The Behavioural and Psychological Effects of Ostracism

In Adolescence and Emerging-Adulthood.

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Abstract

The developmental periods of adolescence (13- to 18-years), and emerging-adulthood (18- to 25-years) are important stages for an individual's emotional and psychological development. For most, adolescence and emerging-adulthood are times of excitement, a time in which they mature and develop a deeper sense of personal identity. However, there is also a subset of the general population who can develop psychological problems such as substance abuse disorders, delinquency, depression, and suicide during this time. While the aetiology of these problems is not entirely clear, a number of researchers have shown that one of the biggest external predictors of problem-behaviour during adolescence and emerging-adulthood is peer influence.

Ostracism - the act of being excluded or ignored by others is one aspect of peer influence that warrants considerable scientific attention. A large body of research has shown that ostracism is associated with a decrease in an individual's psychological well-being, including their self-esteem. Furthermore, work conducted both within our own laboratory and in others has suggested that adolescents and emerging adults may be at an increased risk of experiencing negative effects following ostracism.

The overall aim of this thesis was to investigate the psychological and behavioural impacts of ostracism in adolescent and emerging-adult samples. In Experiment 1, we recruited samples of adolescents, emerging-adults, and young-adults, and examined whether ostracism would influence participants propensity to assert control over a group situation by nominating themselves as a leader. For Experiment 2 and Experiment 3, we chose to focus our investigations on the emerging-adult population. In Experiment 2 we examined the relation between ostracism and risk-taking behaviour, and in Experiment 3 we examined the relation between ostracism and aggressive behaviour, and the effect of being ostracised by a group of close friends compared to a group of strangers.

Overall we found a number of interesting findings. First, consistent with the ostracism literature, in all three of our experiments we found that ostracism had a strong negative effect on participants' psychological well-being. Second, we found a number of specific effects of ostracism on participants' behaviour. In Experiment 1 we found that individuals who reported the greatest negative effect of ostracism on their self-esteem were more likely to nominate themselves for a leadership role; this may be one way in which individuals who are worst affected by ostracism attempt to buffer and re-build their diminished self-esteem. In Experiment 2 we found that ostracised participants were significantly less likely to take risks on a computer-based risk-taking task compared to included participants, therefore suggesting a link between ostracism and introverted behaviour. Finally, in Experiment 3 we found two findings; first, despite prior research suggesting a link between ostracism and increased aggressive behaviour, we found no effect of ostracism on aggression in our sample. Second, counter to the current theoretical models of ostracism, the magnitude of the negative effect of ostracism did not differ as a function of the source of ostracism. That is, individuals who were ostracised by complete strangers or by close friends both reported equal levels of psychological hurt. Overall this thesis provides new insight into the psychological and behavioural symptoms associated with the experience of ostracism.

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Publications Arising From This Thesis

Refereed Conference Presentations

Pharo, H., Gross, J., Hayne, H. (2011). *A comparison of adolescents' responses to ostracism by friends or strangers*. Poster abstract submitted and accepted for presentation at the 2011 Biennial Meeting of the Society for Research on Child Development, Montreal, Canada.

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Chapter 1

"Adolescence is a new birth, for the higher and more completely human traits are now born… The child comes from and harks back to a remoter past; the adolescent is neo-atavistic, and in him the later acquisitions of the race slowly become prepotent. Development is less gradual and more saltatory, suggestive of some ancient period of storm and stress when old moorings were broken and a higher level attained." [G. Stanley Hall (1904), p xiii]

In 1904, G. Stanley Hall published a two-volume epic entitled *Adolescence: Its Psychology and its relation to physiology, anthropology, sociology, sex, crime, religion, and education* (Hall, 1904). In this seminal work, Hall documented a host of physical and cognitive changes that occur between the ages of 12 to 20, including growth spurts in both height and weight, changes to motor functioning, pubertal changes, and a number of behavioural and cognitive changes, such as increases in antisocial behaviour, criminal activity, and sexualised behaviour, as well as increases in cognition and intellectual capacity. Although Hall's work has been criticised by modern scholars as inaccurate and outdated, particularly in areas such as sexual development, Lamarckian evolution (the notion that we can inherit our parent's behavioural traits), and religion, a number of his points are remarkably consistent with modern theories and data (Arnett, 2006b; Brooks-Gunn & Johnson, 2006). Perhaps more important than the specific content of his work, however, Hall's seminal publication marked the inception of the field of adolescent research (Arnett, 2000; Cravens, 2006).

According to modern definitions, adolescence begins at pubertal onset, and culminates with both physical and psychological maturity (Arnett, 2004; Cobb, 2007; Goossens, 2006a; Lerner, 2002; Reber & Reber, 2001). During adolescence, an individual undergoes a host of pubertal changes including changes to specific body parts, changes in overall body shape, and changes to hormonal systems (Alsaker & Dick-Niederhauser, 2006). Despite their emerging physical maturity, adolescents have limited emotional regulatory skills relative to adults, yet they are more emotionally mature than children (Goossens, 2006b). Similarly, adolescents have greater cognitive capabilities than children, yet they are still cognitively underdeveloped relative

to most adults (Lehalle, 2006). In addition to these physical and cognitive changes, adolescents also experience changes in their social structures and in the societal expectations that are placed upon them. For example, adolescents begin to affiliate more with peers of their own age and rely less on their parents for social support (Storch, Masia-Warner, Crisp, & Klein, 2005; Sullivan, Farrell, & Kliewer, 2006). They also begin to experience more independence and autonomy, however, they remain financially dependent on their parents (Heaven, 2001). There are, therefore, multiple factors that change during adolescence. In fact, theorists have proposed that adolescence can be defined within three contexts: a *biological context*, a *psychological context*, and a *sociological context* (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Cobb, 2007; Goossens, 2006a; Lerner, 2002).

A Biological Definition of Adolescence

Biological growth consists of two general stages; first, an organism develops physically to a point at which it can survive independently of its parents, and second, an organism develops the capacity to reproduce; a process known as pubertal maturation (Alsaker & Dick-Niederhauser, 2006). In humans, pubertal maturation typically begins early in the second decade of life (Cobb, 2007) and is associated with a number of hormonal and physical changes to the body (Alsaker & Dick-Niederhauser, 2006). The onset of pubertal maturation features regularly in definitions of adolescence, and is commonly considered to mark the beginning of adolescence (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Cobb, 2007; Goossens, 2006a; Lerner, 2002; Reber & Reber, 2001).

Although the order and timing of pubertal changes varies between individuals, the general pattern of pubertal maturation for humans consistently occurs during the second decade of life (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Cobb, 2007). One of the first noticeable changes during pubertal maturation is a period of increased growth between the ages of 10- and 14-years old, known as the *growth spurt*, when both males and females exhibit dramatic

increases in their height, weight, and muscular development (Cobb, 2007; Rogol, Roemmich, & Clark, 2002). During these early teenage years, individuals also experience changes to their reproductive systems and start to develop secondary sex characteristics such as facial hair in males, and breasts in females (Alsaker & Dick-Niederhauser, 2006). Furthermore, in addition to the physical changes, teenagers also experience physiological changes, most notably a rapid increase in the level of the sex hormones (Alsaker & Dick-Niederhauser, 2006; Cobb, 2007). Male teenagers experience approximately an 18-fold increase in testosterone levels during puberty, and females experience a 9-fold increase in oestrogen levels during puberty (Nottelmann et al., 1987). These hormonal changes result in the onset of menarche in females and the production of sperm in males (Alsaker & Dick-Niederhauser, 2006). It is clear that a number of biological and physiological changes occur during pubertal maturation. Although the onset of puberty provides a reasonably good indicator of the beginning of adolescence, the physical changes described above are complete well before the end of adolescence (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Cobb, 2007). Therefore, it is also important to consider the psychological and sociological changes that occur when formulating a definition of adolescence (Cobb, 2007).

