3.70 (.57)	2.14 – 4.86	.797
	Personal Distress	7	2.80 (.62)	1.00 – 4.29	.737
	Total	28	3.31 (.38)	2.59 – 4.14	.791
Prosocialness Scale for Adults		16	3.72 (.57)	2.25 – 5.00	.901
Autism Quotient	Social Skills	10	2.10 (1.76)	.00 – 6.00	.535
	Attention Switching	10	4.88 (2.24)	.00 – 9.00	.619
	Attention to Detail	10	5.31 (2.17)	1.00 – 10.00	.582
	Communication	10	2.16 (1.58)	.00 – 6.00	.358
	Imagination	10	2.12 (1.60)	.00 – 6.00	.398
Individual Differences in Anthropomorphism Questionnaire		15	58.55 (23.61)	3.00 – 108.00	.833
Social Desirability Scale		11	.42 (.22)	.00 - .91	.669

Table 4

Correlations Between Real and Control Condition Change Scores, Real Life Empathy, Prosocial Behavior, Autism Quotient, and Anthropomorphism Controlling for Social Desirability for Participants who Completed the Real Condition First and Participants who Completed the Control Condition First

Questionnaire	Subscale	Real Condition Change Scores for Participants who Completed the Real Condition First (N = 28)	Control Condition Change Scores for Participants who Completed the Control Condition First (N = 28)
Interpersonal Reactivity Index	Fantasy	-.018	.198
	Perspective Taking	.010	.227
	Empathic Concern	.258	.136
	Personal Distress	.321	-.163
	Total	.225	.128
Prosocialness Scale for Adults		.076	.094
Autism Quotient	Social Skills	-.068	-.185
	Attention Switching	-.238	-.117
	Attention to Detail	-.141	.490*
	Communication	-.291	-.125
	Imagination	-.218	.050
Individual Differences in Anthropomorphism Questionnaire		-.159	-.234

*$p = .008$

Participants' answers to the Cyberball Questionnaire were coded for whether they noticed that one of the players was left out of the game based on their responses to three questions: "When I was playing with the other students, I thought everyone got the ball the same amount" (reverse scored), "When I was playing with the other students, I thought one of the players was treated unfairly," and "When I was playing with the other students, I threw the ball to one player most of the time." If participants had a score of three or higher on the Likert scale portion of the question or gave any indication that they thought that there was inequality in the number of throws to each co-player, they were coded as noticing that someone was excluded. Using these criteria, there were 35 (58.3%) participants who noticed that one of the players was left out of the game and 25 (41.7%) who did not notice. There were no differences between the people who noticed that someone was excluded and those who did not when comparing the change scores for the Real Condition of the participants who completed the Real Condition first to the change scores for the Control Condition of the participants who completed the Control Condition first, F (1, 56) = .014, p = .905.

Fewer participants noticed that one of the walls was left out of the game compared to people who noticed that one of the co-players was excluded. Part of the reason for not noticing that one of the walls was excluded might have been that participants did not pay attention because they did not care about the equality of passes to the walls; in fact, 16 (26.7%) participants explicitly pointed out that they did not pay attention to or did not care about the equality of passes during the Control Condition. Participants' answers to the Cyberball Questionnaire were coded for whether they noticed that one of the walls was left out of the game based on their responses to three questions:

“When I was doing the calibration check, I thought that one of the walls did NOT get the ball as often as the other walls did,” “When I was doing the calibration check, I thought all of the walls were included equally” (reverse scored), and “When I was doing the calibration check, I threw the ball to all of the walls” (reverse scored). If participants had a score of three or higher on the Likert scale portion of the question or gave any indication that they thought that there was inequality in the number of throws to each wall, they were coded as noticing that a wall was excluded. There were 15 (25%) participants who noticed that one of the walls was left out of the game (10 of these participants also noticed that someone was left out of the Real Condition) and 45 (75%) participants who did not notice (20 of these participants also did not notice that someone was left out of the Real Condition). There were no differences between the people who noticed that a wall was excluded and those who did not when comparing the change scores for the Real Condition of the participants who completed the Real Condition first to the change scores for the Control Condition of the participants who completed the Control Condition first, F (1, 56) = .093, p = .762.

Of the 60 participants, 59 gave no indication that they were skeptical about the cover story in response to the first five non-leading questions on the Manipulation Check questionnaire; however, one participant wrote, “but now, maybe the people were controlled by the computer! Their pictures were taken perfectly compared to mine,” which indicated that he or she had thought about the possibility of deception *after* participating in the Cyberball task. Participants’ responses on the Manipulation Check questionnaire were coded for whether they believed the cover story or not. Participants who answered 50% or lower to the leading question, “to what extent did you think you were playing with real students?" were coded as skeptics (n = 15; 25%); participants who answered higher than 50% to this question were coded as believers (n = 45; 75%). There was a significant interaction between condition (within-subjects) and whether participants were skeptics or believers (between-subjects), F (1, 56) = 4.69, p = .035, *partial* η^2 = .077. Believers had higher change scores in the Real Condition (M = 8.84, SD = 11.64) compared to the Control Condition (M = 4.77, SD = 12.93), while skeptics had higher change scores in the Control Condition (M = 9.59, SD = 12.81) compared to the Real Condition (M = -.48, SD = 15.99). There were no differences between skeptics and believers when comparing the change scores for the Real Condition of the participants who completed the Real Condition first to the change scores for the Control Condition of the participants who completed the Control Condition first, F (1, 56) = 1.16, p = .286. There were also no differences between skeptics and believers on any of the individual differences measures (ps > .10).

Discussion

The hypothesis that participants would attempt to include excluded real co-players more often than excluded walls was supported by the comparison of the Real and Control Conditions for participants who completed these conditions first. Participants who completed the Real Condition first threw the ball more to the excluded player than participants who completed the Control Condition first threw the ball to the excluded wall. This result suggests that participants make more of an effort to help an excluded person than they do to evening out the passes to an excluded wall.

There were significant order effects in this experiment. Participants who completed the Real Condition first threw the ball more to the excluded person/wall than those who completed the Control Condition first, regardless of condition. Additionally, there was a marginally significant interaction showing that participants who completed the Real Condition first threw the ball more to the excluded person than to the excluded wall, but there were no differences between the passes to the excluded person and wall for participants who completed the Control Condition first. It seems as if participants' indifference to one of the walls being excluded in the Control Condition carried over into the Real Condition for the participants who completed the Control Condition first. It is also possible that participants who completed the Control Condition first became bored with the task by the time they played with other students in the Real Condition, which decreased their attention.

It was also hypothesized that attempts to include the excluded co-player might be related to self-reports of real life prosocial behavior, empathy, and/or social skills, but there was no support for this prediction. It is possible that there was no relationship between prosocial behavior towards the excluded co-player and self-reports of real life prosocial behavior, empathy, and social skills because many people did not explicitly notice that one of the co-players was left out of the Cyberball game. Although 58% of the participants indicated that they noticed that one of the co-players did not get the ball as often as the others, only 8 (13.3% of the entire sample) of these participants explicitly pointed out that the correct co-player was excluded; the remaining participants either identified the incorrect player as being excluded (6 participants) or did not specifically say who they thought was left out of the game (21 participants). Because so few participants correctly noticed that a player was left out of the game, it will be important in future research to make the exclusion more obvious. Although participants must have implicitly noticed that someone was excluded from the game (because there were differences between the prosocial behavior during the Real Condition and the Control Condition), increasing the salience of the exclusion might amplify the prosocial behavior during the Cyberball task. In Study 2, we lengthened the Exclusion period in the Cyberball game to make it more obvious that one of the players was left out of the game. This will also be important to do in future studies with adults.

An additional hypothesis was that attempts to even out the passes to the excluded wall might be related to self-reports of anthropomorphism. I did not find support for this hypothesis. It is possible that individual differences in anthropomorphism were not related to attempts to even out the passes to the excluded wall because participants did not anthropomorphize the walls. Previous research has found that people attribute causality, intentionality, and animacy to moving shapes (Scholl & Tremoulet, 2000). However, the walls in the present study were not moving; rather, a ball was moving between them. In addition, the walls were identical, plain, black and white structures, which might have helped to make them be perceived as truly nonsocial entities.

A final hypothesis was that individual differences in attention to detail might be related to participants' attempts to include the excluded co-player/wall in either condition. There was no association between attention to detail and attempting to pass the ball to the excluded co-player in the Real condition, but participants who passed the ball more to the excluded wall had higher levels of attention to detail. This result supports previous research that people who score high on the trait of systematizing show superior performance on tasks requiring attention to details, such as detecting patterns (Billington, Baron-Cohen, & Bor, 2008). It is interesting that this pattern emerged only for the Control Condition, indicating that the reason why some people attempted to increase the number of passes to the excluded wall was in order to maintain a pattern. This was not the case for the Real Condition, suggesting that increasing the passes to the excluded co-player reflected an effort to help the other person rather than the goal of evening out the passes.

A limitation of the study is that there was a difference between people who believed the deception used in the study and those who were skeptical that they were playing with real people. As would be expected, people who believed that they were playing with other people attempted to include the excluded co-player more in the Real Condition than the excluded wall in the Control Condition. Unexpectedly, however, participants who were skeptical that they were playing with real people threw the ball more to the excluded wall in the Control Condition than to the excluded co-player in the Real Condition. It makes sense that the skeptics did not attempt to include the excluded co-player because they did not believe they were playing with real people. However, it is unclear why these participants attempted to even out the passes more to the excluded wall than to the excluded co-player, especially because there were no other differences between skeptics and believers on any of the individual differences measures. In future studies, it will be important to ensure that a higher percentage of participants believe the manipulation. Even though the cover story used in the present study was fairly elaborate and proved to be effective for most of the participants, it might be possible to extend it further. For example, participants might be more likely to believe the cover story if they had the opportunity to interact with the co-players by using a pretend Internet chat room or by having the participants talk to the participants on the telephone before the Cyberball game.

In conclusion, adults seem to respond differently while playing Cyberball with real co-players than they do when they are playing with walls (at least when comparing the conditions between groups), suggesting that they are not merely evening out passes in the Real Condition, but rather they are attempting to remedy another person's unfair social exclusion. The next step was to extend this work to children. Cyberball has not been used with children younger than 7-years of age and studies with children have only included the Real Condition. It will interesting to see if children show patterns similar to those shown by adults and to see if there are any developmental differences between 5-year-old and 8-year-old children. Furthermore, Study 2 includes a Fiction Condition in which children play the Cyberball game with novel cartoon characters. This condition was added in order to evaluate the relationship between children's reactions to real and fictional social interactions.

CHAPTER III

STUDY 2

Introduction

The results of Study 1 suggest that the Cyberball paradigm might be a useful tool for assessing prosocial behavior in adults; a between groups comparison indicated that participants responded to the exclusion of a player by increasing their throws to that person, but did not respond to the exclusion of a wall. These results indicate that the increase in throws to the excluded player did not reflect a general tendency to even out passes among the three locations, but instead suggest that the adult participants made an effort to help an excluded co-player.

Study 2 was designed to extend this research by investigating the development of prosocial responses to social exclusion in the Cyberball task with a sample of 5- and 8-year-old children. In addition to examining children's prosocial responses to the social exclusion of a person who was believed to be real, children's responses to the exclusion of a fictional character were examined. Thus, Study 2 included three conditions, Real and Control Conditions similar to those in Study 1 and a new Fiction Condition in which the Cyberball game was played with novel cartoon characters. By including this condition, it was possible to examine the correspondence between children's prosocial behavior in real and fictional social interactions. Study 2 also included questionnaire and/or interview measures of real life empathy and prosocial behavior, theory of mind, pretend play, exposure to fiction in both books and screen-based media (i.e., movies and Television), and anthropomorphism. I included these measures in order to shed light on individual differences in behavior on the Cyberball task.

Everyday prosocial behavior. The precursors of prosocial behavior begin early in life. Young infants have emotional reactions to others' emotions (e.g., they cry when another baby cries) (Martin & Clark, 1982; Sagi & Hoffman, 1976), 8-month-olds engage in rudimentary prosocial behavior, such as sharing objects (Hay & Rheingold, 1983), and 12-month-olds often provide positive contact (e.g., a hug) or verbal reassurance in reaction to another person's emotional distress (Zahn-Waxler, Robinson, et al., 1992). Prosocial behavior increases throughout the toddler- and preschool-age years as children develop the ability to take another person's perspective (Batson, 1991; Eisenberg et al., 2007) and further increases into the elementary school years as perspective taking skills continue to develop and children have more opportunities for social interactions with same-age peers (Eisenberg & Fabes, 1998).

In the present study, children were interviewed using the Berkley Puppet Interview format to collect self-report information about their everyday prosocial behavior. This interview technique was designed to be used with children as young as 4-years and as old as 8-years (Measelle, Ablow, Cowen, & Cowen, 1998). The Cyberball task was used to provide a laboratory procedure for assessing prosocial behavior. There is limited research using this paradigm with children, but in two studies with adolescents, participants witnessed another player being excluded (Masten et al., 2010, 2011). Adolescents in this study were not participants in the game and so could not rectify the exclusion by increasing their throws to the excluded player. However, they were given the opportunity to write a letter to the excluded player. In another study using a different paradigm, 5-year-old children showed behavioral reactions after viewing videos of shapes being excluded by other shapes (Over & Carpenter, 2009). Thus, in Study 2, 5-

year-olds were recruited for the younger group of children, along with a group of 8 year-olds.

Theory of mind and empathy. Theory of mind, the capacity to understand and interpret other people's behaviors in terms of underlying mental states (such as thoughts, feelings, beliefs, intentions, or desires), follows a well-documented developmental timetable (Flavell, 1999; Harris, 2007). Precursors of theory of mind begin in infancy, including imitation, joint attention, empathy, and social referencing (i.e., looking to another person for cues about how to react to a situation). Over the next few years, children gain the abilities to understand their own and others' mental states, such as desire, belief, and knowledge. Much research suggests that by the time children are 5-years-old, they have a well-developed theory of mind. However, it is not until middle childhood that children start to understand that peoples' interpretations of ambiguous situations are influenced by prior beliefs or expectations (Flavell, 1999).

Several studies have shown a correlation between advanced theory of mind skills and higher levels of prosocial behavior (e.g., Eisenberg et al., 2007; Moore, Barresi, & Thompson, 1998). Similarly, empathy has been linked to prosocial behavior; when people feel empathy towards another individual, they are more likely to help that person. Several studies have found that children with higher empathic skills tend to be more prosocial (Eisenberg et al., 2007). Furthermore, some studies have found that altruism increases with age (Zarbatany, Hartmann, & Gelfand, 1985), which has been attributed to developmental differences in empathic sensitivity and perspective taking ability. Therefore, in Study 2, children's empathy and theory of mind were assessed to determine if individual differences in these abilities were related to their prosocial behavior during Cyberball.

Involvement in pretend play and fiction. I was also interested in the possibility that involvement and interest in pretend play and fiction might relate to prosocial behavior during Cyberball. There is some empirical evidence to suggest that there are associations between children's pretend play and prosocial behavior. For example, Howes and Matheson (1992) found that children who engaged in more cooperative social pretend play than their peers when they were 2-years-old were more prosocial as preschoolers (between 3.5- and 5-years). Fiction exposure has also been linked to prosocial behavior. In a study by Mares and Woodard (2005), being exposed to prosocial content on television led to positive behaviors and attitudes (e.g., altruism, positive social interactions, reduced stereotyping) in children. Furthermore, children who frequently play videogames with prosocial content engage in more prosocial behavior in real social interactions (Gentile et al., 2009).

Children's involvement in fiction has been found to be related to theory of mind, which could lead to increases in prosocial behavior. Children who are frequently exposed to storybooks and movies have been found to have superior theory of mind skills (Mar, Tackett, & Moore, 2010). In adults, frequent exposure to fictional narrative predicted social ability (e.g., empathy, mentalizing, and the ability to understand subtle cues in social interactions; Mar et al., 2006). According to Mar and Oatley (2008), fictional narrative is unique because it not only allows for simulation of the real social world; it provides in-depth explanations of social interactions and explicit access to characters mental states.

Role play in which children create and act out the role of a character, affords children with a special kind of social experience which could contribute to their perspective taking and theory of mind development (Harris, 2000; Taylor & Carlson, 1997). There are three types of role play that that differ in the vehicle used for the imagined character (Harris, 2000): (1) invisible friends -- invisible creatures, animals, characters, or people that the child creates without the use of any tangible props; (2) personified objects -- dolls, toys, stuffed animals, or other objects that the child animates and onto which the child projects a role, including psychological characteristics (e.g., personality); and (3) pretend identities -- the child himself or herself acts as the vehicle for the imagined character (i.e., the child impersonates a character, person, or animal). Invisible friends and personified objects are both types of imaginary companions. Although the preschool period is thought to be the high season of pretend play (Singer & Singer, 1990), it is not uncommon for older children and adolescents to engage in role play (Seiffge-Krenke, 1997; Taylor, Carlson, Maring, Gerow, & Charley, 2004). Therefore, the age groups of 5 years and 8 years were appropriate for investigating the relationship between children's pretend play and prosocial behavior.