A Psychological Definition of Adolescence

In addition to the biological changes outlined above, a complete definition of adolescence must also account for the cognitive and behavioural changes that occur during this developmental period (Alsaker & Dick-Niederhauser, 2006; Cobb, 2007; Goossens, 2006b; Lehalle, 2006). The earliest work on cognitive development was carried out by Jean Piaget. Piaget believed that the biggest change in adolescents' cognitive abilities was in the development of "the capacity to reason in terms of verbally stated hypotheses and no longer merely in terms of concrete objects," (Piaget, 1972). In other words, he viewed the early teenage years as the period during which an individual learns to internally reflect upon experiences, and to mentally formulate an outcome based on those reflections (Berk, 2005). Piaget (1972)

referred to this period of cognitive development as the formal operations stage. Many contemporary theorists have gone on to critique and expand upon Piaget's theory (de Ribaupierre & Pascual-Leone, 1979; Fischer, 1980; Kuhn, 2008), however, all modern theorists of cognitive development still agree that the second decade of life is the time when individuals develop a more complex, highly developed set of cognitive skills (de Ribaupierre & Pascual-Leone, 1979; Fischer, 1980; Kuhn, 2008). Specifically, this stage of cognitive development includes developing an awareness of one's own thoughts and identity, an increasing awareness of others' thoughts and actions, and the development of the capacity for abstract reasoning (de Ribaupierre & Pascual-Leone, 1979; Fischer, 1980; Kuhn, 2008; Kuhn & Pease, 2006; Lehalle, 2006); a set of skills which Kuhn (2000) collectively termed "metacognitions."

Adolescent development is also characterised by an increased desire for independence, and as a result, adolescents exhibit a number of behavioural changes relative to childhood (Alsaker & Dick-Niederhauser, 2006; Goossens, 2006b). Adolescents typical display a marked increase in independent, self-directed behaviour; for example, they are more likely to make decisions about their day-to-day life compared to children, and they typically disagree more with their parents about particular decisions (Goossens, 2006c; Lerner, 2002). As they strive for independence, adolescents begin to seek guidance from external sources outside of the home; while children typically rely on parent-centred relationships for their social support, adolescents rely more heavily on peer-centred relationships, garnering much of their social support from similarly-aged peers (Storch et al., 2005; Sullivan et al., 2006). Adolescents also begin to exhibit an increase in sexual thoughts and behaviours, and many individuals experience their first sexual encounter during their teenage years (Heaven, 2001).

Although many of the changes that adolescents experience are positive, adolescents also exhibit a dramatic increase in their propensity for undesirable, risky behaviours including alcohol and illicit drug use, risky sexual behaviour, antisocial behaviour, and dangerous driving (Arnett,

1992; Furby & Beyth-Marom, 1992; Spear, 2000; Steinberg, 2004; Zuckerman & Kuhlman, 2000). Taken together, a psychological definition of adolescence must account for both the increased cognitive awareness that occurs during teenage development (de Ribaupierre & Pascual-Leone, 1979; Fischer, 1980; Kuhn, 2008; Kuhn & Pease, 2006; Lehalle, 2006), as well as the associated increase in independent behaviours that are associated with these cognitive changes (Alsaker & Dick-Niederhauser, 2006; Goossens, 2006b).

A Sociological Definition of Adolescence

Adolescents represent a unique category within society; they are in a state of development where they are no longer fully dependent on their parents, and therefore are no longer children, but they are also not fully self-sufficient, and therefore are not yet adults (Cobb, 2007; Heaven, 2001; Lerner, 2002). From a sociological perspective, the teenage years can therefore be considered as a transition period in which individuals develop independence and self-sufficiency while still receiving guidance from their society (Cobb, 2007; Heaven, 2001). In fact, society has designated the adolescent years as a time in which an increasing number of personal responsibilities are introduced. For example, in most Western societies, adolescents are given an increasing level of independence over what they can consent to including the right to consent to sexual intercourse, the right to consent to certain medical procedures without parental permission, and the right to consent to marriage (Diaz et al., 2004; Kives, 2008; Muscari, 1998). They are also given increasing legal responsibilities such as the right to hold a driver licence and the right to drink alcohol and smoke cigarettes (World Health Organisation, 2001). Despite this increasing level of independence as governed by the state, teenagers are still protected by several laws that make them unique to adults, including compulsory education laws, child labour laws, and a specific juvenile justice system (Cobb, 2007). Therefore, according to society, teenagers are no longer children because they have more rights and trust placed upon them, however, they are not yet adults as they are still governed by a number of laws that

are specifically tailored for their special needs (Cobb, 2007). The teenage years can therefore be considered a distinct category within society; a distinct category that is commonly referred to as adolescence (Arnett, 2000; Cobb, 2007; Heaven, 2001; Lerner, 2002).

A Complete Definition of Adolescence

The three definitions described above each constitute aspects of what it means to be an adolescent. Adolescence is the period of transition from childhood to adulthood. This transition begins with the onset of puberty (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Cobb, 2007), and is coupled with a developing cognitive awareness about one's own independence (Alsaker & Dick-Niederhauser, 2006; Cobb, 2007; Goossens, 2006b; Lehalle, 2006). During this period of cognitive development, adolescents begin to exhibit a number of behavioural changes associated with their search for independence (Alsaker & Dick-Niederhauser, 2006; Goossens, 2006b) and similarly, society begins to treat them more like adults, giving them increasing levels of responsibility and independence (Cobb, 2007; Heaven, 2001; Lerner, 2002). The adolescents' position is difficult; they are becoming increasingly aware of their status in society, they are developing their own opinions, they are creating their own identity, and they are approaching full physical maturity. Yet, at the same time, they are still hampered by biological and cognitive constraints, as well as by societal restrictions that are placed on them. Moffitt (1993) described adolescence as the "maturity gap," arguing that it is a developmental period in which individuals approach full biological maturity, but within society, they are still viewed and treated as immature.

Exploring the boundaries of adolescence: The concept of emerging adulthood

At this point, it is clear that adolescence is a developmental period that begins at the onset of puberty (Arnett, 2004; Cobb, 2007; Goossens, 2006a; Lerner, 2002; Reber & Reber, 2001), and is characterised by changes in both psychological maturity, and social status (Alsaker & Dick-Niederhauser, 2006; Cobb, 2007; Goossens, 2006b; Heaven, 2001; Lerner, 2002). In

conceptualising the changes that occur during adolescence, this raises the question: When does it end? When can an adolescent be considered an adult?

Because an individual's experiences during adolescence can vary dramatically depending on the expectations and practices of their culture, the upper boundary of adolescence differs considerably across cultures (Arnett, 2004; Santrock, 2003). For example, adolescents in traditional cultures typically marry at a younger age than their western counterparts who experience more freedom to explore single-life during their late teens and twenties (Alsaker & Dick-Niederhauser, 2006; Arnett, 2002; Schlegel & Barry III, 1991; Verma & Saraswathi, 2002). As a result, adolescents in traditional societies typically enter into the realm of adulthood and responsibility (namely full-time work and parenting) at younger ages than do westerners (Arnett & Taber, 1994).

Although there are cultural differences in adolescent development, it is important to acknowledge that adolescents all experience a series of developmental changes that mark their ongoing transition to adulthood (Arnett, 2004; Arnett & Taber, 1994; Giedd et al., 1999; Hudspeth & Pribram, 1990; Kelley, Schochet, & Landry, 2004; Sowell, Thompson, Holmes, Jernigan, & Toga, 1999). Irrespective of culture, it is an international trend that, as children mature throughout adolescence, they become increasingly independent and capable of caring for both themselves and others (Arnett, 2004). Many governments around the world acknowledge this fact with legislation which provides adolescents with greater levels of responsibility (Santrock, 2003). For example, in New Zealand, adolescents gain the right to babysit other children at the age of 14, and at 16, they are legally allowed to leave home and live independently of their parents (Children and Young People – Legal Rights, 2009). Similarly, in other countries including Australia, Europe, and the United States of America, adolescents are given the right to care for others and to leave home between the ages of 15 and 18 (Stark, 2005).

Based on these legal policies, one could assume that the end point for adolescence occurs at approximately 18 years of age. However, despite the increasing level of independence and maturity that is associated with adolescent development, most individuals in their late teenage years and early twenties are not fully mature, and are in fact still prone to impulsive and immature behaviour (Arnett, 1992; Arnett, 2000; Dahl, 2004; Steinberg, 2004). By way of local example, consider the hi-jinks exhibited by Dunedin and Christchurch University students in recent years. In 2007, 2008, and 2009 students from the University of Otago in Dunedin and the University of Canterbury in Christchurch have held an annual street party that has degenerated into alcohol-fuelled destruction and stand-offs with the police, and have resulted in 30 to 70 arrests each year (New Zealand Press Association, 2009b). The antisocial behaviour exhibited by these individuals included lighting street fires, setting fire to cars, destroying public and private property, and throwing glass bottles at police and fire fighters (New Zealand Press Association, 2009b; Neville, 2009). Another recent example occurred in February 2009, when the University of Otago held an annual street-parade to welcome the new students to Dunedin. While this event is normally a peaceful affair, the 2009 parade turned into chaos as a number of onlookers, many of whom were university students, pelted the parade with eggs, rubbish, vomit, urine, and faecal matter. The aftermath saw the main street of Dunedin littered with rubbish, and a number of signs and shop windows were broken (New Zealand Press Association, 2009a).

Importantly, the individuals who participated in these events were between the ages of 18- and 22-years old. They had moved out of home and were living independently of their parents, mostly in shared flatting situations. Therefore, on one level, they were able to take care of themselves, pay their rent and bills, and feed themselves – which can be seen as evidence of maturity and independence. However, at the same time, they engaged in reckless, antisocial behaviour which is neither mature nor sensible. Given this, should 18- to 22-year-olds be classified as adults?

In recent years, technical advances in our ability to study brain development have suggested that brain maturation may play a role in adolescent behaviour (Giedd, 2004). Although early theories postulated that brain maturation was complete by late childhood (Giedd, 2004; Hudspeth & Pribram, 1990), a growing body of research now indicates that although individuals reach physical maturity around the age of 18, their brain continues to develop until approximately 22 years of age (Blakemore, 2008). Early research on brain maturation relied exclusively on measurement of skull circumference to infer age-related changes in the size of the brain from childhood to adulthood (Hudspeth & Pribram, 1990). On the basis of these measurements, it was inferred that the brain stopped growing sometime during the late teens. Unfortunately, the crude nature of this technique provided little insight into finer details involved in the maturation of brain *function*. Modern advances in technology such as Electro Encephalogram (EEG) recordings and functional Magnetic Resonance Imaging (fMRI) has provided a clearer view of adolescent brain maturation (Giedd et al., 1999; Hudspeth & Pribram, 1990; Sowell et al., 1999). Using these techniques, it has been shown that the adolescent brain does not reach functional maturity until at least 20-22 years of age (Giedd et al., 1999; Hudspeth & Pribram, 1990; Sowell et al., 1999).

In light of these new data, Arnett (2000) has proposed a distinct developmental phase that occurs between the ages of 18 to approximately 25 years; he has referred to this phase as *emerging adulthood*. Arnett argues that emerging adulthood is distinct from both adolescence and adulthood, in that during the period of emerging adulthood, individuals are independent of their parents, and capable of looking after themselves, however, they have not yet adopted the serious commitments typically associated with adulthood, namely marriage, a career, and parenthood (Arnett, 2000, 2004). Arnett conceptualises emerging adulthood as a period of self-fulfilment, during which people usually explore their own self-identities, world-views, and life-goals (Arnett, 2000, 2004). He outlined five major characteristics that define emerging

adulthood: identity exploration in the areas of love, work and worldviews, instability, being self-focused, feeling somewhere in between, and exploring a number of future possibilities in life (Arnett, 2000, 2006a).

Therefore, when conceptualising adolescence and the beginning of adulthood, we can define it in three specific stages. First, *adolescence* encompasses the period from the onset of puberty to the age when most people begin to leave home, approximately 18-years old. Second, *emerging-adulthood* marks a phase of independence, without serious responsibilities, in which individuals typically explore their own sense of identity, and spans from approximately 18- to 25-years old. Third, *adulthood* marks the point at which people begin to take on more serious responsibilities such as marriage, parenthood, and long-term career decisions.

Coming of Age – Common Problems Encountered During Adolescence and Emerging-Adulthood

There are a number of positive developmental changes that occur during adolescence and emerging-adulthood, including an increase in cognitive awareness (Alsaker & Dick-Niederhauser, 2006; Cobb, 2007; Goossens, 2006b; Lehalle, 2006), and an increase in independence and emotional maturity (Cobb, 2007; Heaven, 2001; Lerner, 2002). For most people, the developmental period surrounding adolescence is a time of excitement and arousal (Dahl, 2004), a time in which they mature and develop a deeper sense of personal identity (Arnett, 1999). Dahl (2004) estimates that around 80% of people traverse adolescence and emerging-adulthood with little to no difficulties, however, there is also evidence to suggest that a sub-set of individuals experience emotional difficulties, stress, and adversity (Arnett, 1999; Dahl, 2004; Larson, Csikszentmihalyi, & Graef, 1980; Larson & Lampman-Petraitis, 1989). For example, there is a sharp increase in mortality rates during adolescence, with some statistics indicating an increase by as much as 200% from middle childhood (Dahl, 2004; Spear, 2000). Furthermore, individuals' experiences during adolescence and emerging-adulthood can be linked

to the developmental roots of lifetime problems such as drug or alcohol dependence, delinquency, poor health habits, relationship difficulties, eating disorders, depression, and suicide (Alsaker & Dick-Niederhauser, 2006; Arnett, 1999; Arnett, 2004; Buelga, Ravenna, Musitu, & Lila, 2006; Cobb, 2007; Dahl, 2004; Heaven, 2001; Koops & de Castro, 2006).

Substance Use

The issue of substance use has a garnered considerable public attention over the past 20 years (Arnett, 2004). Substance abuse during adolescence and emerging-adulthood is an area of public concern because exposure to drugs and alcohol can lead to tolerance and dependency, which can interfere with an individual's education, employment opportunities, and interpersonal relationships (American Psychiatric Association, 2000). Substance dependence also poses as a huge financial burden for society; in the United States, licit and illicit drugs have been estimated to cost the government over half a trillion dollars annually (National Institute on Drug Abuse, 2008), and in New Zealand, that figure is estimated to be between 5 and 10 billion dollars annually (Ministry of Health, 2009).