Hypotheses. The primary goal of the study was to test the hypothesis that the Cyberball task would elicit prosocial behavior from children in the Real and Fiction Conditions, but not the nonsocial Control Condition. More specifically, I expected that participants would attempt to include (i.e., pass the ball more often to) the excluded real co-player (in the Real Condition) and the excluded fictional co-player (in the Fiction Condition). In contrast, I did not expect participants to pass the ball more to the "excluded" wall (in the Control Condition). I also expected that children would behave similarly in the Real and Fiction Conditions (i.e., the increase in passes to the excluded real co-player would correlate with the increase in passes to the excluded fictional co-player and both Conditions would differ from the Control Condition).

Previous research indicates that prosocial behavior increases with age (Eisenberg et al., 2007) and thus, I expected that 8-year-olds would engage in more prosocial behavior during the Cyberball task (in both the Real and Fiction Conditions) than the 5-year-olds.

Study 2 also provided an opportunity to explore possible relations between a range of individual difference measures and prosocial behavior on the Cyberball task. I expected that individual differences in empathy, prosocial behavior, and social understanding might relate to the likelihood of engaging in prosocial behavior in both the Real and Fiction Conditions. In particular, children with higher self-reports of empathy and prosocial behavior and higher parent-reports of theory of mind were expected to behave more prosocially towards the real and fictional players.

I also predicted that engagement in role play and involvement in fiction might relate to the correspondence between the Real and Fiction Conditions. Specifically, children who engage in frequent amounts of role play and fiction might engage in more prosocial behavior towards the fictional characters, due to their practice thinking about the mental states of and empathizing with fictional characters. And perhaps this practice might carry over into their real social interactions; thus, children who were highly involved in role play and fiction might also show high levels of prosocial behavior towards the real characters. Consequently, for these children there might be a stronger correlation between the prosocial behaviors towards fictional characters (Fiction

Condition) and real people (Real Condition) than children who were not as involved and interested in role play and fiction.

Method

Participants. The participants were 74 children recruited from birth announcements in the local newspaper (37 females and 37 males; 37 5-year-olds, and 37 8-year-olds). However, two children did not complete all the tasks and one child asked to use the bathroom in the middle of the Cyberball task. The remaining sample consisted of 71 children: 35 5-year-olds (18 females and 17 males; M_{age} = 5 years, 8.2 months, *SD* = 2.4 months; ranging from 5 years, 3 months to 6 years, 0 months) and 36 8-year-olds (18 females and 18 males; M_{age} = 8 years, 6.5 months, *SD* = 2.9 months; ranging from 8 years, 1 month to 9 years, 0 months).

The majority of participants' parents identified their children as White (n = 63; 88.7%); there were five participants identified as a mix of ethnicities/races; one as Asian, and one as "other." There were 13 (18.3%) only children, 25 (35.2%) children with 1 sibling, 22 (31%) with 2 siblings, 6 (8.5%) with 3 siblings, 1 (1.4%) with 4 siblings, 3 (4.2%) with 5 siblings, and 1 (1.4%) with 7 siblings. Thirty-nine (54.9%) participants were in elementary school (5 in 1st grade, 14 in 2nd grade, 19 in 3rd grade, and 1 in 4th grade), 16 (22.5%) were in kindergarten, 7 (9.9%) were in preschool, 4 (5.6%) were in daycare, and 2 (2.8%) were in other forms of school. The mean age of the parent who accompanied the child to the session (68 mothers and 3 fathers) was 38.9 years (SD = 5.9%; ranging from 27 to 54 years). The majority of participants' parents were married (n = 66; 93.0%) and 4 (5.6%) parents were either single, separated, or had some "other" type of marital status. Thirty (42.3%) of participants' parents had some college or a 2-

year degree, 26 (36.6%) had a bachelor’s degree, 12 (16.9%) had a graduate degree, one (1.4%) had a high school degree, and one (1.4%) had some “other” type of educational level. (Note that demographic information is missing from one participant because the parent did not fill out the Family Information Questionnaire.) Participants were given $10 as compensation for their participation.

Materials.

Cyberball task. Cyberball (version 3) was run on a 996 MHz Dell PC with an Intel Pentium III processor and 512 MB of RAM on Microsoft Windows XP Professional platform (Version 2002 with Service Pack 3). The participants engaged in three conditions: (1) Real Condition in which participants believed they were playing with other children; (2) Fiction Condition in which participants played with novel cartoon characters; and (3) Control Condition in which participants bounced the ball around between walls. The order of the conditions was counterbalanced across participants.

For each condition, Cyberball was set to play with four total locations (the participant, plus three co-players or three walls). The participant was always in the position at the bottom of the screen; the co-players in the Real and Fiction Conditions or the walls in the Control Condition were in locations at the top of the screen, to the right of the screen, and to the left of the screen (see Appendix E for examples of the Real, Fiction, and Control Conditions).

A photograph of the participant was taken at the beginning of the behavioral session and was then uploaded into the Cyberball program to be used in each condition; the participant’s name was also entered to appear below the participant’s photograph in Cyberball. In the Real and Fiction Conditions, there were black and white animated drawings of people in each of the co-player positions that would throw and catch the ball, and next to each animated person were photographs and names of other children (in the Real Condition) or novel cartoon characters (in the Fiction Condition). At the bottom of the screen above the photograph and name of the participant, there was a black and white animated drawing of a hand that would catch and throw the ball. The real and fictional co-players always matched the gender of the participant.

In the Real Condition, the photographs of the co-players were of children from other towns whose parents gave their permission for their children's photograph to be used in the study. These children's real names were not used. Instead the females were given the pseudonyms Suzanne, Phoebe, and Melinda and the males were given the pseudonyms Randy, Joel, and Kevin (these names were chosen to be consistent with Study 1). In the Fiction Condition, the pictures of the co-players were computer-generated drawings of novel cartoon characters that were created for this study by a local artist. There was a set of female cartoon characters and a set of male cartoon characters (see Appendix F). For both genders, the names of the cartoon characters were Zoony, Razzle, and Beamer. The location of the co-players' pictures in the Real and Fiction conditions were counterbalanced. In the Control condition, there were black and white drawings of walls in each of the three "co-player" positions, and in the position of the participant was a black and white animated drawing of a hand that would throw and catch the ball, as well as the photograph and name of the participant.

In each condition, the total number of passes of the ball was set to 96 and the speed of the game was set so that each pass from the co-players or walls ranged from 2 to 5 seconds (the timing was random). Note that this number of passes is fewer than the number of passes used in Study 1; I reduced the number of passes because in pilot testing, a longer version of Cyberball did not maintain children's attention. Each condition was divided into a Baseline portion (average of 45.91 passes, SD = 3.98) and an Exclusion portion (average of 50.09 passes, SD = 3.98). The greater number of passes for the Exclusion period compared to the Baseline period provided participants more of a chance to notice the exclusion, but also allowed the participants to receive the ball a similar number of times during the Baseline (M = 11.28, SD = 1.31) and Exclusion (M = 15.92, SD = 1.5) periods.

During the Baseline portion of the game, all of the co-players (or walls), including the participant, received the ball roughly an equal number of times in a randomized order. After the Baseline portion, the Exclusion portion of the game began, during which one of the co-players (or walls) did not receive the ball from the other two co-players (or walls) (i.e., the only time that the excluded co-player or wall received the ball was if the participant chose to pass it there). The two co-players (or walls) that were excluding the other co-player (or wall) tossed the ball to each other or to the participant roughly an equal number of times, in a randomized order. If the excluded co-player (or wall) received the ball from the participant, it tossed the ball to the other co-players (or walls) or the participant in a randomized order. The location of the co-player (or wall) that was excluded was counterbalanced across participants.

A special button box was created for the children to use to pass the ball to the co-players (or walls). A numeric keypad was enclosed in foam board and large buttons were created by gluing foam board to the 1, 2, and 3 keys. Large arrows pointing to the left, up, and right were drawn on the buttons. When the participant received the ball, he or she chose where to pass it by pressing the left arrow (to pass to the co-player or wall on the left of the screen), up arrow (to pass to the co-player or the wall at the top of the screen) or right arrow (to pass to the co-player or wall on the right of the screen). An example of the layout used for each run of Cyberball was reproduced and printed on a sheet of paper to illustrate the game for participants. For 5 participants, there were minor malfunctions with the button box (e.g., one of the arrows broke off in the middle of a run, so the child had to press what was left on the key of the broken arrow; two of the arrows stuck together resulting in a couple of passes going to a different player than intended). However, there were no significant differences between the patterns of results for the children who had problems with the button box and those who did not; therefore data from these 5 participants were included in all of the analyses.

Individual difference measures. In addition to the Cyberball behavioral assessment of prosocial behavior, individual differences in children's reactions to Cyberball, real life empathy, prosocial behavior, anthropomorphism, social understanding (i.e., theory of mind), pretend play, and exposure to fiction were measured. Each of these will be discussed in turn.

Reactions to Cyberball, real life empathy, prosocial behavior, and anthropomorphism – child tasks. The Berkeley Puppet Interview (BPI) was used to assess children's reactions to the Cyberball behavioral task, real life empathy, prosocial behavior, and anthropomorphism. The BPI is a widely used and validated technique for assessing young children's perceptions of themselves and their environments (Measelle et al., 1998). Children engaged in a dialog with two puppy-dog puppets (Iggy and Ziggy); each of the puppets provided a statement about itself (e.g., Iggy: "I try hard to be a good friend to other kids", Ziggy: "I don't try hard to be a good friend to other kids. How about you?"), and then the child responded about himself or herself. The BPI consisted of items to measure children's reactions (including empathic reactions) to the Cyberball procedure and whether they believed the deception (see Appendix G), as well as items about real life empathy adapted from Bryant's (1982) Index of Empathy for Children and Adolescents, the original BPI prosocial behavior subscale, and items about anthropomorphism (Tahiroglu, 2012). Children's responses to the BPI were coded by two independent coders for all of the participants (92.1% reliability); a third coder resolved disagreements. Each response was coded on a seven-point scale depending on which statement children said was most like them (according to the BPI coding criteria).

Each of the items from the reactions to Cyberball subscale (for all three conditions of the Cyberball game) was designed to measure different aspects of the Cyberball game: (1) whether participants noticed that a co-player/wall was excluded from the game (1 item for each condition; e.g., Ziggy: "When I was playing with the kids, I thought one of the kids did not get the ball very much." Iggy: "I thought everyone got the ball the same amount. What did you think?"), (2) whether participants had a preference for one of the co-players/walls (2 items for each condition; e.g., Iggy: "When I was playing with the walls, I had a favorite wall." Ziggy: "I didn't have a favorite wall. How about you?"), (3) if participants had an empathic reaction to the real and/or fictional co-players being excluded (2 items for the Real and Fiction Conditions; e.g., Ziggy: "When I was playing with the characters, I felt bad for one of the characters." Iggy: "I didn't feel bad for any of the characters. How about you?"), and (4) if participants believed the deception used in the task (1 item for the Real Condition; e.g., Iggy: "When

I was playing the ball tossing game with the kids, I thought the players were real kids playing the game on the Internet." Ziggy: "I didn't think the players were real kids playing the game on the Internet. How about you?").

Scores for (1) favoring the co-player/wall and (2) feeling empathy for the fictional and real co-player were created by averaging the two items for those subscales. The internal consistencies (Cronbach's Alpha) for favoring a co-player/wall for each condition were very low (Real: α = .485; Fiction: α = .115; Control: α = .091) and there were no significant relationships between favoring a co-player/wall and behavior during Cyberball (*ps* > .10); therefore, favoring a co-player/wall will not be discussed further.

The internal consistencies (Cronbach's Alpha) for feeling empathy for the excluded real (α = .718) and fictional (α = .689) co-players were adequate. In addition to theses scores, children were given scores (based on the average of the items) for (1) the real life empathy (14 items; e.g., Iggy: "Seeing a boy/girl who is crying makes me feel like crying." Ziggy: "Seeing a boy/girl who is crying doesn't make me feel like crying. How about you?"), (2) prosocial behavior (7 items; e.g., Iggy: "When I play games, I don't make sure everyone gets a turn." Ziggy: "When I play games, I make sure everyone gets a turn. What about you?"), and (3) anthropomorphism subscales (6 items; e.g., Ziggy: "I think trees cannot think about anything." Iggy: "I think trees can think about things; they can think about their birthdays or friends. How about you? What do you think?") based on the average of the items for each subscale. The internal consistencies (Cronbach's Alpha) for real life empathy (α = .699), prosocial behavior (α = .694), and anthropomorphism (α = .696) were adequate. The anthropomorphism subscale will not be discussed further because anthropomorphism scores were unrelated to Cyberball change scores and all other individual differences measures (*ps* > .10); furthermore, results from Study 1 with adults suggests that anthropomorphism was unrelated to performance during Cyberball.

Due to technical errors with the video and/or audio recording equipment, there are no data from the BPI for 5 of the participants. Additionally, there were one or two missing items (out of 42 total items) for 17 participants due to either technical errors, non-compliance, experimenter error, or non-codable responses; if there were missing data for any aggregate scores, averages were based on the available data.

Children's theory of mind – parent questionnaire. Parents completed the Children's Social Understanding Scale (CSUS) to assess their children's theory of mind (Tahiroglu, Moses, Carlson, & Sabbagh, 2009). The questionnaire consists of 42 items and measures six components of theory of mind: (1) belief [e.g., "Talks about what people think or believe (e.g., "I think it's raining"; "He thinks it's bedtime")"], (2) knowledge [e.g., "Can tell you how s/he found out about things (e.g., "Sally told me about it"; "I saw it happen at the park"; "I heard it on the radio")"], (3) perception (e.g., "Thinks you can still see an object even if you are looking in the opposite direction" – reverse scored), (4) desire [e.g., "Talks about differences in what people like or want (e.g., "You like coffee but I like juice")"], (5) intention (e.g., "Understands when s/he is being teased or made fun of"), and (6) emotion (e.g., "Tries to understand the emotions of other people (e.g., wants to know why you are crying)"]; each subscale consists of 7 items. Questions were answered on a 4-point Likert scale ranging from 1 (Definitely untrue) to 4 (Definitely true), but parents also had the option of answering 'do not know' for each question. The Children's Social Understanding Scale was scored by averaging the items of each subscale. All of the subscales were highly correlated (*ps* < .001); therefore, a composite social understanding score was created by averaging across all of the items in the questionnaire. This total theory of mind score had high internal consistency (Cronbach's $\alpha = .901$) and will be used in further analyses (instead of the separate subscales). Possible scores could range from 1 to 4.

Pretend Play Assessment. The Pretend Play Assessment consisted of a child role play interview, a parent role play questionnaire, a pretend phone conversation as a behavioral measure of role play, and an action pantomime task as a behavioral measure of object substitution ability. Each of these will be discussed in turn.

<u>Role play interview – child task.</u> Children were asked about imaginary companions in the following way: 'some friends are real like the kids who live on your street, the ones you play with. And some friends are pretend friends. Pretend friends are ones that are make-believe, that you pretend are real. Do you have a pretend friend?' Children who said they had an imaginary companion were asked a series of questions about it (e.g., age, whether it was invisible or based on a toy, appearance, what they liked to do together, etc). Then, children were asked about pretend identities: 'now I'm going to ask you about another type of pretending. Sometimes children like to pretend that they are someone else. They like to talk and act like another person or an animal. Do you pretend to be someone else—like another person or an animal?' If the child said 'yes', he or she was asked a series of questions about the pretend identity (e.g., 'when you are Lizardman, can you do anything special?').

<u>Parent role play questionnaire.</u> Imaginary companions were described in the following way: 'many children enjoy pretending to interact with someone who is not real.

For example, they might talk to an invisible character that they have created or that is based on a real person who is not actually present (e.g., a favorite cousin who lives far away). The pretend interactions might also be with a special stuffed animal or doll. For some children, this type of pretend play is frequent and the child is described as having an imaginary companion.' If the parent indicated that the child had an imaginary companion, they were asked a series of forced-choice and open-ended questions [e.g., 'Is the imaginary companion completely invisible or is it a toy?' 'If the imaginary companion is invisible, what do you know about the physical characteristics of the imaginary companion (e.g., size, hair color, clothing)?' 'If the imaginary companion is a toy, please describe the toy.'].

Pretend identities were described to parents in the following way: 'many children enjoy pretending to be someone else (a person or animal). For some children this type of play goes beyond occasional pretend games of "house" or "doctor." For these children, the pretend play can be almost like having an alter ego or pretend identity. They act out a particular role on a regular basis.' If parents indicated that their child engaged in this type of play, they were asked a series of forced-choice and open-ended questions [e.g., 'Is the pretend identity a person, animal (what kind?) or something else (please describe)'; 'How would you describe the personality and behavior of the pretend identity?']. The information provided by the parent was used to help code whether the child has an invisible friend, personified object, and/or pretend identity (as described above). A parent follow-up questionnaire was used after children completed the role play interview and parents completed the role play questionnaire to help clarify any inconsistencies between the parent- and child-reports.