Given the negative impacts associated with substance use, a number of researchers have focused on this topic (Adolescent Health Research Group, 2008; Centers for Disease Control and Prevention, 2008; Hayes, Smart, Toumbourou, & Sanson, 2004; Health Behaviour in School-aged Children [HSBC], 2001/2002; Kypri, Langley, McGee, Saunders, & Williams, 2002; Ministry of Health, 2009). Unfortunately, these researchers have found that many adolescents and emerging-adults not only experiment with alcohol and cannabis, they often consume these substances in excessive quantities. For example, binge-drinking is a common social behaviour during adolescence and emerging-adulthood (Adolescent Health Research Group, 2008; Centers for Disease Control and Prevention, 2008; Hayes et al., 2004; Kypri et al., 2002; Ministry of Health, 2009). Binge drinking is typically defined as consuming 5 or more standard drinks in less than 4 hours (World Health Organisation, 2004). In a recent survey of New Zealand youth, 12.6%

of 16-17-year-olds reported binge-drinking at least once in the past week, and 71.6% had done so on at least 1 occasion in the past year. Furthermore, 26.3% of 18-24-year-olds reported bingeing weekly, and 80.6% did so in the past year (Ministry of Health, 2009). Similarly, the Youth '07 National Survey of the Health and Wellbeing of New Zealand Secondary School Students found that about 34% of secondary school students reported binge drinking in the past 4 weeks (Adolescent Health Research Group, 2008), and in a sample of university students in Dunedin, Kypri et al. (2002) found that approximately 60% of emerging-adult students consumed more than the national recommended guidelines for safe drinking. A number of international studies have also reported high rates of binge-drinking among adolescents and emerging-adults. The Australian School Students' Alcohol and Drug Survey found that, by 14 years of age, 90% of children have tried a full glass of alcohol, and that 34% of adolescents between the ages of 12-17 years reported consumption in the past week (Hayes et al., 2004). The Health Behaviour in School-Aged Children Survey (HSBC, 2001/2002) investigated substance use in adolescents from 35 countries in Europe and North America, and found that 29.1% of all 15-year-olds drink alcohol on a weekly basis, and that 24-32% of 15-year-olds reported binge drinking in the past month. Likewise, the researchers using the Youth Risk Behaviour Surveillance System survey found that 26% of North American students aged between 13 and 20 had binged in the past 30 days (Centers for Disease Control and Prevention, 2008).

In addition to alcohol use, the rate of cannabis consumption among young people is disturbingly high (Arnett, 2004; Cobb, 2007; Santrock, 2003). For example, approximately 18.8% of 15-year-olds from Europe and North America have used cannabis in their life time, with 7.9% using it on a regular basis, and 2.8% reporting heavy use (which was defined as more than 40 times per year) (HSBC, 2001/2002). In one study conducted in the United States, 38.1% of 13- to 18-year-olds had used marijuana over the course of their lifetime, and 19.7% were regular users (Centers for Disease Control and Prevention, 2008), while 5% of secondary school students in

New Zealand have reported using cannabis on a weekly basis (Adolescent Health Research Group, 2008).

Overall, although specific numbers vary across different countries, the rate of substance use among adolescents and emerging-adults is very real, and in a number of cases, quite alarming (Kypri et al., 2002). Take for the example, the binge-drinking data from New Zealand; 12.6% of 16-17-year-olds and 26.3% of 18-24-year-olds equates to over 16,000 adolescents and over 100,000 emerging-adults binging on a weekly basis (Ministry of Health, 2009; Statistics New Zealand, 2009). The impact of this binge-drinking culture is a serious public health concern, as it has a direct impact on the health and well-being of young people in New Zealand; we are constantly reminded of its impact in both the media, and by public health statistics (Ministry of Health, 2002). In New Zealanders aged under 25-years old, alcohol-related trauma is a major cause of death, with approximately 23% of deaths among 15-24-year-olds being directly attributable to alcohol (Ministry of Health, 2002). Furthermore, regular cannabis use during adolescence heightens the risk of developing a range of psychosocial problems such as school drop-out (Lynskey, Coffey, Degenhardt, Carlin, & Patton, 2003), criminal activity including further illicit drug use, depression, psychosis, and suicidal behaviour (Fergusson, Horwood, & Swain-Campbell, 2002).

Delinquency

Another area of concern during adolescence and emerging-adulthood is the onset of anti-social or delinquent behaviour (Arnett, 2004; Cobb, 2007; Koops & de Castro, 2006; Moffitt, 1993; Santrock, 2003). Adolescents and emerging-adults are grossly over-represented in crime statistics, and criminology researchers consistently find that the majority of offending is committed by individuals between the ages of 14 and 24, particularly young males (Arnett, 2004; Blumstein & Cohen, 1987; Farrington, Blumstein, & Piquero, 2007; Koops & de Castro, 2006; U.S. Department of Justice, 2004). For example, data from the U.S. Department of Justice (2004)

reveals that a disproportionate number of people aged 15-24 are arrested every year in the United States. In 2003, there were 13,600 arrests per 100,000 people aged between 15-24 (which equates to 13.6% of the adolescent population) compared to only 3,800 per 100,000 aged 25 and over (U.S. Department of Justice, 2004). Juvenile delinquent behaviour can vary in form, from less serious acts such as violating curfews, vandalism, or consuming illicit substances, to more serious acts of criminal behaviour such as violence, robbery/theft, fraud, and sexual offenses (Cobb, 2007; Farrington et al., 2007; Slowikowski, 2009). There is some evidence to suggest that younger adolescents engage in less serious forms of delinquency, with the more serious criminal behaviour such as violence, robbery, and rape typically occurring more frequently during emerging adulthood (Cobb, 2007; Slowikowski, 2009). However, despite this overall trend, there are still a number of young adolescents both in New Zealand and overseas, who are arrested for serious acts of violence and other forms of delinquency (Koops & de Castro, 2006; McLaren, 2000; Slowikowski, 2009).

Delinquency is a significant public health concern not only because of the obvious impact that it can have on victims, but also because it typically occurs during a very short window of development, yet can have a dramatic impact on lives of perpetrators (Arnett, 2004; Cobb, 2007; Farrington et al., 2007; McLaren, 2000). Research into the life-course patterns of criminal behaviour reveals several interesting trends. First, only a small subset of the adolescent and emerging-adult population engage in serious criminal behaviour (Blumstein & Cohen, 1987; Farrington et al., 2007; Koops & de Castro, 2006; Moffitt, 1993), and second, this small sub-set typically exhibit a rapid increase in criminal behaviour from the ages of 14 to 18, before declining and stabilising by around the age of 25 (Blumstein & Cohen, 1987; Farrington et al., 2007; Koops & de Castro, 2006; Moffitt, 1993; Moffitt & Caspi, 2001; Moffitt, Caspi, Harrington, & Milne, 2002). Based on longitudinal data collected in New Zealand, Moffit (1993) drew a distinction between two types of delinquents: life-course persistent individuals, who engage in antisocial

acts throughout their life, and adolescence-limited individuals, whose delinquent behaviour is largely restricted to the periods of adolescence and emerging-adulthood. Moffitt found that only 5% of the males in her sample could be classified as life-course persistent, having committed antisocial acts consistently during childhood, adolescence, and adulthood. Conversely, one third of all males exhibited antisocial behaviour that started between ages 11 and 15 but that had disappeared by adulthood. Based on the number and kind of antisocial acts, the two groups were indistinguishable at the age of 15, and for the vast majority of adolescents, delinquency decreased dramatically during late adolescence and emerging-adulthood (Moffitt et al., 2002). Moffit (1993) suggested that adolescence-limited antisocial behaviour is likely to reflect an attempt by previously-conforming adolescents to gain status and power by imitating their life-course persistent antisocial peers.

Studies such as Moffitt's (1993) show that for the vast majority of those who engage in antisocial acts during adolescence, this behaviour is transient, and does not necessarily signal any long-term difficulties. However, of those who do engage in serious delinquent behaviour, the majority of them are likely to experience later difficulties in life such as financial hardship, difficulties securing employment, and mental health problems (Farrington et al., 2007; Moffitt, 1993; Moffitt & Caspi, 2001; Moffitt et al., 2002). It therefore appears that delinquency occurs during a relatively short window in the developmental period, but that individuals can make choices during this time which can dramatically alter their future.

Psychopathology

Substance abuse and delinquency are both classified as externalising behaviour problems because they involve behaviours that manifest in an individual's outward behaviour (Arnett, 2004; Liu, 2004). However, the problems encountered during adolescence and emerging-adulthood are not limited to externalising problems. Adolescents and emerging-adults are also at an increased risk of developing serious internalising problems; problems which affect the

individual's internal psychological environment, such as depression and increased suicidality (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Cobb, 2007; Heaven, 2001; Liu, 2004).