Role play coding. Children were coded for whether they had invisible friends, personified objects, and pretend identities based on the child role play interview and the parent role play and follow-up questionnaires. The criteria for being coded as having an invisible friend were: (1) the child and the parent said that the child has (or had) an invisible friend and provided a good description of it; the 'good' description of the friend was required to eliminate cases in which a child reported that he or she had an invisible friend, but neither the child nor the parent could remember anything about it, and thus answered 'don't know' to many of our questions, or (2) if the child's parent did not corroborate the child's response, the child's description of the invisible friend had to be particularly detailed; parents sometimes do not know about the presence of imaginary companions for older children (Taylor et al., 2004), so this criteria was added to be more inclusive of invisible friends for older children. The reliability between two coders for 36 (50.7%) of the participants for invisible friends was 91.7%; disagreements were resolved by discussion.

The criteria for coding children as having a personified object were similar, with one addition: the description of the object had to go beyond the physical appearance to include psychological details (e.g., personality, mental states). This extra criterion helped differentiate between transitional objects that were used for comfort (Winnicott, 1953) and personified objects that were treated as characters with personalities. The reliability between two coders for 36 (50.7%) of the participants for personified objects was 94.4%; disagreements were resolved by discussion.

For pretend identities, the criteria were similar, with the addition that the description had to go beyond a description of a costume to include details about behavior or personality (e.g., flying, being brave). This extra criterion helped differentiate between the enjoyment of wearing a costume and the creation of a character to be impersonated. The reliability between two coders for 36 (50.7%) of the participants for pretend identities was 66.7%; disagreements were resolved by discussion. The low reliability between the coders for pretend identities reflects a general difficulty with categorizing this type of play that has been encountered in past research. Most children and parents indicate that the children occasionally impersonate a character, which makes it difficult to differentiate children who, for example, sometimes pretend to be Batman from children who create a distinct, enduring pretend identity that is impersonated on a regular basis. Because the reliability between the two coders for pretend identities was substantially lower than the reliability for invisible friends and personified objects, pretend identities will not be included in future analyses.

Pretend phone conversation – child task. The pretend phone conversation task was designed as a behavioral assessment of children's ability to generate a pretend conversation with an imaginary partner. This task is based on past research comparing pretend conversations with real and imaginary friends (Taylor, Cartwright, & Carlson, 1993). The experimenter asked, 'Do you have a special friend you like to play with?' After the child named a real friend, he or she was asked, 'Do you know how to use a telephone?' Then, the experimenter gave a toy phone to the child and asked the child to pretend to call his or her friend. The child's phone call was given a score out of 5, with one point each for (1) dialing, (2) holding the phone to his/her ear, (3) listening, (4) talking, and (5) generating content beyond stereotyped phrases such as 'hello' or 'how are you?' (e.g., 'Do you want to come over and have a sleepover or not?'). Possible scores could range from 0 to 5; the internal consistency for total scores was adequate (Cronbach's α = .774). The number of words uttered during the pretend conversation were also counted. There are missing data for the total phone task score for one participant and for the number of words used during the pretend phone conversation for two participants because they could not be coded due to technical errors with the audio and/or video recording equipment. The phone conversations for 35 (49.3%) of the participants were coded by a second experimenter with 96.0% reliability; disagreements were resolved by discussion.

Action pantomime – child task. The action pantomime task is a developmentally sensitive behavioral measure of object substitution (Overton & Jackson, 1973). During the task, children are asked to perform simple pretend actions requiring tools but are not given an object to substitute as the tool. Therefore, the child had to come up with his or her own way of representing the tool. Younger children typically use his or her hand as the tool required for the action (e.g., used a finger as a toothbrush), while older children typically pretend to hold an invisible tool, which is a more sophisticated representation of the tool instead of relying on a body part to represent the tool. Children begin to be able to use invisible objects earliest (around age 3-years) when they are asked to hold an object without performing an action with the pretend object, followed by being able to use invisible objects for action sequences that are directed toward the self (e.g., pretending to comb one's own hair) between the ages of 4- and 6- years, then for action sequences that are externally directed (e.g., pretending to hit a block with a hammer) between the ages of 6- and 8- years (Dick, Overton, & Kovacs, 2005; Overton & Jackson, 1973).

In Study 2, children were asked to perform nine simple pretend actions. Two of the actions were to hold an external object that was not provided by the experimenter: hold a pencil and hold a knife. Three of the actions were directed toward the body: brush teeth with a toothbrush, put on sunglasses, fan yourself with a fan. Two of the actions were directed toward an external object that was provided by the experimenter: hammer a wooden block with a hammer and cut a piece of paper with scissors. Two of the actions were directed toward an external object that was not provided by the experimenter: pour water with a pitcher and flip a pancake with a spatula. For each of the nine actions, the experimenter recorded whether children used their hand to represent the tool for the action (e.g., used a finger as a toothbrush), or whether they pretended to hold an invisible tool. Children earned a point for each time they pretended to hold an invisible tool; possible scores could range from 0 to 9. The internal consistency for total action pantomime scores was relatively low (Cronbach's $\alpha = .466$), but this was largely because there was low variability in some of the actions, especially the hold actions, which would be expected with children of this age. However, because there was variability in most of the items, they were all included in a total action pantomime score. There is missing data for the total action pantomime scores for two participants due to refusal to complete an action or misunderstanding the task. The pretend actions for 35 (49.3%) of the participants were coded by a second experimenter with 94.2% reliability; disagreements were resolved by discussion.

Fiction involvement questionnaire – parent questionnaire. Parents were asked to fill out a questionnaire to measure their own exposure to fictional and nonfictional books and their child's exposure to fictional and nonfictional books, movies, and television shows. The questionnaire was developed by Mar and colleagues (Mar et al., 2006; Mar et al., 2010) and is a variation of the Author Recognition Test (Stanovich & West, 1989), which has been used to measure adults' interest and involvement with reading by using a signal detection approach to control for socially desirable responding. The questionnaire presents a list of authors (of adult and children's books), book titles, movie titles, and television show titles and 'foils' (i.e., made-up names of authors, books, movies, and television shows). Parents were instructed to identify the names and titles that they recognized. In order to discourage guessing, parents were also told that (for the author lists), "some of the names are people who are not writers, so guessing can easily be detected" and (for the title lists), "some of the titles are not real movies/shows/books, so guessing can easily be detected."

To measure *parents*' exposure to fiction and nonfiction books (Mar et al., 2006), parents completed that Adult Author Recognition checklist, which consisted of 50 names divided into 5 genres (e.g., thrillers, romance) of narrative fiction authors (e.g., P. D. James), 50 names divided into 5 genres (e.g., science, philosophy) of non-narrative expository nonfiction (e.g., Oliver Sacks), and 40 foils (e.g., Aimee Dorr).

To measure *children's* exposure to fiction and nonfiction books, parents completed the Children's Author Recognition checklist and Children's Title Recognition checklist (Mar et al., 2010). In the Children's Author Recognition checklist, there were 70 names of children's narrative fiction authors (e.g., Eric Carle), 13 names of children's nonfiction authors (e.g., Jill Frankel Hauser), and 32 foils (e.g., Jeanne Brooks). In the Children's Title Recognition checklist, there were 63 titles of children's narrative fiction books (e.g., *We're Going on a Bear Hunt*), 12 titles of children's nonfiction (e.g., *One*

Grain of Rice: A Mathematical Folktale), and 29 foils (e.g., *I Hear a Knock at My Window*). To measure children's exposure to fiction in film, parents completed the Children's Film Recognition test (Mar et al., 2010), which consisted of 87 titles of children's fiction films (e.g., *Bambi*) and 12 foils (e.g., *Robert's Last Lollipop*). To measure children's exposure to fiction in Television, parents completed the Children's Television Recognition test (Mar et al., 2010), which consisted of 68 titles of children's fiction television shows (e.g., *The Adventures of Jimmy Neutron: Boy Genius*) and 15 foils (e.g., *Café Creative*).

Each subscale [i.e., parents' exposure to (a) fiction books (Cronbach's α = .924) and (b) nonfiction books (Cronbach's α = .902); children's exposure to (c) fiction authors (Cronbach's α = .911) and (d) nonfiction authors (Cronbach's α = .363); (e) fiction book titles (Cronbach's α = .794) and (f) nonfiction book titles (Cronbach's α = 421); (g) fiction film (Cronbach's α = .886); and (h) fiction television (Cronbach's α = .901)] was scored by subtracting false positives (when a parent identified a fake name or title) from correct hits (checking off actual names or titles). The internal consistencies were high for all subscales except for children's exposure to nonfiction books (authors and titles), which had low internal consistencies. The average scores for children's exposure to nonfiction books (both authors and titles) was -.35 (*SD* = 1.3) indicating that parents checked off more foils than actual nonfiction authors or titles, resulting in meaningless scores; therefore, children's exposure to nonfiction books will not be included in further analyses.

Two composite scores were created for children: (1) Fiction book exposure, which was created by averaging scores on the Children's Author Recognition checklist and the Children's Title Recognition checklist for fiction books and (2) Fiction screen-based media exposure, which was created by averaging scores on the Children's Film Recognition checklist and the Children's Television Recognition checklist. For parents, three composite scores were created for familiarity with, (1) Fiction authors, (2) Nonfiction authors, and (3) overall Books, which was created by averaging scores from the Fiction and Nonfiction subscores.

Demographic information – parent questionnaire. Basic demographic information, including child's gender, child's and parent's age, child and parent's ethnicity, parent's education level, parent's marital status, number and age of child's siblings, child's school, etc. were collected using a questionnaire developed for this study. This information was used to describe the sample and was not evaluated in relation to Cyberball behavior or other individual differences measures.

Procedure. Participants and their parents were seen for a two-hour long session in a university laboratory. Upon arrival to the lab, participants were introduced to two experimenters (Experimenter 1 was in charge of the participant and Experimenter 2 was in charge of setting up the computer and giving the questionnaires to the parent). Parents were asked to read and sign the consent form. Eight-year-old children were given an assent form to read and sign; 5-year-old children were told about the study and gave verbal consent. After the parents and children were given a tour of the lab, Experimenter 1 took the parents into a separate room (Experimenter 2 stayed with the children in the waiting room) and explained the deception that would be used with their child; verbal consent was obtained from the parents to use the deception in the cover story (no parents refused). Then, the cover story for the Real Condition was told to the children (i.e., that they would be playing a virtual ball-tossing game with three other children who would be connected over the Internet). The following script was used:

> Today you will be playing a ball tossing game on the computer with other children, pretend cartoon characters (like Snoopy), and nobody at all. The other children are kids just like you and they are also playing games in other labs just like this one, they are just at other universities in different states. You will get to see each other and see where the other kids are throwing the ball because you will all be connected over the Internet. Do you know what the Internet is? It is a way of talking with people who are far away, kind of like a telephone, but using a computer instead. You won't talk to the other kids, but you will get to see their pictures. They will also see a picture of you! We would like to take your picture now. This picture will be erased after you are done playing the games with us today. Is it okay with you that we take your picture?

Experimenter 2 took the participants' photographs with a digital camera and went into the testing room to upload them into the Cyberball program. Before Experimenter 2 went into the testing room, Experimenter 1 asked Experimenter 2, "Will you go get set up for the game and double check that the other kids are ready?" While Experimenter 2 set up the Cyberball program, Experimenter 1 played with the children and talked to the parents in the waiting room.

After Cyberball was set up, Experimenter 2 returned to the waiting room and handed Experimenter 1 a sticky note with the names of the co-players written on it and said that the game was ready. Experimenter 2 stayed with the parents in the waiting room, where they were given the questionnaires to complete. After the parents completed the questionnaires, they were invited to watch their children complete the tasks on a television in a room adjacent to the testing room. Experimenter 1 took the children into the testing room and gave them instructions for how to play the Cyberball game using the instructions in Appendix H depending on which condition came first.

While the children played Cyberball, Experimenter 1 took notes about what the children were doing and, if necessary, reminded the children to pay attention to the game, pass the ball, only press one button at a time, etc. After the participants finished the first run of Cyberball, Experimenter 1 asked them to sit at a small table in the testing room, where they completed the Pretend Phone Conversation and Action Pantomime Task. Once those tasks were finished, there was a short break while Experimenter 2 set up the next condition of Cyberball; after which, Experimenter 1 took the participants back into the testing room and gave the instructions for this condition. There was no practice session given for the second and third conditions because children were already familiar with the Cyberball game. After the children finished the second condition, they were asked to sit at a small table in the testing room, where they completed the Role Play Interview. Once the interview was over, there was a short break while Experimenter 2 set up the third condition of Cyberball, and Experimenter 1 completed the Parent Follow-up about the children's role play behavior. Then Experimenter 1 took the participants back into the testing room and gave them instructions for the third condition. After the children finished, they were asked to sit at a small table in the testing room, where they completed the Berkeley Puppet Interview (BPI). A short break was given in the middle of the BPI. Because deception was used for the Cyberball task, participants were debriefed following completion of the BPI. Including the cover stories and set-up time, it took approximately 40 minutes to complete the Cyberball task (each condition lasted approximately 5 minutes). The Pretend Phone Conversation and Action Pantomime tasks took approximately 10 minutes combined; the Role Play Interview took approximately 15 minutes; the Berkeley Puppet Interview took approximately 20 minutes. The entire session was video-recorded.

Results

Cyberball. As in Study 1, the Cyberball game was divided into the Baseline period (i.e., from the beginning of the game until the onset of a co-player/wall being excluded) and the Exclusion period (i.e., from the onset of a co-player/wall being excluded until the end of the game), as well as further sub-divided into the first and second halves of the Baseline and Exclusion periods. The percentage of passes from the participant to the excluded player/wall were calculated for each half of the Baseline and Exclusion periods in the Real, Fiction, and Control conditions (the number of times the participant passed the ball to the excluded player/wall divided by the total number of passes to all three players/walls, multiplied by 100) (see Table 5 for means and standard deviations). These percentages were used to create three change scores (one for each condition) that were used as an index of the percent increase of passes to the excluded player from Baseline to Exclusion (percentage of passes to the excluded player/wall during Exclusion minus the percentage of passes to the excluded player/wall during Baseline). As in Study 1, positive change scores (increase in the percent of passes from Baseline to Exclusion) were interpreted as attempts to include the excluded player/wall.

Negative change scores (decrease in the percent of passes from Baseline to Exclusion) were interpreted as attempts to exclude the excluded player/wall, a pattern that might indicate that the participant was attempting to affiliate with the two included players/walls. Change scores near zero were interpreted as no attempt to either exclude or include the excluded player/wall, a pattern that might indicate the participant did not notice that one of the players/walls was being excluded.

Table 5
Means and Standard Deviations (in Parentheses) of Percentage of Passes to the Excluded Co-Player/Wall During the First and Second Half of the Baseline and Exclusion Periods for the Real, Fiction, and Control Conditions

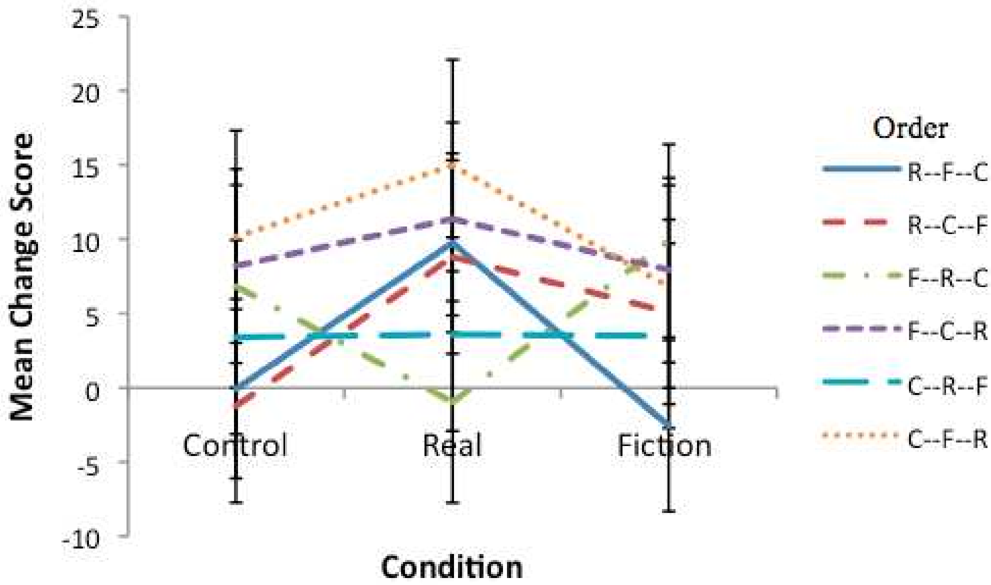
		First half	Second half
Baseline	Real	30.88 (18.14)	26.90 (20.00)*
	Fiction	30.30 (18.59)	32.65 (22.43)
	Control	34.16 (18.17)	31.87 (20.35)
Exclusion	Real	32.94 (18.53)	34.74 (20.86)
	Fiction	33.07 (20.96)	37.16 (21.34)
	Control	37.14 (22.17)	36.17 (21.98)

*Significantly lower than chance, t (70) = -2.57, p = .012

Order effects. Because there were three conditions, there were six possible counterbalanced orders with 10 to 14 participants randomly assigned to each order (Real 1st, Fiction 2nd, Control 3rd; Real 1st, Control 2nd, Fiction 3rd; Fiction 1st, Real 2nd, Control 3rd; Fiction 1st, Control 2nd, Real 3rd; Control 1st, Real 2nd, Fiction 3rd; Control 1st, Fiction 2nd, Real 3rd). To assess the possibility that children's responses were effected by the order in which they completed the conditions, I conducted a 3 X 6 mixed factorial ANOVA with condition (Real vs. Fiction vs. Control) as a within-subjects factor, order (comparing the 6 possible orders) as a between-subjects factor, and Cyberball change scores for the Baseline and Exclusion periods as the dependent variable. There were no main effects of order or condition and no interaction between order and condition (*ps* > .25). Similar results are found when using the change scores based on the second half of the Baseline period (i.e., after children had become familiar with the game) and the second half of the Exclusion period (after children had had ample opportunity to notice that a player was being excluded) (*ps* > .50). Although inspection of Figure 2 suggests that the change scores varied across orders, the differences between the means were small compared to the substantial variability in the change scores for each order. I also examined the possibility of order effects in other ways (e.g., comparing the change scores for each condition when the Real Condition was first vs. when the Fiction Condition was first vs. when the Control Condition was first, collapsing across the conditions that occurred second and third; *ps* > .40), as well as including age and gender as between subjects factors (*ps* > .20). None of these analyses yielded any significant effects of order. Therefore, I have reported the results collapsing across order.

Condition differences. The substantial variability in the change scores within each condition suggests that children approached the task in a variety of different ways. The decision to pass to a particular co-player/wall could reflect: (a) a desire to include the excluded co-player/wall, (b) a preference to affiliate with the other two co-players/walls, (c) the maintenance of a pattern (e.g., passing the ball in a particular order), (d) a desire to throw the ball back to the co-player/wall that threw it to the participant, (e) an

Figure 2. Mean Change Scores (Second Half of Baseline and Exclusion) for Each Condition by Condition Order (R = Real Condition, F = Fiction Condition, C = Control Condition)



idiosyncratic preference for a particular co-player/wall or location, (f) a tendency to even out one's own passes, or (g) some combination of these factors. The variability in children's behavior could also reflect individual differences in whether the children explicitly noticed that a co-player/wall was being excluded. Even the adults in Study 1 did not always notice the exclusion.

The large standard deviations present a challenge for these analyses because comparisons of overall condition averages are rendered meaningless. In order to proceed, I examined information from the Berkeley Puppet Interview (BPI) to determine if children's individual reactions to Cyberball might help to explain the variability in the responses. None of the variables in the BPI responses about the extent to which participants (1) had a favorite co-player/wall, (2) noticed that a co-player/wall was being excluded, (3) felt empathetic for the excluded real or fictional co-players, or (4) believed the deception used for the Real Condition were related to children's Cyberball change scores (*ps* > .10). For example, replicating the result of Study 1 with adults, the extent that children explicitly reported noticing that a co-player/wall was excluded did not predict their pattern of throws.

In addition to asking children specifically about Cyberball, I collected information about children's real life empathy, prosocial behavior, theory of mind, pretend play, and exposure to fiction, as well as gender and age. I next investigated the extent that individual differences in these variables were related to Cyberball change scores. None accounted for the variability in the behavioral responses during Cyberball (ps > .10; see Table 6 for correlations) – with one exception: individual differences in children's tendency to empathize in real world situations.

To test the differences between conditions with BPI real life empathy scores as a covariate, a Repeated Measures ANCOVA was conducted with condition (Control vs. Real vs. Fiction) as the within subjects factor, and Cyberball change scores for the second half of Baseline and the second half of Exclusion as the dependent variable (see Table 7 for the Means, Standard Deviations, and Standard Errors). There was not a significant main effect of real life empathy, F (1, 64) = .413, p = .523, *partial* η^2 = .006, but there was a marginally significant main effect of condition, F (2, 128) = 2.71, p = .07, *partial* η^2 = .041, and a significant interaction between condition and real life empathy, F (2, 128) = 3.12, p = .048, *partial* η^2 = .046. Analyses of contrasts revealed a significant difference between change scores in the Real Condition compared to change scores in the Control and Fiction Conditions for both the main effect of condition, F (1, 64) = 5.213, p = .026, *partial* η^2 = .075, and the interaction between condition and real life empathy,

Table 6
Correlations Between Real, Fiction, and Control Condition Change Scores, Real Life Empathy, Prosocial Behavior, Anthropomorphism, Theory of Mind, Fiction Involvement, and Pretend Phone Conversation

	Real Condition Change Scores	Fiction Condition Change Scores	Control Condition Change Scores
Real Condition Change Scores			
Fiction Condition Change Scores	-.047		
Control Condition Change Scores	.003	-.049	
Real Life Empathy	.283*	-.132	-.028
Real Life Prosocial Behavior	.139	-.012	.037
Anthropomorphism	.145	-.001	.127
Theory of Mind (Total Scores)	.043	-.018	-.055
Parent Book Composite	.162	-.014	-.007
Child Fiction Book Composite	.188	.030	-.069
Child Screen-based Fiction Composite	.091	.075	-.052
Pretend Phone Conversation Total Scores	.161	.054	-.112
Pretend Phone Conversation Number of Words	.188	-.079	.110

*p = .021

F (1, 64) = 6.058, p = .017, *partial* η^2 = .086. After controlling for real life empathy, children's change scores were higher in the Real Condition than they were in the Fiction and Control Conditions (see Figure 3). Furthermore, change scores for the Real

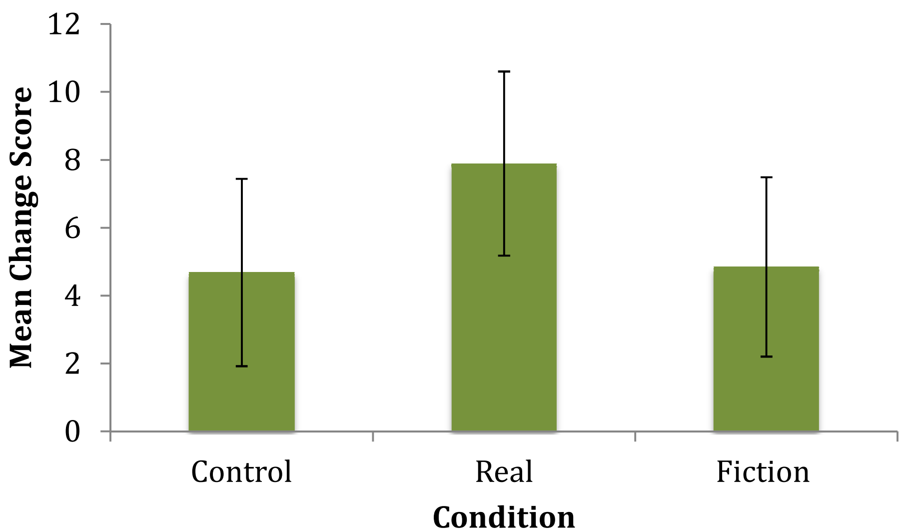
Condition were significantly above chance (i.e., significantly above 0), *t* (70) = 2.99, *p* = .004, were marginally above chance for the Fiction Condition, *t* (70) = 1.90, *p* = .061, but were not different from chance for the Control Condition, *t* (70) = 1.61, *p* = .113.

Table 7
Means, Standard Deviations, Standard Errors, and Minimum and Maximum Scores for Real, Fiction, and Control Condition Change Scores for the Second Half of Baseline and Exclusion Controlling for BPI Real Life Empathy Scores

Condition	Mean	Standard Deviation	Standard Error	Minimum Score	Maximum Score
Control	4.68	22.27	2.76	-42.86	50.00
Real	7.89	22.81	2.71	-75.00	66.67
Fiction	4.85	21.49	2.64	-60.00	54.76

Note: N = 66 because there were missing real life empathy scores for 5 children due to technical errors with the video and/or audio recording equipment. There were no differences between the conditions for these 66 participants *without* controlling for empathy, indicating that it is meaningful to control for empathy rather than the differences between conditions being a pattern specific to these particular participants.

Figure 3. Mean Change Scores for Each Condition for the Second Half of Baseline and Exclusion Controlling for BPI Real Life Empathy



This pattern is contrary to my hypothesis that change scores in both the Real and Fiction Conditions would be higher than change scores in the Control Condition. Only in the Real Condition were children significantly moved to take steps to include the excluded co-player. Although these results are interesting, they should be interpreted with caution because they are only significant when controlling for children's abilities to empathize in real life situations and there were no significant differences between the conditions for the change scores for the entire Baseline and Exclusion periods (even when controlling for real life empathy). A second analysis using median split scores for real life empathy (i.e., children with real life empathy scores above the median of 4.86 were categorized as having high empathy and children with real life empathy scores below the median of 4.86 were categorized as having low empathy) was not significant ($ps > .15$).

Includers vs. excluders. Another way to evaluate individual differences in Cyberball behavior is to categorize children as being includers (i.e., attempting to include the excluded co-player/wall in the Exclusion period) or excluders (i.e., making no attempt to include the excluded co-player/wall in the Exclusion period). Children were categorized as being above (n = 8), below (n = 9), or at chance (n = 54) using a binomial test for the proportion of passes to the excluded real co-player during the second half of the Exclusion period in the Real Condition. There were no significant differences between these groups of children on Fiction or Control Condition change scores ($ps > .1$). I also attempted to categorize children based on their pattern of throws during the Exclusion period (e.g., an increasing tendency to throw only to the excluded co-player/wall), but there was no clear basis for categorization. Therefore, using change scores for each condition seems to be more meaningful then categorizing children based on their pattern of throws.

Correlations between the conditions. Contrary to the hypothesis that the Real and Fiction Conditions would be correlated, change scores in the Real Condition were uncorrelated with change scores in the Fiction Condition (for both the entire Baseline and Exclusion periods and the second halves of the Baseline and Exclusion periods; *ps* > .50). Change scores for the Real and Fiction Conditions were also uncorrelated with change scores for the Control Condition (for both the entire Baseline and Exclusion periods and the second halves of the Baseline and Exclusion periods; *ps* > .06; note that a Bonferroni correction requires a significance level of .017 for these analyses).

Reactions to Cyberball. There was not a difference between the empathy children felt for the excluded co-player in the Real Condition ($M = 3.03$, $SD = 1.53$) compared to the empathy children felt for the excluded co-player in the Fiction Condition ($M = 3.06$, $SD = 1.56$), $t(62) = -.043$, $p = .965$. In fact, the empathy that children felt for the real and fictional co-players was significantly positively correlated, $r(61) = .565$, $p < .001$; children who reported feeling high amounts of empathy for a real co-player also reported feeling high amounts of empathy for a fictional co-player. This suggests that children have a similar emotional reaction to an excluded real co-player as they do to an excluded fictional co-player, a finding that is surprising considering that children's behavioral reactions differed when a real co-player was excluded compared to when a fictional co-player was excluded.

Feeling empathy for the excluded real co-player was significantly positively correlated with BPI real life empathy scores, $r(63) = .317$, $p = .01$, but not BPI real life prosocial behavior scores, r (63) = .06, p = .64. Feeling empathy for the excluded fictional co-player was not correlated with BPI real life empathy or prosocial behavior scores (ps > .06; note that a Bonferroni correction requires a significance level of .0125 for these analyses). These results indicate that children's self-reports of feeling empathy towards the excluded real co-player, but not the excluded fictional co-player, relate to their self-reports of empathy in real-world situations. This could also help explain why participants attempted to include the excluded real co-player more than the fictional co-player.

There was a difference in noticing that a co-player/wall was excluded between the Real, Fiction, and Control Conditions, F (2, 112) = 3.832, p = .025, *partial* η^2 = .064. Participants were more likely to notice that a co-player was excluded in the Real condition (M = 4.02, SD = 2.0) and that a wall was excluded in the Control Condition (M = 4.06, SD = 1.95) than they were to notice that a co-player was excluded in the Fiction Condition (M = 3.33, SD = 1.90), F (1, 56) = 5.97, p = .018. However, this was unrelated to Cyberball change scores (ps > .09).

Other results. Although the primary goal of this dissertation research was to examine prosocial behavior in reaction to social exclusion in real and fictional social interactions, the results for the individual differences measures were interesting in their own right. In what follows, I shift from discussing results related to Cyberball to report the relations between individual differences in real life empathy, prosocial behavior, theory of mind, pretend play, and fiction exposure.

Real life empathy, prosocial behavior, and theory of mind. See Table 8 for descriptive statistics for the subscales and composite scores of real life empathy (from the

Berkeley Puppet Interview), prosocial behavior (from the Berkeley Puppet Interview), and theory of mind (from the Children's Social Understanding Scale). Age and gender were significantly related to real life empathy scores. 8-year-olds (M = 5.00, SD = .59) had significantly higher empathy scores than 5-year-olds (M = 4.45, SD = .82), F (1, 62) = 12.57, p = .001, *partial* η^2 = .169. Girls (M = 5.00, SD = .68) had significantly higher empathy scores than boys (M = 4.46, SD = .74), F (1, 62) = 12.38, p = .001, *partial* η^2 = .166. There was also a marginally significant interaction between age and gender, F (1, 62) = 3.93, p = .052, *partial* η^2 = .06, indicating that the gender difference was more pronounced for 5-year-olds than it was for 8-year-olds, with 5-year-old boys having the lowest BPI empathy scores (M = 4.0, SD = .62) compared to 5-year-old girls (M = 4.87, SD = .76), 8-year-old boys (M = 4.87, SD = .58), and 8-year-old girls (M = 5.12, SD = .60). These results are consistent with previous research showing that empathy increases with age (Saarni, Campos, Camras, & Witherington, 2006) and that girls have superior empathizing skills compared to boys (Wakabayashi, Sasaki, & Ogawa, 2012).

Table 8
Means, Standard Deviations (in Parentheses), and Minimum and Maximum Scores for Real Life Empathy, Prosocial Behavior, and Theory of Mind

Subscale or Composite Score	Mean (SD)	Min – Max scores
Empathy (N = 66)	4.74 (.75)	3.07 – 6.0
Prosocial Behavior (N = 66)	5.39 (.73)	3.14 – 6.14
Theory of Mind Total Scores (N = 71)	3.41 (.33)	2.21 – 3.95

Three Pearson's correlations showed that real life prosocial behavior scores were significantly positively correlated with real life empathy scores controlling for age, r (63) = .401, p = .001. This is a result that is consistent with the literature that empathy and prosocial behavior are related (Eisenberg et al., 2007).

Age and gender were unrelated to theory of mind (ps > .09). Theory of mind scores were significantly correlated with empathy scores, r (64) = .317, p = .01, but not prosocial behavior, r (64) = .064, p = .612. The significant positive correlation between theory of mind scores and empathy scores remains after the Bonferroni correction, which requires a significance level of .017, and after controlling for age, r (63) = .261, p = .036. This is a relationship that replicates previous research (Harris & Saarni, 1989).

***Pretend Play Assessment*.**

Role play (child role play interview and parent role play questionnaire). There were 17 children (23.9% of the sample) coded as having invisible friends and 14 children (19.7% of the sample) coded as having personified objects (see Table 9 for examples of invisible friends and personified objects). Overall, there were 29 children (40.8% of the sample) coded as having one type of imaginary companion (see Table 10 for frequencies of invisible friends, personified objects, and any type of imaginary companion as a function of age and gender). Two of these children were coded as having both an invisible friend and a personified object. For these children, two coders coded the predominant type of imaginary companion based on the child- and parent-reports (100% reliability). This resulted in 17 children coded as having invisible friends, 12 as having personified objects, and 42 as having no imaginary companion.

Table 9
Examples of Invisible Friends and Personified Objects

Type of imaginary companion	Age and gender of child	Name and description of imaginary companion
Invisible friends		
	5-year-old boy	Vambi, a 1,500-year-old vampire, who the child can ride, shows up by the child pressing a button in his house, and chews on the child's toys.
	5-year-old girl	Squinch, a creature with a small body and a pointy horn on her head, who knows to show up for the child by using a little computer in her car.
	8-year-old boy	Baba, an invisible creature who is partly human and partly something else; Petee, a red bird who likes red and has a red sports car; and Ee-oo-ah, who is the biggest, strongest, and is "on the top" and likes the color black. The child would talk to and "hang-out" with Baba, Petee, and Ee-oo-ah.
	8-year-old girl	Snoozer, a nice, funny hamster who hides and sleeps in the child's backpack
Personified objects		
	5-year-old boy	Policey, a toy police badge, who has 'special effects' when he is in the child's pocket; child said that Policey and he always do the same thing together and they do not argue.
	5-year-old girl	Tom, a purple stuffed monkey, who is the child's prince; child said that Tom is "mostly my friend and doesn't act rude to me."
	8-year-old boy	Polka Dot, a stuffed Dalmatian, who is nice and likes to play.
	8-year-old girl	Luke, a stuffed penguin with a bow that lights up; child said that they "argue over when we want to sleep or play."