Depression is defined as an enduring mood state characterised by feelings of sadness, inadequacy, and hopelessness, as well as a general decrease in activity and reactivity (Reber & Reber, 2001). *Depression* can refer to several different conditions which are either clinical or sub-clinical. Generally speaking, research into depression distinguishes between three major categories: *Depressed mood*, *Dysthymic disorder,* and *Major Depressive Disorder* (American Psychiatric Association, 2000; Arnett, 2004; Petersen et al., 1993). Depressed mood describes feelings of sadness without any major accompanying symptoms (Arnett, 2004; Fleming & Offord, 1990; Garber, Keiley, & Martin, 2002; Petersen et al., 1993). Dysthymic disorder refers to an enduring period of sadness for at least two years, and is associated with symptoms such as feelings of inadequacy and guilt, anhedonia (the inability to experience pleasure from activities usually found enjoyable), and social withdrawal. Unlike Major Depressive Disorder, however, Dysthymic disorder is typically absent of vegetative symptoms such as sleep disruptions, appetite and weight change, and psychomotor symptoms (American Psychiatric Association, 2000). In contrast, Major Depressive Disorder refers to an enduring time during which an individual has experienced several major depressive episodes which are characterised by a period of at least 2 weeks when an individual experiences depressed or extremely irritable mood, anhedonia, changes in appetite or weight, sleep disruptions, changes in psychomotor activity, lethargy, feelings of worthlessness or guilt, difficulty concentrating and making decisions, or recurrent thoughts of death or suicidal ideation. Furthermore, these symptoms must cause clinically significant levels of distress or impairment in social, occupational, or other important areas of the individual's functioning (American Psychiatric Association, 2000).

Research has shown that the incidence of Dysthymic Disorder (DD) and Major Depressive Disorder (MDD) is relatively low in the general adolescent and emerging-adult population.

Overall, prevalence estimates range from between 3% - 7% of adolescents and emerging-adults in the general community meeting diagnostic criteria for either DD or MDD (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Rohde, Lewinsohn, & Seeley, 1991; Sweeting & West, 2003), which is similar to incidence estimates in the adult community (American Psychiatric Association, 2000). Conversely, researchers have found a high rate of depressed mood in adolescent and emerging-adult populations relative to childhood and adulthood, and it has been estimated that approximately 35% of adolescents experience depressed mood (Petersen et al., 1993). It is well documented that both self-reported levels of depressed mood, and sub-clinical symptoms of depression increase during adolescence relative to childhood (Birmaher et al., 1996; Fleming & Offord, 1990; Garber et al., 2002; Garber, Weiss, & Shanley, 1993; Holsen, Kraft, & Vitterso, 2000; Lewinsohn et al., 1993; Petersen et al., 1993; Sweeting & West, 2003), persisting during emerging-adulthood, before declining as those individuals advance into adulthood (Birmaher et al., 1996; Fleming & Offord, 1990; Garber et al., 2002; Meadows, Brown, & Elder, 2006; Petersen et al., 1993). For example, Sweeting and West (2003) followed a sample of 2586 school children from the age of 11- to 15-years old. They assessed a variety of adolescent-related health concerns using self-report questionnaires including a 6-item depression scale based on Kandel and Davies' (1982) scale of depressive mood. Participants' reports of feeling "sad, unhappy or low" increased from approximately 35% of the sample at age 11, to over 42% by age 15. Similarly, they found a three-fold increase in cases of clinical depression, from 4% of the sample at age 11, to 12% by age 15. Similarly, using the Community Mental Health Assessment Survey, Radloff (1991) investigated the incidence of depressed mood ratings across samples of high-school students, University students, and adults from the general community. The authors found dramatic increases in depressed mood between the ages of 13 and 15 years, a peak at approximately 17-20 years, and a subsequent decline during adulthood. In another study, Holsen et al. (2000) investigated the stability of depressive symptoms in a sample of 538 adolescents

between the ages of 13- and 19-years old. They found that, for males, there were no significant changes in depressed mood over that period, but that in females, there was an increase in self-reported levels of depression between the ages of 13 and 18 and a gradual decrease after that point. The findings of these studies provide support for a *mid-adolescence peak* in depressed mood, starting around the age of 15-20 years, with a pattern of general decline during the early twenties (Petersen et al., 1993).

Suicidality

The study of depression is important because of the strong links between depression and suicidal behaviour during adolescence and emerging-adulthood (Alsaker & Dick-Niederhauser, 2006; Arnett, 2004; Heaven, 2001). *Suicide* refers to any act in which an individual knowingly and intentionally causes their own death (Alsaker & Dick-Niederhauser, 2006; Reber & Reber, 2001). Studies of suicide typically distinguish three types of suicidal behaviour; suicidal ideation – which refers to cognitions and plans about suicide, attempted suicide, and suicide (Alsaker & Dick-Niederhauser, 2006). Unfortunately, the topic of suicide is highly relevant for New Zealand, because New Zealand has the highest rate of youth suicide (ages 15-24) for all Organization for Economic Cooperation and Development (OECD) countries (Ministry of Health, 2004). In fact, suicide is the number one cause of death in New Zealand adolescents and emerging-adults (Ministry of Health, 2004). Adolescent suicide is also a serious public-health concern in a number of other countries including Russia, Switzerland, Austria, Canada, Australia, and the United States of America (Heaven, 2001). For example, in the U.S., 33% of all adolescents report having suicidal ideations, 16% report having attempted suicide at least once, and suicide is the third most common cause of death for adolescents and emerging-adults behind automobile accidents and homicide (Arnett, 2004).

A number of researchers have found a relation between depressed mood and suicidal behaviour during adolescence and emerging-adulthood (Apter & Freudenstein, 2000; Gould et

al., 1998; Lewinsohn, Rohde, & Seeley, 1996; Shaffer, Garland, Gould, Fisher, & Trautmann, 1988; Steinhausen, Bösiger, & Metzke, 2006). For example, Gould et al. (1998) investigated the relation between suicidality and psychopathology in a sample of 1,285 adolescents aged 9 to 17 using the Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3). They found that mood disorders, anxiety disorders, and substance abuse/dependence disorders all independently increased the risk of suicidal ideation and/or suicide attempts, even after controlling for socio-demographic factors including age, gender, and socioeconomic status. In another study, Steinhausen et al. (2006) followed a sample of 49 participants (mean age 13.7 years) and assessed each individual at three time-points for their degree of suicide risk as well as the prevalence of emotional and behavioural difficulties using both questionnaires and structured diagnostic interviews. Specifically, they examined the correlation between suicidality during adolescence, and a number of negative life factors including mood disorders, anxiety problems, aggressive behaviour, and low social support. Steinhausen et al. found that suicidality was very stable within individuals across the three phases, in that adolescents who reported suicidal ideations and/or behaviours were extremely likely to continue to report such symptoms during the later phases of the study. Furthermore, the authors found that suicidality was significantly correlated with a number of emotional and behavioural difficulties including depression, anxiety, low self-esteem, social difficulties, attention difficulties, aggressive behaviour, and delinquent behaviour. Taken together, the findings of these studies support a relation between adolescent depression and an increased risk of suicidality; a relation that has been demonstrated in numerous other studies in both adolescence (Apter & Freudenstein, 2000; Gould et al., 1998; Lewinsohn et al., 1996; Shaffer et al., 1988; Steinhausen et al., 2006) and emerging-adulthood (Pompili et al., 2008; Schaffer et al., 2008; Simon & Savarino, 2007).

Summary

Overall, there are a number of serious life problems which have their developmental roots in adolescence, and persist into early adulthood. These life problems include substance abuse disorders, delinquency, depression, and suicide. It is particularly important to note that, although legally speaking, most individuals are treated as an adult by the age of 18, many of the problems described above are over-represented in the emerging-adult population relative to adulthood. This highlights the ongoing importance of this transition period for the psychological and social development of our young people within society. It is also important to remember, however, that adolescence and emerging-adulthood are by no means periods of doom and gloom. We have already established that the vast majority of individuals traverse these years with little to no difficulties (Arnett, 2004). Furthermore, adolescence and emerging-adulthood are both characterised by a number of positive changes to both physical maturity and psychological maturity that contribute to an increased sense of responsibility and identity in most adolescents (Alsaker & Dick-Niederhauser, 2006; Cobb, 2007; Goossens, 2006b; Heaven, 2001; Lerner, 2002).

What Causes Problems During Adolescence and Emerging-Adulthood?

The specific causal mechanisms underlying the problems that emerge during adolescence and emerging-adulthood are still, to a large extent, unknown (Arnett, 2004). However, there are several theories which outline links between aspects of social and biological development, and negative life events (Dahl, 2004). For example, certain personality characteristics are strongly linked to instances of negative behaviour, including substance abuse, and delinquency (Arnett, 2004). Specifically, aggression, impulsivity, and sensation-seeking, have consistently been related to substance abuse, and delinquency (Arnett, 1992; Eysenck, 1990; Stanford, Greve, Boudreaux, Mathias, & L. Brumbelow, 1996; Wagner, 1993; Zuckerman & Kuhlman, 2000; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). Several leading theorists also propose that

maturational changes in the neural pathways associated with emotional regulation and reward sensitivity (such as the prefrontal cortex and the limbic regions) actually have important implications for negative behaviours during adolescence and emerging-adulthood (Blum, Cull, Braverman, & Comings, 1996; Gardner, 1999; Kelley et al., 2004; Spear, 2000). Specifically, Blum et al. (1996) and others have proposed that increases in synaptic transmission, along with increases in the concentration of the neurotransmitter dopamine, may contribute to a "reward deficiency syndrome" (Blum et al., 1996), whereby adolescents, and to a lesser extent emerging-adults, experience reinforcing stimuli to be less pleasurable than the rest of the population. It is proposed that this reduced reinforcement therefore leads adolescents and emerging-adults to actively seek out new, more-rewarding stimuli. As a result, adolescents and emerging-adults on average engage in a higher degree of antisocial delinquent behaviour compared to children and adults (Blum et al., 1996; Gardner, 1999; Kelley et al., 2004; Spear, 2000).

Peers – A Powerful Influence During Adolescence and Emerging-Adulthood

While biological and personality factors have been shown to play a role in the development of problem behaviours, a number of researchers have shown that one of the biggest external predictors of problem behaviour during adolescence and emerging-adulthood is, in fact, peer influence (Ali & Dwyer, 2009; Andrews, Tildesley, Hops, & Li, 2002; Barber, Bolitho, & Bertrand, 1999; Dinges & Oetting, 1993; Fuemmeler, Taylor, Metz, & Brown, 2002; Guo, Elder, Cai, & Hamilton, 2009; Hawkins, Catalano, & Miller, 1992; Kandel, 1985; Larsen, Engels, Granic, & Overbeek, 2009; Larsen, Engels, Souren, Granic, & Overbeek, 2010; Monahan, Steinberg, & Cauffman, 2009; Prinstein & Wang, 2005; Rodgers & Rowe, 1993; van Schoor, Bot, & Engels, 2008). *Peer influence* is defined as the persuasive power of a social group on an individual's thoughts and behaviours (Brown, Bakken, Ameringer, & Mahon, 2008). Although peer influence is often referred to as a single process, it is in fact multi-modal, encompassing several different forms of influential behaviours (Brown et al., 2008).

Peer pressure is the most widely recognised term, and it is a term which is often used interchangeably with peer influence, but peer pressure only refers to one aspect of peer influence -- a direct effort from peers to manipulate the attitudes or behaviours of another individual within that group (Brown et al., 2008). Peer pressure is typically cast in a negative light; the term is used to describe negative pressure from peers to convince an individual to do something that he or she should not. Despite these negative connotations, peer pressure can also be positive, such as a friend encouraging another friend to take part in a school drama production, or to trial for a sports team (Brown et al., 2008; Prinstein & Dodge, 2008). In contrast to peer pressure, which is a direct conscious effort by one peer or peers to influence the behaviour of others, peer influence can also occur through behavioural display, a form of social learning whereby individuals mimic a desired behaviour or attitude which is being modelled by one or more of their peers (Bandura & Walters, 1963). While peer pressure is the term most commonly used to describe peer influence, behavioural display is actually believed to be the most common form of peer influence amongst adolescents (Brown et al., 2008). In addition, peer influence can also come in the form of antagonistic behaviours such as light-hearted teasing (Eder, 1991) or ridicule (Lashbrook, 2000) to more aggressive behaviours such as bullying and relational aggression (Barner-Barry, 1986; Cillessen & Mayeux, 2004; Khatri, Kupersmidt, & Patterson, 2000; Leets & Sunwolf, 2005).

Peer Influence and Adolescent 'Health' Behaviours

A number of researchers have found that peer influence has a powerful effect on adolescents and emerging-adults. For example, several recent studies have emerged from the National Longitudinal Study of Adolescent Health (Add Health) that link peer influence to negative outcomes such as alcohol abuse (Guo et al., 2009), smoking (Ali & Dwyer, 2009; Bauman, Carver, & Gleiter, 2001), and drug use (Maxwell, 2002). In the Add Health study, researchers followed a sample of over 90,000 American adolescents from 132 different schools

over an 8-year period from early adolescence through to emerging-adulthood. Participants and their parents were interviewed at three time points: 1994, 1996, and 2002. Researchers collected data on participants' social status, psychological well-being, and physical health, as well as contextual data on their family, neighbourhood, community, school, friendships, peer groups, and romantic relationships (Carolina Population Center, n.d.). One of the major strengths of the Add Health study is the scope of its recruitment pool; researchers collected data from entire communities, including participants and their peer networks, providing an excellent database from which to draw conclusions about the influence of peers.

In one Add Health study, Ali and Dwyer (2009) examined the effect of peer networks on smoking behaviour. In a sample of 20,745 adolescents, smoking was assessed using self-report measures of individuals' smoking frequency in the past 30 days and was compared to the smoking data from participants' nominated friends and classmates. The authors found that the adolescents in their study were significantly more likely to smoke if they associated with peers who smoked, even after controlling for other factors such as parental influence, socio-economic status, race, and sex.

In another Add Health study, Guo et al. (2009) investigated genetic and environmental contributions to adolescent alcohol abuse. A sample of 228 adolescent twin-pairs (mean age 15.91 years) were divided into monozygotic (MZ) twin pairs, and dizygotic (DZ) same-sex twin pairs. Participants reported on their frequency of drinking behaviour using a standardised questionnaire assessing recent drinking episodes, as well as drinking behaviour during the previous year. The authors also tracked the responses to the same alcohol questionnaire in the participant's peer networks, therefore providing a direct measure of drinking behaviours exhibited by the participants and their peers. Guo et al. calculated heritability estimates of participants' drinking behaviour by calculating the correlations in alcohol use between two twins for both the MZ twin pairs and DZ twin pairs. They then measured the difference between the

MZ correlations and the DZ correlations to provide a heritability estimate of drinking behaviour (h^2). Guo et al. then assessed heritability as a function of peer influence: participants with non-drinking peers, with low-drinking peers, or with high-drinking peers. The authors found evidence for a gene-environment interaction; higher levels of peer drinking were linked with higher levels of genetic contribution to alcohol use (lowest h^2 =.76), while lower levels of peer drinking were linked with lower levels of genetic contribution (highest h^2 = .53). That is, they found greater correlations in drinking behaviour between the MZ twin pairs compared to the DZ twin pairs when those pairs associated with high-drinking peers, compared to when they associated with low-drinking peers. That is, the genetic contribution to adolescent drinking was dependent on the influence of their friends' drinking behaviour (Guo et al., 2009).