Table 10
Frequencies (and Percent of Entire Sample) for Each Type of Imaginary Companion as a Function of Age and Gender

		Imaginary Companion Type		
Age	Gender	Invisible Friend	Personified Object	Total
5-year-olds	Male	2 (2.8%)	3 (4.2%)	5 (7.0%)
	Female	2 (2.8%)	7 (9.9%)	9 (12.7%)
8-year-olds	Male	6 (8.5%)	2 (2.8%)	7 (9.9%)
	Female	7 (9.9%)	2 (2.8%)	8 (11.3%)

Age was significantly related to imaginary companion status; 8-year-olds were more likely to have an invisible friend, while 5-year-olds were more likely to have a personified object; 5- and 8-year-olds were equally as likely to *not* have an imaginary companion, χ^2 (2, N = 71) = 10.09, p = .006, *Cramer's V* = .377. This finding supports previous research showing that older children are more likely to have invisible friends than personified objects (Taylor et al., 2004; note, however that there were no differences between the likelihood of having an invisible friend and personified object in younger children in Taylor et al.'s study). This relationship between imaginary companion status and age suggests that the *type* of role play in which children engage is related to development rather than the *ability* to engage in role play, as 5- and 8-year-olds were equally as likely to not engage in role play. Gender and imaginary companion status were not related, χ^2 (2, N = 71) = 1.76, p = .415.

Behavioral measure of role play (pretend phone conversation task). The average total pretend phone conversation score was 3.47 (*SD* = 1.5; ranging from 1 to 5) and the average number of words used during the pretend phone conversation was 8.39 (*SD* = 14.0; ranging from 0 to 74). 8-year-olds (*M* = 12.6, *SD* = 17.64) used more words during the phone task than 5-year-olds (*M* = 4.06, *SD* = 6.74), *t* (44) = 2.67, *p* = .011 (equal variances not assumed). After controlling for the number of words used during the pretend phone conversation, age was not significantly related to total phone task scores, *F* (1, 66) = .098, *p* = .756. Gender was unrelated to both phone task scores (*ps* > .20).

Object substitution (action pantomime task). As would be expected from previous research showing that the use of symbolic objects in pretend actions increases with age (Dick et al., 2005; Overton & Jackson, 1973), 8-year-olds (*M* = 82.33%, *SD* = 12.88%) used significantly more symbolic objects than 5-year-olds (*M* = 69.29%, *SD* = 18.29%), *t* (60.9) = 3.47, *p* = .001 (equal variances not assumed). Gender was not related to the use of symbolic objects, *t* (69) = 1.75, *p* = .085, which is consistent with previous research (Dick et al., 2005; Overton & Jackson, 1973).

Relationships between pretend play assessment subscales. Previous research has found that children with imaginary companions were better able to generate a pretend conversation during the phone task than children without imaginary companions. Thus, child- and parent-reports of children's engagement in role play out of the lab predicts performance on a behavioral assessment of role play (Tahiroglu, Mannering, & Taylor, 2011; Taylor, Sachet, Maring, and Mannering, 2013). The results of Study 2 replicated this finding. Children with imaginary companions (combining invisible friends and personified objects) (*M* = 4.03, *SD* = 1.24) had higher total pretend phone conversation scores than children without imaginary companions (*M* = 3.07, *SD* = 1.56), *t* (67) = 2.87, *p* = .005 (equal variances not assumed), providing further evidence that the role play interview/questionnaire is a valid measure of children's role play. Imaginary companion status was unrelated to number of words used during the pretend phone conversation, $t(67) = 1.67$, $p = .10$. Children with imaginary companions differ more from other children in the content of what they say (i.e., generating content that goes beyond a stereotyped greeting) than in the quantity of what they say (i.e., the number of words).

My colleagues and I have previously argued that engagement in role play and object substitution ability show different patterns of relationships, such that engagement in role play is more of an individual difference variable that reflects children's interests, personalities, and proclivities, while object substitution ability is more related to development (Sachet & Mottweiler, in press; Taylor et al., 2013). In Study 2, imaginary companion status and total phone task scores were unrelated to action pantomime scores ($ps > .50$), replicating previous studies showing no relationship between children's role play behavior and object substitution skills (Taylor et al., 2013). Taken together with the finding of a relationship between age and action pantomime scores, these results support the idea that role play and object substitution show different patterns of correlations, with role play being more of an individual differences and object substitution being more related to development (Sachet & Mottweiler, in press).

Fiction Involvement Questionnaire. See Table 11 for descriptive statistics for children's fiction and parents' fiction and nonfiction exposure. There were significant differences in the amount of children's exposure to fiction in books and screen-based media. Children were more likely to be exposed to fiction in film and television (M = 21.38, SD = 6.36) than to fiction in books (M = 12.32, SD = 5.85), $t(70) = 10.23$, $p < .001$, a finding that supports previous research about the prevalence of screen-based media in children's lives (Rideout & Hammel, 2006). Parents were more familiar with fiction authors (*M* = 3.59, *SD* = 5.03) than nonfiction authors (*M* = 8.46, *SD* = 8.63), *t* (70) = 6.71, $p < .001$, but these two subscores were highly correlated, *r* (69) = .719, $p < .001$, indicating that parents who read numerous fiction books also read a relatively large amount of nonfiction books. This high correlation between parents' familiarity with fiction and nonfiction justifies the composite score of parents' overall book exposure, which will be used in future analyses instead of parent fiction and nonfiction book scores separately.

Table 11
Means, Standard Deviations (in Parentheses), and Minimum and Maximum Scores for the Fiction Involvement Questionnaire

Subscale or Composite Score	Mean (SD)	Min – Max scores
Child Fiction Book Composite (N = 71)	12.32 (5.85)	.5 – 35.5
Child Screen-based Fiction Composite (N = 71)	21.38 (6.36)	4.5 – 34.5
Parent Author Fiction (N = 71)	8.46 (8.63)	-2.0 – 40.0
Parent Author Nonfiction (N = 71)	3.59 (5.03)	-1.0 – 32.0
Parent Book Composite (N = 71)	6.03 (6.37)	-1.5 – 36.0

Parents' exposure to books was highly correlated with children's fiction book exposure, *r* (69) = .728, $p < .001$, but not to children's exposure to screen-based fiction, *r* (69) = .067, $p = .581$. These results suggest that parents' reading habits and preferences are related to children's book exposure, but not to children's screen-based media exposure. Age and gender were unrelated to children's exposure to fiction books, children's exposure to screen-based fiction, and parents' exposure to books (*ps* > .10).

Relationships between individual differences measures. To further investigate the idea that engagement in role play is more of an individual difference variable that reflects children's interests, personalities, and proclivities, while object substitution ability is more related to development (Sachet & Mottweiler, in press; Taylor et al., 2013), imaginary companion status and action pantomime scores (separately) were investigated in relation to theory of mind, composite empathy/prosocial scores, children's exposure to fiction in books, children's exposure to screen-based fiction, and parents' exposure to books, which are variables that are more related to age. Five comparisons were conducted, requiring a significance level of .01 with a Bonferroni correction to control for multiple comparisons. Children with imaginary companions (M = 14.28, SD = 6.85) had marginally significantly more exposure to fiction in books than children without imaginary companions (M = 10.96, SD = 4.67), t (69) = 2.42, p = .018. The parents of children with imaginary companions (M = 8.02, SD = 7.88) also had marginally significantly more exposure to books than children without imaginary companions (M = 4.65, SD = 4.70), t (69) = 2.25, p = .028. These trends remained after controlling for age (*ps* < .03). There was not a significant difference between children with and without imaginary companions on their exposure to screen-based fiction, t (69) = .756, p = .452. Imaginary companion status was also unrelated to children's theory of mind and everyday empathy/prosocial behavior (*ps* > .10). Action pantomime scores were unrelated to all individual difference measures, including social understanding and everyday empathy/prosocial behavior (*ps* > .06). Note, however, that the internal consistency of the items for the total action pantomime score was relatively low; therefore, it is difficult to interpret this finding.

Previous research has shown that exposure to children's fiction in books and film is related to children's theory of mind (Mar et al., 2010). To examine this the relations between children's exposure to fiction in books and screen-based media, parents' exposure to books, theory of mind, and everyday empathy/prosocial behavior scores were investigated. Because 4 comparisons were conducted, a Bonferroni correction required a significance level of .013. Children's fiction book scores were significantly positively correlated with total social understanding scores controlling for age, r (68) = .345, p = .003, but not to composite empathy/prosocial scores, r (64) = -.036, p = .774. Children's exposure to screen-based fiction and parents' exposure to books were not correlated with theory of mind or the composite empathy/prosocial score (ps > .09). These results partially support Mar et al.'s (2010) finding, in that children's fiction book exposure, but not screen-based fiction exposure was related to children's social understanding.

Discussion

Cyberball. In this study, 5- and 8-year-old children tended to behave more prosocially when playing with real children than when playing with fictional characters, controlling for individual differences in children's empathy. Specifically, children increased the number of times they threw the ball to a real co-player who was being excluded by other co-players in a computerized ball-tossing game. When the co-players were fictional characters, children did not treat an excluded co-player differently than an excluded wall (in a non-social Control Condition). For both Fiction and Control Conditions, they were significantly less likely to address the exclusion with their own throws of the ball than for the Real Condition. Although children took steps to remedy the unfair exclusion when the other players were believed to be real children, they felt equally empathetic towards the excluded real and fictional co-players. Thus, there was a dissociation between what children experienced emotionally and how they reacted behaviorally in response to real and fictional social interactions. While these results are interesting, they must be interpreted with caution because the pattern was statistically significant only when the second half of Baseline and Exclusion were used and were not significant unless individual differences in real life empathy were controlled.

While not underestimating the need for additional empirical support for this pattern of results, it is interesting to speculate about why children might help real individuals but not fictional ones. After all, my original expectation was quite different; the main hypothesis guiding this research was that the Cyberball task would elicit prosocial behavior from children in both the Real and Fiction Conditions. The pattern found in Study 2 is inconsistent with this hypothesis, indicating a need to rethink the correspondence between real and fictional experiences. I speculate about this issue in the General Discussion.

There were several limitations of this study, including the large amount of variability in the Cyberball behavior scores, a session that was too long for many of the participants, and many participants failing to notice the exclusion. Nevertheless, the results suggest that future research should explore the interesting disconnect between emotional and behavior responses to fictional situations and characters.

Other results. Children were much more likely to be exposed to fiction in film and television than fiction in books. Interestingly, children's exposure to fiction in books, but not to fiction in film or television, was related to children's theory of mind, which partially supports the previous finding that exposure to children's fiction in books and films, but not television was related to children's social understanding (Mar et al., 2010). Note that this result does not suggest that exposure to fiction in books *causes* increases in theory of mind because of the possibility of third variables, such as parenting practices (e.g., parents who read more to their children might also have styles that promote theory of mind development). It is also possible that children with superior social understanding skills enjoy reading fiction because they enjoy reading about the mental states of the characters in the books. However, it is possible that exposure to fiction through books contributes to children's social understanding abilities. Future research should investigate this possibility experimentally, by manipulating fiction book exposure in a group of young children and measuring the effects on social understanding.

Another interesting result was a trend that children with imaginary companions had more exposure to fiction books, as did their parents, than children without imaginary companions. This trend is worth noting because no previous research has explored the possibility of a relation between children's fiction involvement and their engagement in role play. This finding is consistent with the evidence that children with imaginary companions have higher fantasy predisposition, meaning that they are more likely to incorporate myth, magic, and other fantasy elements into their play, to daydream, and to be captured by vivid memories and imaginings (Bouldin, 2006; Bouldin & Pratt, 1999; Kidd, Rogers, & Rogers, 2010). Furthermore, reading has been suggested to impact children's imaginations (Singer & Singer, 2005). There is evidence that adults who had imaginary companions as children tend to become more absorbed in imaginative activities than adults who did not have imaginary companions as children (Kidd, Rogers, & Rogers, 2010). Children with imaginary companions could also have this tendency to become absorbed in fictional experiences, which could explain why they might be more likely to be interested in reading fiction. Although this is an interesting result, it must be interpreted with caution and will need to be replicated in future research, as it was only marginally significant after the Bonferroni correction to control for multiple comparisons.

It is interesting that not only children's exposure to fiction, but also their parents' exposure to books (both fiction and nonfiction) was marginally related to having an imaginary companion. Perhaps parents who read more have certain parenting styles that encourage their children's role play as well as reading fiction. However, this could be an artifact of the measure of fiction involvement (because the parent completed both the measure of their own book exposure as well as their child's book exposure). It is also interesting that this result did not extend to children's exposure to fiction in film and television. Singer and Singer (2005) have suggested that there are special cognitive benefits of reading, such as active encoding and processing, that make reading more important to imagination then screen-based media. The finding that children with imaginary companions are more exposed to fiction in books, but not fiction in television or film, than children without imaginary companions further supports this idea.

In summary, Study 2 presents new, although tentative, information about children's reactions to real and fictional social interactions, provides a replication of previous research investigating different forms of pretend play, and furthers our understanding of children's engagement in role play with a novel finding about the fiction exposure of children with imaginary companions. Perhaps the most important contribution of this research is the redirecting of future work away from a theoretical framework in which fiction is expected to simulate the emotional *and* behavioral responses of real life situations. Instead the results of this study suggest that it will be more useful to investigate the differences in behavioral responses to fiction and real life and explore why these distinctions might be beneficial.

CHAPTER IV

GENERAL DISCUSSION

The goals of this dissertation were to (1) develop a new behavioral measure of prosocial behavior by adapting the Cyberball paradigm and designing a nonsocial Control Condition to be used in comparison to social conditions, and (2) investigate the relationship between children's reactions to real and fictional social interactions. I first discuss the limitations of Cyberball as well as its potential for use in future research. With the limitations of the version of Cyberball used in this research in mind, I then turn to a discussion of how the results of Study 2 shed light on the extent of the correspondence between emotional and behavioral reactions to real life and fictional experiences.

Cyberball as a Measure of Prosocial Behavior

There were several limitations of using Cyberball as a behavioral measure of prosocial behavior, including (1) the large amount of variability in the Cyberball behavior scores, (2) many participants failing to notice the exclusion of one of the co-players, (3) participants' real life prosocial behavior not being related to behavior during Cyberball, and (4) a session that was too long for many of the child participants. Each of these will be discussed in turn.

Large variability. The large variability in each of the Cyberball conditions for both adults and children was a major limitation of this research. Some of this variability was expected, which is why I collected information about real life prosocial behavior, empathy, theory of mind, anthropomorphism, attention to detail for the adults, and engagement in role play and exposure to fiction for the children. These individual differences measures were included to provide possible explanations for variability in responses during Cyberball. However, the only individual differences that accounted for some of the variability in the data were the tendency to pay attention to detail for the adults and real life empathy for the children.

Adults who reported that they had more of a tendency to pay attention to detail were more likely to attempt to include the excluded wall in the Control Condition. It is possible that this occurred because paying attention to the details of the game, such as the asymmetry in passes to the three locations, is related to the tendency to systematize, which includes the desire to maintain and organize patterns (Billington, Baron-Cohen, & Bor, 2008). However, although data for the Control Condition suggests that some participants might have attempted to increase the number of passes to the excluded wall in order to maintain a pattern, the attempts to include the excluded real co-player were not related to the tendency to pay attention to detail. It is not obvious why systematizing tendencies would affect performance in the Control Condition but not the Real Condition. The lack of a correlation between the tendency to pay attention to detail and behavior in the Real Condition suggests that participants were not merely evening out the passes in that condition, but rather that they were trying to help the other person.

For children, the measures of empathy did shed light on the Cyberball behavior scores. I collected information about two types of empathy: (1) children's general tendency to respond empathically in real life situations, and (2) more specifically, children's empathic reactions to the real and fictional co-players in the Cyberball game. Controlling for individual differences in real life empathy revealed significant differences between children's *behavioral* reactions towards the excluded real co-player compared to the fictional co-player and the wall. The Cyberball measure of empathy revealed that children had similar *empathic emotional* reactions to the real and fictional co-player. Because both measures of empathy helped to interpret the results of this study, it will be important to include a more comprehensive assessment of children's empathy in future research.

Another individual difference that could potentially account for variability in Cyberball scores is the type of strategy that participants use to decide where to throw the ball. Strategies might have included (1) throwing the ball back to the co-player/wall that threw the ball to them (which would presumably result in negative prosocial behavior scores because the excluded co-player/wall would not have the opportunity to throw the ball to the participant), (2) maintaining a pattern (e.g., tossing to the left, middle, then right co-player/wall), (3) keeping track of which co-player/wall has not had the ball in a while (which would be the most likely to result in positive prosocial behavior scores because the participant would probably notice that a co-player/wall was left out of the game and thus, toss the ball more to the excluded co-player/wall), (4) passing to a favorite player/location, or (5) randomly tossing the ball (i.e., no strategy). Although I collected some information about these kinds of strategies and behaviors, it would be useful to measure them more systematically in future research by adding items about possible strategies to the Reactions to Cyberball Questionnaire for adults and the Berkeley Puppet Interview for children. However, note that some of these strategies might be implicit and not reported in an interview.