Using the Add Health data, many other researchers have found a relation between peer influence and negative behaviours during adolescence. For example, Maxwell (2002) found that both male and female adolescents were, on average, 1.9 times more likely to exhibit risky behaviours such as cigarette smoking, alcohol consumption, and marijuana use if their nominated peers reported the same behaviour. Similarly, Bauman et al. (2001) found that peer smoking was a stronger predictor of adolescent smoking behaviour compared to parent smoking.

In addition to the Add Health data, other researchers have documented a link between peer influence and negative health outcomes during adolescence. In one example, Barber et al. (1999) investigated the relation between substance use and peer influence in a sample of 1,942 junior high-school students aged between 12 and 18 years old. Participants were assessed for their level of drug use using a self-report questionnaire, as well as answering a three-item questionnaire assessing the degree of peer influence they experienced in relation to drug use. Barber et al. found a strong relation between participants' reported drug use, and their reports of peer influence on drug use. Specifically, peer drug use was consistently found to be the

strongest predictor of adolescent drug use (smallest β = .28), even after accounting for other variables including conduct problems, socio-economic status, family environment, religion, and race.

There is also evidence that the effects of peer influence are not limited to adolescence. For example, Andrews et al. (2002) investigated the effect of peer influence on substance abuse disorders in an emerging-adult population. Using longitudinal data collected from a sample of 19- to 25-year-olds, the authors obtained self-report data on the frequency of individual's substance use from both the participants and two nominated peers. The experimenters also obtained self-report data on the quality of the peer relationships to ensure that peer influence was consistent across all participants in the study. Andrews et al. examined the relation between participant substance use and the frequency of substance use exhibited by their peers. They found a relation between reports of peer substance use and participants' substance use across time. Specifically, cigarette use, alcohol use, binge drinking, and marijuana use were correlated between participants and their peer networks. Furthermore, they found that peer substance use was a strong predictor of future cigarette use, binge drinking, and problem drug use in the emerging-adult participants.

Observational Studies of Peer Influence

While many studies investigate the impacts of peer influence using questionnaires, some researchers have attempted to observe the direct effects of peer influence in a controlled laboratory setting. Rutger Engels and his colleagues from the University of Nijmegen in The Netherlands conducted a series of experiments using a specially constructed bar within their research laboratory in which they could directly observe the influence of peer drinking behaviours (Larsen et al., 2009; Larsen et al., 2010; van Schoor et al., 2008). In these studies, 18- to 28-year-old university students were told that they would be taking part in experiments requiring them to rate the attractiveness of people, or to rate television commercials. In reality,

the experiments were bogus, and researchers were in fact looking at the influence of peers on participants' drinking behaviour. The studies took place in a replica bar setting located within the university, which participants were told was used for staff social functions. After completing the bogus experiment, participants were told that there would be a 50-minute break during which they could order either an alcoholic or non-alcoholic drink from the bar. During the break period, participants were recorded on video cameras, and independent observers coded their drinking in relation to the degree of peer influence they experienced.

Van Schoor et al. (2008) used the bar lab paradigm to investigate the relation between personality characteristics and drinking. Participants were recruited in groups of 6-8 friends and were told they were taking part in an experiment looking at group discussion and judgement. After completing a 30-item version of the Big Five Personality Questionnaire, they were placed in the bar for the break period where researchers could observe their behaviour. Van Schoor et al. found that the level of drinking exhibited by their peers was the strongest predictor of observed drinking levels in observed participants, while personality traits had no predictive power. That is, if their peers ordered alcoholic drinks during the break period, then participants were significantly more likely to follow suit and order an alcoholic drink. Overall, the authors concluded that peer drinking had the largest influence on participants' observed drinking levels.

While Van Schoor et al. (2008) looked at the effects of peer influence on drinking behaviour within a peer group, other researchers have used the bar lab paradigm to investigate the same peer influence effects with strangers. For example, Larsen et al. (2009) used the bar lab paradigm to investigate whether individuals would imitate the drinking behaviours exhibited by unfamiliar peers. Participants were placed in a group with 10 same-sex confederates who were trained to exhibit three different conditions of drinking behaviour during the break; a control condition where they only drank two sodas, a 'light' condition where they drank one alcoholic drink and two sodas, or a 'heavy' condition where they drank three to four alcoholic drinks. The

confederates were instructed to place their orders at the very start of the break period to ensure maximum time for imitation/influence to occur. The examiners then assessed participants' total amount of alcohol consumption as a function of the confederates drinking behaviour. They found that participants in the heavy condition drank significantly more alcohol than those participants in the light condition and the control condition.

In another experiment, Larsen et al. (2010) employed a similar methodology to that used by Larsen et al. (2009), and instructed confederates to either order a non-alcoholic or an alcoholic drink during a 30-minute break period. They then examined participants' drinking behaviour based on the four possible drinking scenarios: both the confederate and participant consumed alcoholic beverages (BA); the confederate drank alcohol and the participant did not (CA); the participant consumed alcohol and the confederate did not (PA); both the confederate and participant consumed non-alcoholic beverages (BN). Larsen et al. (2010) calculated the number of imitations (defined as a sip within 10 seconds of a confederate's sip), and analysed the relation between imitation and drinking situation. After correcting for the overall number of sips exhibited by each participant, they found a strong positive correlation between the number of confederates' sips and the number of participants' sips. In addition, they found that participants were significantly more likely to imitate sips if they were in the BA condition, compared to the CA, PA, or BN conditions. The findings of this study suggest that not only is the decision to drink influenced by peers, but that the rate at which alcohol is consumed is also influenced by one's peers.

Overall, Engels and his colleagues reveal an interesting insight into the mechanisms of peer influence on drinking behaviours. Their studies represent an effort to observe and quantify the effects of peer influence in a controlled laboratory setting. The authors of these studies consistently observed a link between peer drinking and participants' decisions to order an

alcoholic beverage. The data suggest that, at least in isolated incidents, peer influence plays a strong role in contributing toward emerging-adults' decisions regarding drinking.

Peer Influence and Delinquency

There is a clear link between peer influence and negative health behaviours in adolescence and emerging adulthood, including smoking, drinking, and drug-use (Ali & Dwyer, 2009; Andrews et al., 2002; Barber et al., 1999; Bauman et al., 2001; Guo et al., 2009; Larsen et al., 2009; Larsen et al., 2010; Maxwell, 2002; van Schoor et al., 2008). Similarly, researchers have also found a relation between peer influence and the onset of adolescent delinquency (Agnew, 1991; Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Aseltine, 1995; Matsueda, 1982; Monahan et al., 2009). For example, Agnew (1991) investigated the relation between exposure to delinquent peers and the onset of delinquent behaviour in a sample of 1,725 11- to 17-year-old adolescents. The participants were recruited from the National Youth Survey, a longitudinal study into adolescent delinquency and drug use. Agnew incorporated a self-report technique in which participants were required to report their own level of delinquency as well as estimate the level of delinquency exhibited by their peers. First, participants were asked to report their own level of delinquency. Second, they were asked to report their exposure to minor peer delinquency (such as "How many of your close friends have hit or threatened to hit someone?") and/or serious peer delinquency (such as "How many of your friends have broken into a vehicle or building to steal something"). Third, they were asked to report their exposure to peer influence, including peers who approve of delinquency (such as "How would your close friend react if you sold hard drugs?"), and peers who exert peer pressure (such as "How much do you agree with the statement – 'you have to be willing to break some rules if you want to be popular with your friends'?"). Agnew examined the relation between exposure to peer delinquency, exposure to peer influence, and participants' own delinquent behaviour. He found a significant peer influence × peer delinquency interaction on participants' self-reported levels of

delinquency. That is, when participants reported a high degree of exposure to peer influence, their exposure to serious peer delinquency was a significant predictor of their own delinquent behaviour (accounting for over 40% of the variance in delinquent behaviour). When exposure to peer influence was medium or low, on the other hand, there was no effect of peer delinquency on participants' own delinquency. No interaction effects were present when peers only engaged in minor delinquency. Overall, Agnew (1991) concluded that exposure to peer delinquency can have a significant impact on adolescents' delinquent behaviour, but that it is strongly mediated by the degree of influence exerted by those peers.