Failure to notice exclusion. Another limitation of the Cyberball task for both adults and children is that many participants did not explicitly notice that a co-player or wall was excluded. This could account for why prosocial behavior and theory of mind were not related to behavior during Cyberball and for why children did not attempt to include the excluded fictional co-player. Children reported noticing that the real co-player and the wall were excluded more often than they reported noticing that the fictional co-player was excluded. It could be that children paid more attention to who was getting the ball in the Real Condition than in the Fiction Condition. This finding is consistent with previous research suggesting that when people read expository nonfiction, they focus on integrating information from the text with their knowledge about a situation; whereas when people read literary fiction, they focus on details about the wording and meaning of the text (Zwaan, 1994). Perhaps instead of paying attention to how often each fictional co-player was getting the ball, children focused on surface details of the game (e.g., the appearance of the fictional co-players).

To clarify this possibility in future research, it might be helpful to collect information about participants' level of attention during the game. Participants could be tested about details of the game (e.g., the color shirt co-players were wearing; how often each player got the ball), or eye tracking could be used (i.e., if participants focus more on certain details, such as facial features, rather than where the ball is going throughout the game). Eye tracking could also be useful as a participant-centered index of when (if ever) participants started to notice that a co-player/wall was excluded. This index might be helpful for defining the onset of exclusion. The onset of exclusion in both Study 1 and Study 2 was set to be at a certain point in the game and was defined by the last time that one of the two "excluder" co-players/walls passed the ball to the excluded co-player/wall. Defining exclusion in this way might have been problematic because not all participants noticed the exclusion right away (if at all). Therefore, using eye tracking to measure when participants noticed that a player was excluded might be a valuable tool for future research.

It is less clear why children would notice that a wall was excluded more than noticing that a fictional co-player was excluded. It is possible that noticing that a wall was excluded is related to systematizing in children, as it was in Study 1 with adults. Unfortunately, systematizing was not measured in Study 2, but would be beneficial to measure in future research.

Although the Cyberball task was modified in Study 2 to make it more obvious that a co-player/wall was excluded (i.e., by lengthening the exclusion period), many children did not notice. In future studies, it should be made much more obvious that a co-player/wall was excluded in each condition. One way to do this would be to lengthen the exclusion period. However, this strategy has the disadvantage that it would require shortening the Baseline period, thus making it difficult to collect a representative measure of the proportion of throws to the excluded co-player before the Exclusion period. Another way to make the exclusion more obvious would be to program Cyberball so that the excluded co-player/wall changes color, jumps up and down, or makes frustrated noises after not receiving the ball. Additionally, participants could be primed to pay attention to exclusion by explicitly telling them to make sure that everyone gets the ball the same amount, or by playing a round of Cyberball during which they, themselves, are excluded, followed by a discussion of how it felt to be excluded and how other people might feel if they are excluded.

No relationship between prosocial behavior during Cyberball and real life prosocial behavior. Another limitation of Cyberball is that with both adults and children, there was no evidence of a relationship between attempting to include the excluded real co-player (and for children, the excluded fictional co-player) and real life prosocial behavior. This result could be because the Cyberball task taps implicit as well as explicit prosocial behavior, whereas all the general measures related to prosocial behavior (the Prosocialness Scale for Adults, the Autism Quotient Questionnaire, the Interpersonal Reactivity Index, the Berkeley Puppet Interview, and the Children's Social Understanding Scale) are self-report measures that require explicit awareness.

The lack of a relationship between prosocial behavior during Cyberball and self-reports of real life prosocial behavior suggests that my version of Cyberball might not be a valid measure of prosocial behavior. In future studies, it would be worth assessing the relationship between prosocial behavior during Cyberball and other behavioral measures of prosocial behavior, such as (1) asking participants to write an email to each of the players in Cyberball and later coding them for prosocial content (Masten et al., 2010, 2011) or (2) setting up a scenario in which participants could help an experimenter or confederate, which has been used with both children (e.g., Chambers & Ascione, 1987) and adults (e.g., Greitemeyer & Osswald, 2010) as a behavioral measure of real life prosocial tendencies. It might also be useful to collect reports of real life prosocial behavior from other sources, such as teachers (e.g., Vitaro, Gagnon, & Tremblay, 1991), friends, or relatives, in addition to self-reports and parent-reports.

Session length. A limitation of Study 2 is that the 2-hour session was too long for some of the participants, especially the 5-year-olds. Although there were several breaks and the tasks were designed to be enjoyable for the children, by the time children played the third run of Cyberball, they might have been tired and bored. In future research, it might be beneficial to use a between subjects design (which would, however, limit the ability to investigate correlations of behavior between conditions) or to test children in two or three separate, shorter sessions spread over several weeks (which would have the disadvantage of possible attrition).

Potential of the Control Condition. One of the contributions of this research was the successful development of a Control Condition as a useful tool for determining that participants' reactions in the Real Condition were not merely to even out the passes to the excluded co-player. In Study 1, there was a difference between participants' reactions to the Real Condition compared to the Control Condition. Specifically, participants attempted to include the excluded co-player more than they attempted to pass the ball to the excluded wall. Note however, that this pattern was only seen when comparing the participants who completed the Real Condition first compared to those who completed the Control Condition first. In Study 2, there were no order effects, and children treated the excluded wall differently than the excluded real co-player. Specifically, when controlling for individual differences in real life empathy, children increased their throws to the excluded real co-player more than they did to the excluded wall and the excluded fictional co-player. This result was found when using the data from the second half of the Baseline period (after participants had time to get used to the game) and the second half of the Exclusion period (after participants had time to notice that a co-player/wall was being excluded).

Correspondence Between Real and Fictional Experiences

Study 2 addressed the relationship between children's reactions to real and fictional social interactions, which was the main focus of this dissertation. Based on Mar and Oatley's (2008) theory that fiction simulates real world situations and the research showing that fictional contexts can foster prosocial behavior (Gentile et al., 2009; Greitemeyer & Osswald, 2010, 2011; Mares & Woodard, 2005; Ostrov et al., 2006), I hypothesized that children would have similar reactions to the excluded fictional co-player as they would to the excluded real co-player, and that reactions to these conditions would differ from reactions to the excluded wall. The results from Study 2 did not support this hypothesis. Instead, I found that children attempted to include the excluded real co-player more than the excluded wall or the excluded fictional co-player. Thus, the Fiction Condition was more similar to the Control Condition than the Real Condition.

Although children only showed prosocial behavior in response to the excluded real co-player, there were no differences between children's reports of their empathic reactions towards the excluded real and fictional co-players. Thus, there was a dissociation between how children behaved and what they felt. These results must be interpreted with caution, however, because children's empathic reactions were based on only two self-report questions for each condition in the Berkeley Puppet Interview and the differences between conditions were only seen when controlling for individual differences in children's real life empathy and when using the second half of the Baseline period and the second half of the Exclusion period of Cyberball.

Nonetheless, the results of Study 2 are interesting in light of other research suggesting that behavioral responses might be more connected to real life situations than to fictional ones. For example, according to Goldstein (2009), the reason why people find enjoyment in watching sad movies depicting events that would never be enjoyed if they occurred in real life is because it is only in real life situations that people are expected to deal with what has occurred. This hypothesis is based on the results of a study in which Goldstein investigated whether emotional reactions of sadness and anxiety to fiction were different from emotional reactions to nonfiction and one's own experiences. She found that adults were equally likely to feel sadness when viewing fictional and nonfictional film clips and when recalling a sad personal event, but felt significantly more anxiety when recalling the personal event than when viewing the film clips. Her interpretation of these results was that people might enjoy fiction partly because the sadness elicited by watching films is unadulterated by the anxiety that one experiences in addition to sadness in response to a personal challenge. The anxiety felt in response to recollections of personal events might be because, in real life, we know that the experience will not vanish, but instead we must continue to cope with the situation. The anxiety might also motivate people to react appropriately to the scenario.

In Study 2, participants experienced an event (i.e., the Cyberball game) with both real and fictional characters. They expressed similar levels of empathic reaction when playing with real co-players as when playing with fictional co-players, but they were more likely to actually help the excluded real co-player. This result suggests that Goldstein's theory might extend to fictional situations such as what would be experienced in videogames (which are similar in many respects to Cyberball), in addition to passively viewing fiction, such as watching a movie. Goldstein's theory also suggests that if the stakes were raised in the Cyberball game (e.g., the excluded co-player exhibiting distress in response to social exclusion), the difference between the Real and Fiction Conditions might be enhanced because increasing the participants' anxiety about the need to help would only affect the Real Condition.

Another area of research that suggests differences in behavioral responses to real and fictional content is recent work investigating the extent that children transfer information taught to them in different contexts. Fiction is often used to teach children about real-world information with the assumption that fiction and fantasy are engaging and make the material more interesting (Lepper, Aspinwall, Mumme, & Chabay, 1990; Parker & Lepper, 1992). However, there is growing evidence that children do not transfer information to the real world as well when they learn the information from fantastical characters as they do if they learn the information from realistic characters (Richert, Shawber, Hoffman, & Taylor, 2009; Richert & Smith, 2011) and that fictional contexts are sometimes not effective for teaching (Ganea, Pickard, & DeLoache, 2008; Mares & Acosta, 2008; DeLoache et al., 2010; Kuhl, Tsao, & Liu, 2003; Robb, Richert, & Wartella, 2009). For example, Richert et al. (2009) found that preschool children were more likely to transfer the solution to a problem to a new situation in real life if it was taught to them by a real life character than by a fantasy character.

Taken together, research on differences between emotional responses to movies, the transfer of information presented in real and fictional contexts, and the results of Study 2 suggest that real and fictional situations often differ in the behavioral responses that they elicit. However, this should not be taken to imply that children cannot learn from fiction. Children use their general knowledge when they pretend (e.g., a child who pretends to be a dog uses general knowledge about dogs), making shared pretend play a vehicle for learning about the real world from others (Sutherland & Friedman, 2012). In addition, fiction can be a way to explore emotional situations that one would not otherwise encounter.

The results of Study 2 are consistent with the research suggesting that children and adults have similar emotional reactions to fictional experiences as they do to real life situations (Bourchier & Davis, 2000a; DiLalla & Watson, 1988; Golomb & Galasso, 1995; Harris, 2000; Harris et al., 1991; Kavanaugh & Harris, 1999; Mar, Oatley, Djikic, Mullin, 2010; Oatley, 1999; Taylor et al., 2007; Taylor, 1999; Woolley, 1997). However, the results of Study 2 are inconsistent with the studies showing that children and adults show similar behavioral reactions towards imagined situations as they do towards real life events (e.g., Johnson, 2000; Sachet, Frey, Jacobson, & Taylor, under review) and the facilitative effects of prosocial behavior and other positive abilities, attitudes, and behaviors learned in fictional contexts (e.g., videogames) on real life behaviors (e.g., Brambilla et al., 2012; Gentile et al., 2009; Greitemeyer & Osswald, 2010; Mares & Woodard, 2005; Ostrov et al., 2006; Turner & West, 2012).

Why might there be a close connection between emotional reactions, but not for behavioral reactions to real and fictional situations? One possibility lies in children's abilities to tell the difference between what is real and what is pretend. As reviewed in Chapter 1, children are quite skilled at distinguishing between fantasy and reality by the time they are 4 years old (Bourchier & Davis, 2000b; Bretherton & Beeghley, 1982; Estes, Wellman, & Woolley, 1989; Flavell, Flavell, & Green, 1987; Harris, Brown, Marriott, Whittall, & Harmer, 1991; Sharon & Woolley, 2004; Wellman & Estes, 1986; Woolley & Wellman, 1993). Therefore, the 5- and 8-year-old children in Study 2 were old enough to have a firm grasp on the fantasy/reality distinction. It could be that children had different behavioral reactions to the real and fictional co-player being excluded because they recognized that the fictional situation was not real, so there were no real consequences of a fictional character being excluded from the game, which is consistent with Goldstein's (2009) view.

Furthermore, Harris (2000) proposed a theory that might help explain the dissociation between the emotional and behavioral reactions in response to the real and fictional characters. He suggested that we can simultaneously have an understanding that a fictional experience is not real while also having emotional reactions to fictional content because the emotional reaction is experienced automatically, independent of whether the stimulus is real or pretend. According to his theory there are regulatory processes that can feed into the system that allow for decisions to be made about how to react to automatic emotional responses. The children in Study 2 might have had an automatic emotional response in reaction to the game, regardless of whether the players were real or pretend, but their behavioral response was dependent on their evaluation of whether the co-players were real or fictional. What is interesting is that this processing seems to have occurred outside of the children's awareness because many of the children did not notice that a real or fictional co-player was being excluded. An investigation of children's responses to fiction and their abilities to distinguish fantasy from reality would be an interesting area for future research.

Future Directions

Despite the limitations of these studies, the differences between the Real and Control Conditions for the adults, and between the Real, Fiction, and Control Conditions for children, suggest that participants had different behavioral reactions when a real person was excluded compared to when a fictional character or a wall were excluded. Furthermore, there was a dissociation between how children behaved and how they felt in response to the real and fictional social interaction. These results present some interesting directions for future research.

Reactions to real and fictional social interactions when another person or character is excluded. The results that children showed different behavioral responses, but similar empathic responses towards the fictional and real co-players will need to be replicated in future research. In this research, children's general empathy as well as their specific empathic responses to the real and fictional co-players were valuable sources of information, but in future research, it will be important to include a more comprehensive measure of children's emotional reactions to the excluded players. This could be done by including more questions about different types of emotions (e.g., sadness, anxiety) in the Berkeley Puppet Interview or by collecting information about emotional reactions while participants are playing the game. For example, while playing the game (1) children's facial expressions could be recorded and later coded for emotional reactivity (e.g., frowning), (2) physiological responses could be measured, such as heart rate, which has been found to be associated with empathic responses in adults (Oliveira-Silva & Gonçalves, 2011), or (3) children could use an emotion thermometer to report the emotions they experience. Including multiple measures of the emotions felt during Cyberball could help tease apart the mismatch between emotional and behavioral reactions that was found in Study 2.

Another avenue for future research would be to include the Fiction Condition, in addition to the Real and Control Conditions, for adults. As suggested by Goldstein's (2009) findings that adults have similar emotions of sadness, but different anxiety levels in response to real and fictional experiences, perhaps adults would show the same disconnect between emotions felt for and behavioral reactions towards the real and fictional co-players. It is possible that adult participants would show a stronger dissociation than children between emotions and behavior because adults are more able to report and reflect on their emotions (Saarni et al., 2006).

I have already argued that children did not attempt to include the fictional character because they did not feel the need to intervene in a fictional context, but it is also possible that children did not attempt to include the excluded fictional co-player because they were not given any background information about the fictional characters. Although the background information provided about the real children was minimal (children were told that the other children were the same age as the participant and that they were at other universities across the country), it might have been enough information for participants to identify with the children. In contrast, no information was presented about the fictional characters beyond their names. In future research, children should be given more (and equal amounts of) background information about the real and fictional co-players. For example, parents could be asked to indicate three favorite cartoon characters and three of the children's real friends (as well as to provide photographs of the children's friends) prior to the session. Alternatively, the same novel cartoon characters and real children that were used in Study 2 could be used, but information about each character and child could be provided before children play Cyberball with them. It would be interesting to see if children show similar patterns as were found in the present study with these modifications or if providing more (and equal) background information about real and fictional co-players would increase the similarities of prosocial responses to the excluded fictional co-player and the real co-player.

Expanding the information provided about the co-players could also be used to test different hypotheses related to prosocial behavior, such as the theories of kin selection and reciprocal altruism. Kin selection and reciprocal altruism are two theories to explain why people engage in prosocial behavior (Penner, Dovidio, Piliavin, & Schroeder, 2005). Kin selection relates to the evolutionary drive to help relatives (especially people who share your genes) more than strangers, while reciprocal altruism relates to helping people who are more likely to help you in the future. Cyberball could be used to test both of these hypotheses. To test the idea of kin selection, participants could play two conditions of Cyberball, both with a relative (e.g., a sibling) and two strangers. In one condition, their relative would be excluded, while in the other condition, a stranger would be excluded; the attempts to include the excluded relative and stranger would be measured. A similar design could be used to test the hypothesis of reciprocal altruism. Participants would play Cyberball with someone who would be deemed as a potential valuable source of help in the future (e.g., a tutor for students who need help in a specific topic, such as math) and two strangers who would not be useful to the participant (e.g., students from another school). Although the use of Cyberball as a behavioral measure of prosocial behavior in its present form is not ideal, my hope is to adjust it so that it is helpful for future research to test hypotheses such as these.

Reactions to participants' own exclusion. Previous studies using Cyberball have attempted to use a non-social Control Condition by telling participants that the game was controlled by a computer program instead of leading them to believe that they were playing with other people (e.g., Tang & Richardson, 2012; Zadro et al., 2004). Participants who knew that the computer was controlling the game had similar levels of distress as they did when they believed that they were being excluded by real people. However, this "control" condition was flawed because it was social in nature due to the co-players being depicted as animated people. It would be informative to include the Control Condition developed for this dissertation, to see if participants have the same negative responses to exclusion by inanimate objects that they do to exclusion by real and fictional co-players. Based on previous research, I would expect that participants would be equally distressed when excluded by real and fictional co-players. However, it is possible that participants would not be as distressed when excluded in the Control Condition, but instead they might report feelings of boredom or show disinterest in the game.

Extending the previous suggestion to children would also be an interesting avenue for future research. The effects of peer rejection on children's development have been well documented. For example, children who are victims of social exclusion have higher rates of negative psychological effects, such as social anxiety, depressive symptoms, low self-esteem, externalizing behavior problems (Laird, Jordan, Dodge, Pettit & Bates, 2001; Twenge, Catanese & Baumeister, 2003), reduced prosocial behavior (Moor et al., 2012), and poor self-concept (Sandstrom & Zakriski, 2004). Some studies have used Cyberball to induce the experience of social exclusion during middle childhood and adolescence with similar negative psychological responses as adults, such as threatening self-esteem and the need for belonging (e.g., Abrams, Weick, Thomas, Colbe, & Franklin, 2011; Bolling et al., 2011; Moor et al., 2012). However, these studies have only used real social interactions. It would be interesting to see if children are equally as distressed when they are excluded by fictional characters and by walls in the Control Condition. Based on previous research with adults, I would expect for children to be equally as distressed when being excluded by fictional co-players and real co-players, but just as I hypothesized for adults, children might not feel distressed when they are excluded by walls.

Conclusion

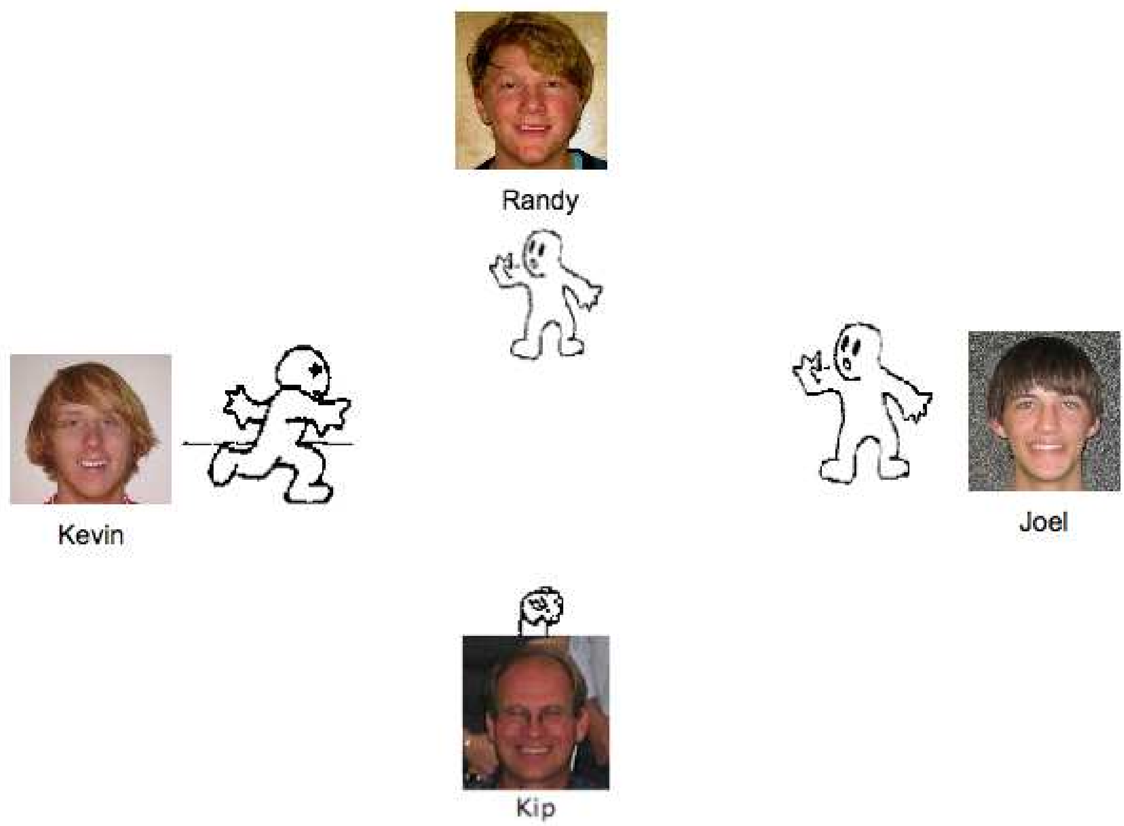
This dissertation research contributed to the development of a measure of prosocial behavior using Cyberball and a Control Condition that does not involve social interaction. In addition, I suggested several modifications to Cyberball that would improve the usefulness of the paradigm as a measure of prosocial behavior to be used in the future.

Despite the limitations of the current form of Cyberball, the findings of Study 2 suggest that children had similar emotional reactions, but differing behavioral reactions, in response to real and fictional social interactions. If this result is replicated in future research, it could have implications for clinical and educational settings. Fiction might be a particularly effective and safe way for children to explore, understand, and regulate their emotions. In fictional contexts, such as pretend play, children are not burdened by the social obligation to act in a particular way and instead they have the freedom to act in any way they please. Thus, in fictional contexts, children have the opportunity to experiment with alternative ways of behaving and then experience the corresponding emotional consequences of their actions.

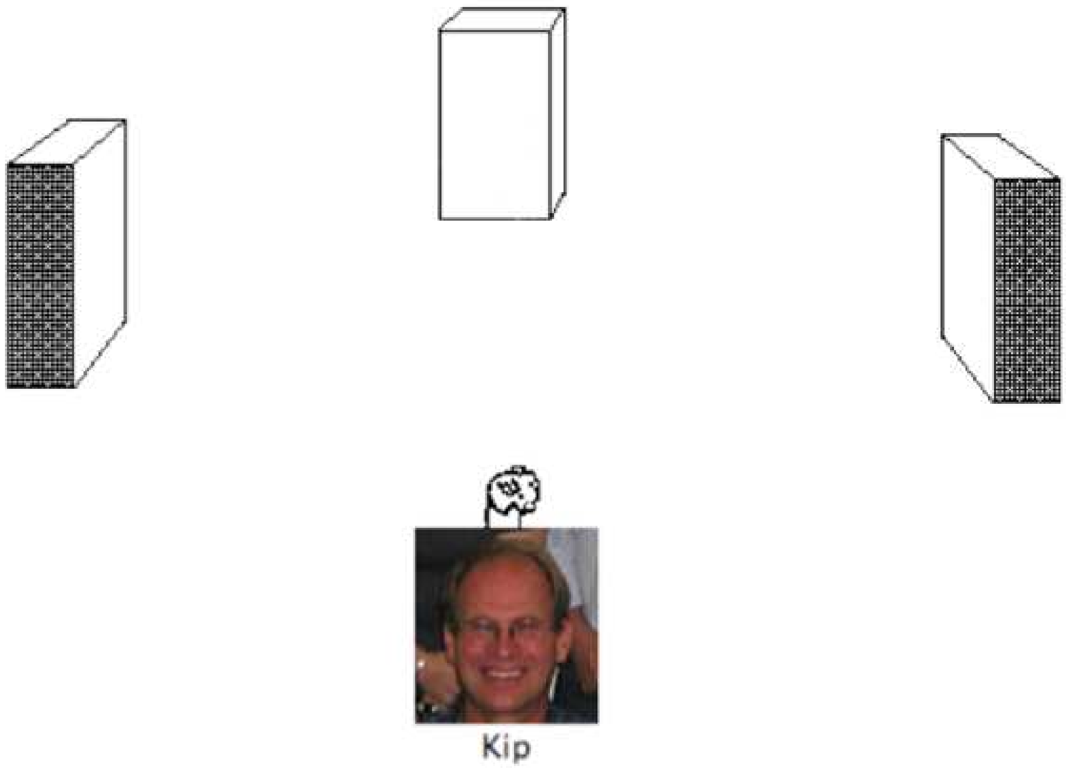
APPENDIX A

EXAMPLES OF CYBERBALL FOR STUDY 1

Example of the Real Condition



Example of the Control Condition



APPENDIX B

REACTIONS TO CYBERBALL QUESTIONNAIRE

The following statements describe a large number of common reactions to Cyberball. There are no “right” or “wrong” answers; the best answer is the immediate, spontaneous one. Read carefully each phrase and mark the answer that reflects your first reaction. Sometimes you will be asked to elaborate on your response (please answer these questions in the space provided). Please use the following scale to indicate the degree to which each statement is true for you:

1	2	3	4	5
never or almost never true	occasionally true	sometimes true	often true	almost always or always true

1. I liked the Cyberball game.

1 2 3 4 5

2. When I was playing with the other students, I had a favorite player.

1 2 3 4 5

If you did, who was your favorite player?___________________________________

3. When I was playing with the other students, I thought everyone got the ball the same amount.

1 2 3 4 5

4. When I was playing with the other students, I thought one of the players was treated unfairly.

1 2 3 4 5

Please explain why you responded this way.

5. When I was playing with the other students, I threw the ball to one player most of the time.

1 2 3 4 5

Please explain why you responded this way.

6. When I was doing the calibration check, I thought that one of the walls did NOT get the ball as often as the other walls did.

1 2 3 4 5

7. When I was doing the calibration check, I threw the ball to all the walls.

1 2 3 4 5

Please explain why you responded in this way.

8. When I was doing the calibration check, I thought all of the walls were included equally.

1 2 3 4 5

Please explain why you responded in this way.

APPENDIX C

MANIPULATION CHECK QUESTIONNAIRE

Please read the questions carefully and answer honestly. Sometimes you will be asked to elaborate on your response (please answer the questions in the space provided).

1. Did you think there was anything strange about the game? no___ yes__

If yes, what did you think was strange?

2. Did you think that maybe we were testing something about what you did while you were playing the game? no_______ yes_______

3. What did you think we were studying with the Cyberball task?

4. Did you think anything was unusual about the other students? no___ yes__

If yes, what did you think was unusual about the students?

5. Did you think there was anything unusual about the calibration check? no___ yes__

If yes, what did you think was unusual about the calibration check?

6. To what extent did you think you were playing with real students?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

not at all neutral a lot

7. To what extent did you think we were measuring your reaction time in the calibration check?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

not at all neutral a lot

Thank you!

APPENDIX D

INSTRUCTIONS FOR CYBERBALL FOR STUDY 1

Real Condition first

The people you will be playing with are Suzanne, Phoebe, and Melinda/Randy, Joel, and Kevin [while looking at sticky note with names on it]. The game is simple – you just toss the ball around between the four of you. When you get the ball, you can throw it to whomever you want. To toss the ball to a player, you'll use the 1, 2, 3 keys [point to keys] – those keys match up to the locations like this - this is a little bit like what you'll see with different pictures, this is just an example [show picture of Cyberball locations with #s]. Your picture will be here, with your name [point to participant location] and the other players will be here [point to other locations]. You'll push the 1 key to throw the ball to this person [point to location], the 2 key to throw the ball to this person [point to location], or the 3 key to throw the ball to this person [point to location]. The other students will see a game much like the one you see, but their locations will be a little different than what you see. For example, they'll see their own picture in this location [point to participant location] and you and the two other participants will go in these locations [point to other locations]. The important thing to know is that if, for example, you throw the ball to Trevor, that everybody will see you throw the ball to Trevor, and Trevor will be the person who gets the ball and he'll throw it next. It is very important to only press the number keys when you get the ball, so pay close attention to who is tossing the ball to who and ONLY press key when you have the ball in your hand. This round of the game will last about 6 minutes. When you're done, you can just let me know and I'll give you more instructions. After you get started, I'll leave so you can play the game on your own. Do you have any questions? [answer any questions they have] Are you ready to play? [when they are ready to play] Ok, the other players should be ready to play too. Let's check. Go ahead and click 'Start Playing Now'. [wait for game to load] Ok, it looks like everybody is ready to play! [Wait for participant to get the ball at least once, to see that they get the game.] Ok, I'll come back when you're done. [Experimenter 1 leaves room.]

Control Condition first

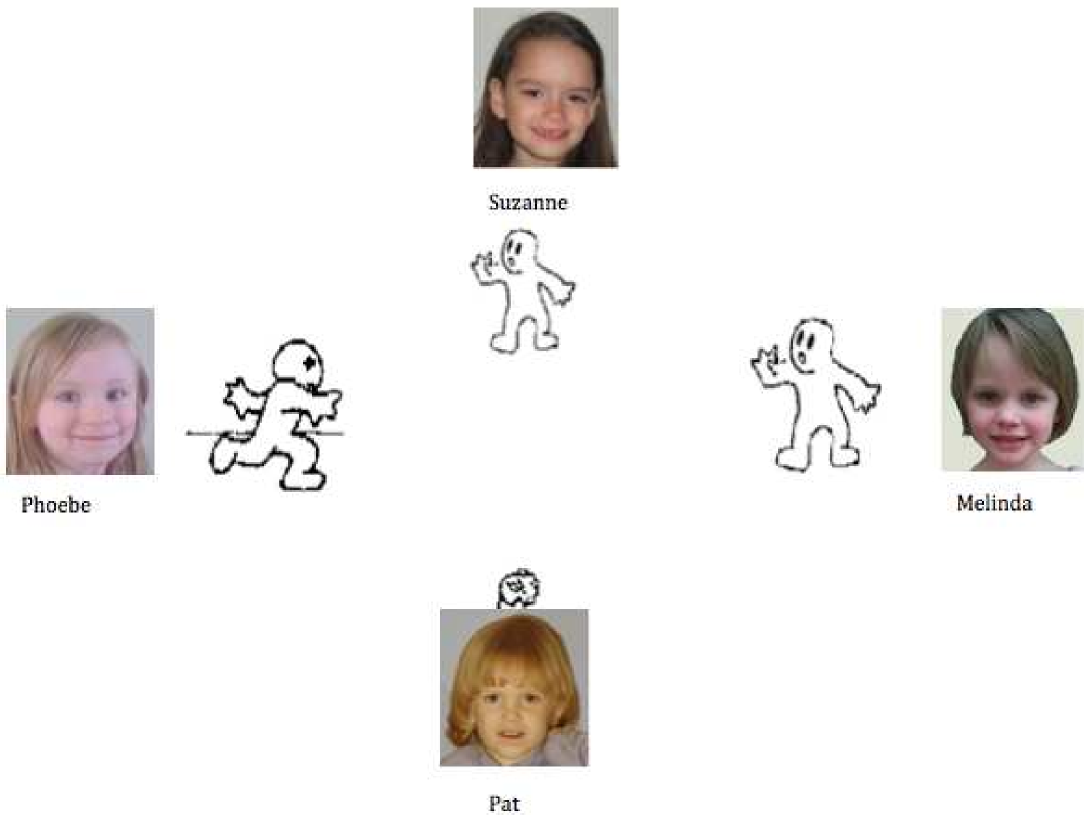
The calibration check is simple - you just toss the ball around between yourself and three walls. This time, the computer will control where the ball is tossed, except for when you get the ball. When you get the ball, you'll choose which location to toss the ball to - you can toss the ball to wherever you want. You won't be able to control the angle at which the ball bounces off the walls – that's not the point of the calibration check, we're just trying to get a measure of your average reaction time when you get the ball and we're calibrating it with our internet connection. So, I don't want you to purposefully go fast or slow or anything, I want you to choose where you want to toss the ball naturally. To toss the ball to a wall, you'll use the 1, 2, 3 keys [point to keys] – those keys match up to the locations like this [show laminated picture of Cyberball locations with #s]. Your picture will appear here [point to participant location]. You'll push the 1 key to throw the ball to this wall [point to location], the 2 key to throw the ball to this wall [point to location], or the 3 key to throw the ball to this wall [point to location]. It is very important to only press the number keys when you get the ball, so pay close attention to where the ball is going and ONLY press key when you have the ball in your hand. The calibration check will last about 6 minutes. When you're done, you can just let me know and I'll give you more instructions. After you get started, I'll leave so you can do the calibration on your own. Do you have any questions? [answer any questions they have] Are you ready to play? [when they are ready to play] Ok, go ahead and click 'Start Calibration Now'. [wait for game to load] I'll come back when you're done.

[Experimenter 1 leaves room.]

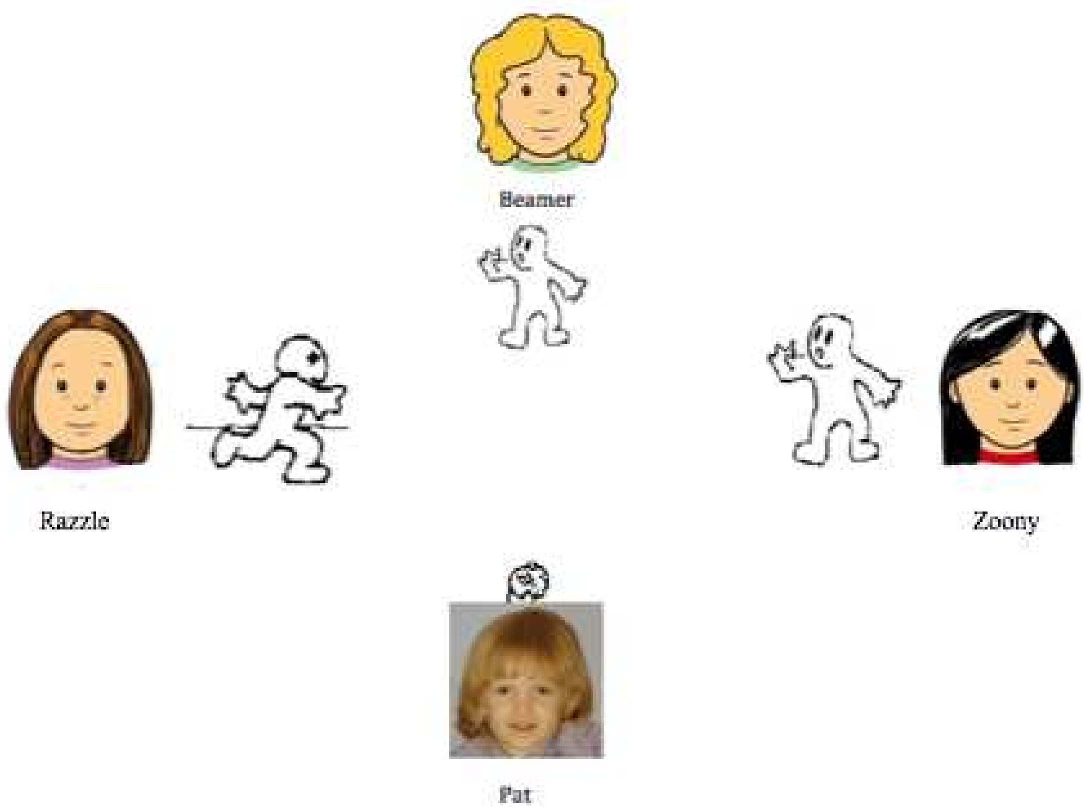
APPENDIX E

EXAMPLES OF CYBERBALL FOR STUDY 2

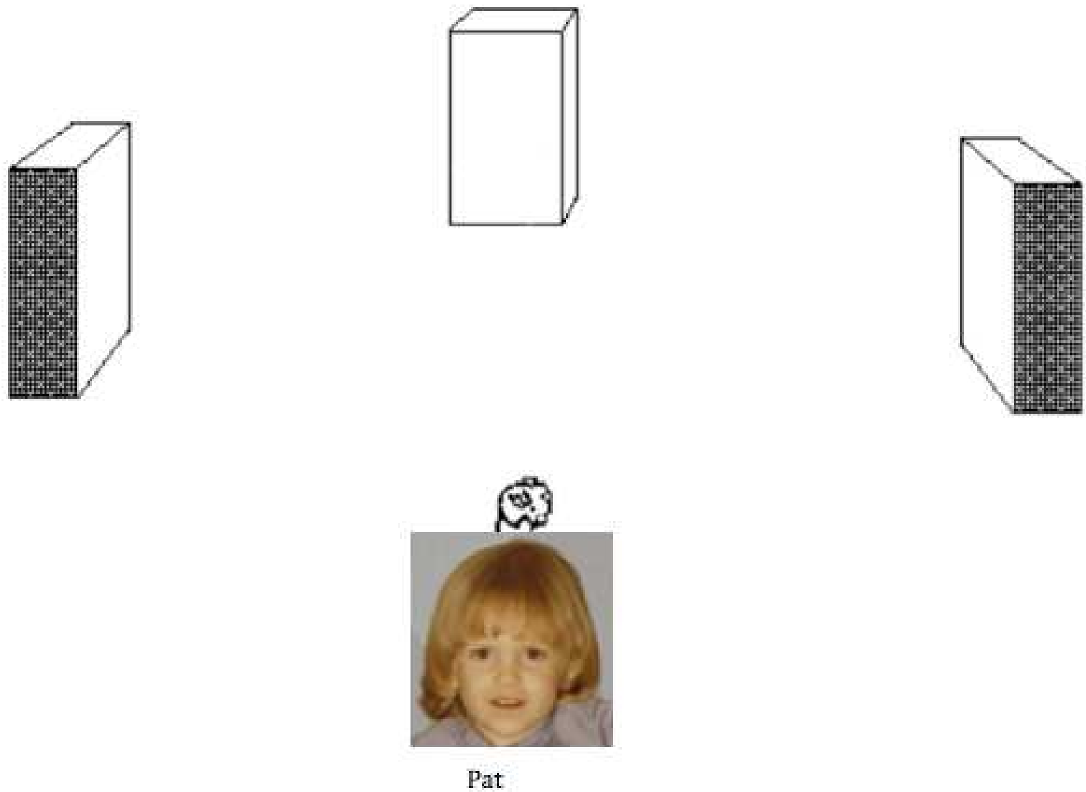
Example of the Real Condition



Example of the Fiction Condition



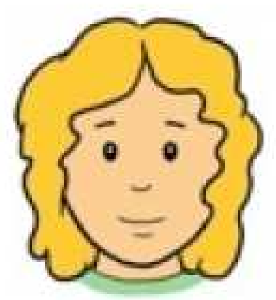
Example of the Control Condition



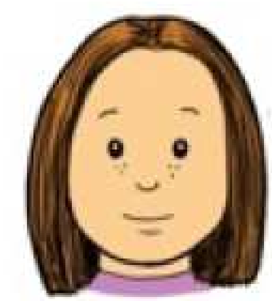
APPENDIX F

NOVEL CARTOON CHARACTERS USED IN THE FICTION CONDITION IN

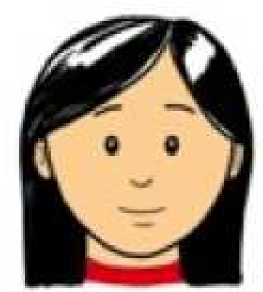
STUDY 2



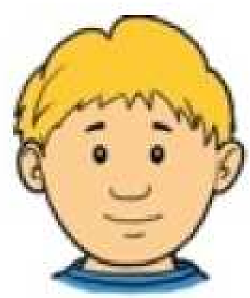
Beamer



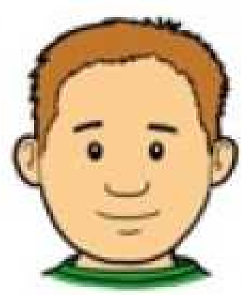
Razzle



Zoony



Beamer



Razzle

Zoony

APPENDIX G

BERKELEY PUPPET INTERVIEW: REACTIONS TO CYBERBALL ITEMS

Iggy: Do you remember when you played the ball tossing game with the walls? (Wait for child to respond.) When I was playing with the walls, I thought one of the walls did not get the ball very much.
Ziggy: I thought every wall got the ball the same amount.
What did you think?
Probe question (if says he/she thought a wall didn't get the ball very much): Which wall didn't get the ball very much?

Iggy: When I was playing with the walls, I had a favorite wall.
Ziggy: I didn't have a favorite wall.
How about you?
Probe question (if says he/she had a favorite wall): Which wall was your favorite?

Iggy: When I was playing with the walls, I threw the ball to every wall.
Ziggy: I threw the ball to one wall.
How about you?
Probe question (if says he/she threw the ball to one wall): Which wall did you throw the ball to? Why did you throw the ball to that one?

Ziggy: I liked the ball tossing game.
Iggy: I didn't like the ball tossing game.
What about you?

Ziggy: Do you remember when you were playing the ball tossing game with the other kids – Phoebe, Suzanne, and Melinda/Joel, Kevin, and Randy? When I was playing with the kids, I thought one of the kids did not get the ball very much.
Iggy: I thought everyone got the ball the same amount.
What did you think?
Probe question (if says he/she thought somebody didn't get the ball very much): Who didn't get the ball very much?

Iggy: When I was playing with the kids, I felt bad for one of the kids.
Ziggy: I didn't feel bad for any of the kids.
What about you?
Probe question (if says he/she felt bad): Who did you feel bad for? Why did you feel bad for [name]?

Ziggy: When I was playing with the kids, I had a favorite kid.
Iggy: I didn't have a favorite kid.
How about you?
Probe question (if says he/she had a favorite player): Who was your favorite player?

Ziggy: When I was playing with the kids, I threw the ball to everyone.
Iggy: When I was playing with the kids, I threw the ball to one kid.
What about you?
Probe question (if says he/she threw the ball to one player): Who did you throw the ball to? Why did you throw the ball to them?

Iggy: When I was playing the ball tossing game with the kids, I thought the players were real kids playing the game on the internet.
Ziggy: I didn't think the players were real kids playing the game on the internet.
How about you?
Probe question (if says he/she didn't think the players were real kids): What made you think this? How did you think the game worked?

Ziggy: When I was playing with the kids, I thought one of the kids was treated unfairly.
Iggy: I thought all of the kids were treated fairly.
What did you think?
Probe question (if says he/she thought one player was treated unfairly): Who did you think was treated unfairly? What was unfair about how they were treated?

Iggy: Do you remember the ball tossing game with the pretend characters – Zoony, Beamer, and Razzle? When I was playing with the characters, I thought one of the characters did not get the ball very much.
Ziggy: I thought everyone got the ball the same amount.
What did you think?
Probe question (if says he/she thought somebody didn't get the ball very much): Who didn't get the ball very much?

Ziggy: When I was playing with the characters, I felt bad for one of the characters.
Iggy: I didn't feel bad for any of the characters.
How about you?
Probe question (if says he/she felt bad): Who did you feel bad for? Why did you feel bad for [name]?

Iggy: When I was playing with the characters, I had a favorite character.
Ziggy: I didn't have a favorite character.
What about you?
Probe question (if says he/she had a favorite player): Who was your favorite player?

Ziggy: When I was playing with the characters, I threw the ball to one character.
Iggy: I threw the ball to everyone.
How about you?
Probe question (if says he/she threw the ball to one player): Who did you throw the ball to? Why did you throw the ball to them?

Iggy: When I was playing with the characters, I thought all of the characters were treated fairly.
Ziggy: I thought one of the characters was treated unfairly.
What did you think?
Probe question (if says he/she thought one player was treated unfairly): Who did you think was treated unfairly? What was unfair about how they were treated?

APPENDIX H

INSTRUCTIONS FOR CYBERBALL FOR STUDY 2

Control Condition first

Now you will play the ball tossing game where you play with nobody at all. The game is simple - you will be tossing the ball around between yourself and 3 different walls. It will look a little bit like this [show picture of Cyberball locations with arrows]. You will see your own picture and your own name here [point to participant location] and you'll also see these walls [point to walls]. When you get the ball, you can throw it wherever you want. To toss the ball to the wall, you'll use these arrow buttons [point to arrow buttons on button box] – those arrows match up to the walls like this [show picture of Cyberball locations with arrows]. You'll push this arrow [point to left arrow on the button box] to throw the ball to this wall [point to left wall on picture], see how the arrows match up [point to left arrow on the button box and the arrow next to the left wall on the picture]? You'll use this arrow [point to up arrow on button box] to throw to this wall [point to the upper wall on the picture], see how the arrows match up [point to up arrow on the button box and the arrow next to the upper wall on the picture]? And you'll push this arrow [point to right arrow on the button box] to throw to this wall [point to right wall on the picture], see how the arrows match up [point to right arrow on the button box and the arrow next to the right wall on the picture]? Want to try it? Ok! [Participants then practiced playing Cyberball while Experimenter 1 pointed out the participant and wall locations and narrated which wall was getting the ball and asked the child where he or she wanted to throw the ball when he or she received it. Experimenter 1 ended the practice session after the child received the ball 3 times, then quickly set up

Cyberball for the Control Condition. When Cyberball was ready, Experimenter 1 continued with the script.] Ok, now we're ready to play the game with the walls. It is very important to only press the arrows when you get the ball in your hand – you'll see the ball in your hand here [point to hand on Cyberball picture], so pay close attention to where the ball is going and ONLY press the arrow key when you have the ball in your hand. When the game is over, you can just let me know. I'll be sitting back there doing some work [Experimenter 1 sat at a small table in the testing room with the child]. Do you have any questions? Are you ready to play? Ok, it's all ready for you.

Real Condition first

Now you will play the ball tossing game with other kids. The other kids you will be playing with are Suzanne, Phoebe, and Melinda/Randy, Joel, and Kevin [while looking at sticky note with names on it]. The game is simple – you just toss the ball around between the four of you. It will look a little bit like this. [show picture of Cyberball locations with arrows] You will see your own picture and your own name here [point to participant location] and you'll also see these little throwing guys with pictures above them [point to co-player locations]. The pictures above the throwing guys are pictures of other kids that you'll be playing with – you'll see different kids than these. Each of these kids will be controlling a little throwing guy. You will be too – the other kids will see your picture above a throwing guy. When you get the ball, you can throw it wherever you want. To toss the ball to a kid, you'll use the arrow buttons [point to arrow buttons on the button box] – those arrows match up to the kids like this [show picture of Cyberball locations with arrows]. You'll push this arrow [point to left arrow on the button box] to throw the ball to this kid [point to left kid on picture], see how the arrows match up [point to left arrow on the button box and the arrow next to the left kid on the picture]? You'll use this arrow [point to up arrow on button box] to throw to this kid [point to the upper kid on the picture], see how the arrows match up [point to up arrow on the button box and the arrow next to the upper kid on the picture]? And you'll push this arrow [point to right arrow on the button box] to throw to this kid [point to right kid on the picture], see how the arrows match up [point to right arrow on the button box and the arrow next to the right kid on the picture]? Want to try it? Ok! [Participants then practiced playing Cyberball while Experimenter 1 pointed out the participant and co-player locations and names and narrated who was getting the ball and asked the child where he or she wanted to throw the ball when he or she received it. Experimenter 1 ended the practice session after the child received the ball 3 times, then quickly set up Cyberball for the Real Condition. When Cyberball was ready, Experimenter 1 continued with the script.] Ok, now we're ready to play the game with the kids. It is very important to only press the arrows when you get the ball in your hand – you'll see the ball in your hand here [point to hand on Cyberball picture], so pay close attention to where the ball is going and ONLY press key when you have the ball in your hand. When the game is over, you can just let me know. I'll be sitting back there doing some work. [Experimenter 1 sat at a small table in the testing room with the child] Do you have any questions? Are you ready to play? Ok, it's all ready for you.

Fiction Condition first

Now you will play the ball tossing game with the cartoon characters – they are just pretend. The pretend cartoon characters you will be playing with are Zoony, Beamer, and Razzle. The game is simple – you just toss the ball around between the four of you. It will look a little bit like this. [show picture of Cyberball locations with arrows] You will see your own picture and your own name here [point to participant location] and you'll also see these little throwing guys with pictures above them [point to co-player locations]. The pictures above the throwing guys are pictures of characters that you'll be playing with – you'll see different cartoon characters than these. When you get the ball, you can throw it wherever you want. To toss the ball to a pretend cartoon character, you'll use the arrow buttons [point to arrow buttons on the button box] – those arrows match up to the cartoon characters like this [show picture of Cyberball locations with arrows]. You'll push this arrow [point to left arrow on the button box] to throw the ball to this character [point to left character on picture], see how the arrows match up [point to left arrow on the button box and the arrow next to the left kid on the picture]? You'll use this arrow [point to up arrow on button box] to throw to this character [point to the upper character on the picture], see how the arrows match up [point to up arrow on the button box and the arrow next to the upper character on the picture]? And you'll push this arrow [point to right arrow on the button box] to throw to this character [point to right character on the picture], see how the arrows match up [point to right arrow on the button box and the arrow next to the right kid on the picture]? Want to try it? Ok! [Participants then practiced playing Cyberball while Experimenter 1 pointed out the participant and co-player locations and names and narrated who was getting the ball and asked the child where he or she wanted to throw the ball when he or she received it. Experimenter 1 ended the practice session after the child received the ball 3 times, then quickly set up Cyberball for the Fiction Condition. When Cyberball was ready, Experimenter 1 continued with the script.] Ok, now we're ready to play the game with the cartoon characters. It is very important to only press the arrows when you get the ball in your hand – you'll see the ball in your hand here [point to hand on Cyberball picture], so pay close attention to where the ball is going and ONLY press key when you have the ball in your hand. When the game is over, you can just let me know. I'll be sitting back there doing some work. [Experimenter 1 sat at a small table in the testing room with the child] Do you have any questions? Are you ready to play? Ok, it's all ready for you.

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