In another example using the self-report technique, Monahan et al. (2009) investigated the relation between peer influence and delinquent behaviour in a sample of 1,354 adolescent and emerging-adult offenders aged between 14- and 22-years old. They collected self-report data over a 3-year period assessing participants' antisocial behaviour and their level of exposure to peer delinquency. Antisocial behaviour was measured using the The Self-Report of Offending measure (Huizinga, Esbensen, & Weiher, 1991), while a composite measure of peer delinquency was created using self-report questions from the Peer Delinquent Behaviour scale (Thornberry, Lizotte, Krohn, Farnworth, & Jang, 1994) which assessed peers' antisocial behaviour (such as "How many of your friends have sold drugs?"), and the antisocial influence of peers (such as "How many of your friends have suggested that you should sell drugs?"), as well as participant's ratings of the number of close friends who had been arrested and/or jailed in the months preceding the interview. Monahan et al. found that reported levels of peer delinquency were predictive of greater self-reported antisocial behaviour in both middle adolescence (14-15 years), and later adolescence (15-20 years), while no such relation was found in young adulthood (21-22 years).

Peer Delinquency in The Add Health Sample

While researchers who use the self-report technique conclude that peer influence is a major contributing factor in the development of delinquent behaviour during adolescence and emerging-adulthood (Agnew, 1991; Akers et al., 1979; Matsueda, 1982; Monahan et al., 2009), others suggest that the relation between peer influence and delinquency is not as straightforward. Some researchers have argued that the self-report technique could inflate participant's estimates of peer delinquency because individuals might over-estimate peers' behaviour relative to their own, which in turn would lead researchers to credit peers with having an exaggerated influence on delinquency (Haynie, 2002; Haynie & Osgood, 2005; Kandel, 1996; Regnerus, 2002; Zhang & Messner, 2000). Results emerging from the Add Health study support this claim, and suggest that peer influence may not be as significant a contributing factor in the onset of adolescent delinquency as was previously thought (Haynie, 2002; Haynie & Osgood, 2005; Regnerus, 2002).

For example, Regenerus (2002) investigated the relation between delinquent behaviour and peer delinquency in a sample of 2171 13- to 18-year-old adolescents recruited from the Add Health database. Participants were asked about their level of participation in four forms of theft over the previous year: theft under $50, theft exceeding $50, taking something from a store without paying for it, and going into a house or building with intent to steal. Furthermore, they were asked about their engagement in other forms of delinquency namely: painting graffiti or signs on someone else's property or in a public place, deliberately damaging other's property, participating in a fight, and being loud, rowdy, or unruly in a public place. Participants were then required to nominate up to 10 close friends from the data pool, who were also included in the analysis (recall that the Add Health study collected data from entire social networks). Regenerus also collected data on a number of individual factors including family satisfaction, family economic advantage (a measure of SES), their level of autonomy, self image, and the total

amount of time participants spent with peers. Overall, Regenerus found a modest effect of peer delinquency on participants' anti-social behaviour patterns, and found the strongest peer effect to be simply the total time spent with peers, irrespective of the level of delinquent behaviour exhibited by those peers. Specifically, Regenerus found that although peer delinquency and participant's delinquency were correlated, none of the correlations between friends' delinquency and that of the participants' delinquency exceed .17. In addition, Regenerus found that peer delinquency did not add any more predictive power over several of the dynamic variables including overall time spent with friends, family satisfaction, and school trouble. Regenerus (2002) concluded that although peer influence does have some level of impact on delinquency, the degree of effect is modest. Furthermore, he suggested that traditional studies in which participants are required to estimate their peers' level of delinquent behaviour may result in an overestimation of the effects of peer influence.

In another study, Haynie and Osgood (2005) investigated the relation between peer delinquency and reported levels of delinquency in a sample of 2,274 adolescents from the Add Health database. Delinquency was assessed by asking participants to rate their frequency of engagement in 14 different acts of delinquency over the past twelve months, including graffiti, theft of less than $50, theft of greater than $50, burglary, drug dealing, physical fighting, and physical fighting involving a weapon. Haynie and Osgood also obtained peer nomination data and measured peers' responses to the same questions on delinquency. In addition, the authors collected data on a number of control variables including sex, race, parental education, family structure, school achievement, and total number of friends. They found a significant effect of peer delinquency on participants' reported levels of delinquency even after accounting for the control variables described above. However, similar to the findings of Regnerus (2002), Haynie and Osgood (2005) found the effect of peer delinquency to be modest at best, with correlations ranging from .05 to .14. They concluded that traditional studies of peer delinquency tend to

result in an overestimation of the effects of peer influence, and that the best external predictors of adolescent delinquency were simply age, gender, race, family structure, and school achievement.

Peer Influence – Summary

The effects of peer influence on delinquency are complex. While is it evident that peer influence is a significant contributing factor in the development of negative health-behaviours such as smoking, drinking, and drug use, the relation between peer influence and delinquency in adolescence and emerging-adulthood is less clear. When researchers ask participants to estimate their peers' level of delinquency, they find that peer influence is a powerful predictor of adolescent delinquency. However, data from the Add Health sample suggests that these estimations may be exaggerated (Haynie & Osgood, 2005; Regnerus, 2002). It is important to note that in the Add Health studies, peer delinquency is still a predictor of adolescent delinquency, albeit a modest predictor, and in the case of Regenerus (2002), the mere presence of peers appears to be a bigger predictor of delinquency. In summarising his findings, Regenerus (2002) actually suggested that the strongest influence may in fact be an individual's *perceptions* of their peers' delinquent behaviour rather than their peers' true levels of delinquency.

Despite some disagreement about the degree of the impact that peers have on delinquency, most researchers agree that peer influence is a contributing factor in the onset of problem behaviours during adolescence. However, the specific mechanisms that underlie the effects of peers are still to be established. Although many studies have provided the opportunity to analyse the effects of exposure to peers, they do not provide a detailed understanding of the specific mechanism underlying that influence. For example, the studies using the Add Health data simply ask participants to nominate peers and then assume peer nominations to be indicative of peer influence without actually providing any insight into the degree of influence that occurs. Conversely, the studies that rely on participants' estimations of their peers'

behaviours do attempt to quantify the degree of influence that occurs, but this may lead to an overestimation of these behaviours.

The studies by Engels and his colleagues using the bar lab paradigm represent a notable effort to directly isolate and observe the effects of behavioural display in a controlled setting (Larsen et al., 2009; Larsen et al., 2010; van Schoor et al., 2008). Behavioural display is believed to be the most commonly occurring form of peer influence (Brown et al., 2008), and these studies provide insight into the effects of behavioural display on drinking. However, alcohol abuse is only one of a number of problems that can occur during adolescence and although behavioural display is the most common form, there are other forms of peer influence as well. In order to better understand the impacts of peer influence during adolescence, further research is required to examine the direct effects of both peer pressure and antagonistic behaviours on a wide range of adolescent problem behaviours.

Social Exclusion, Rejection, and Ostracism – Forms of Peer Influence

Given the importance of peers during adolescent development, a number of researchers have chosen to focus on the issues associated with peer influence. Interestingly, one aspect of peer-influence that has received a marked increase in scientific attention is the experience of social exclusion. In fact, the past decade has marked a proliferation in the number of experimental studies investigating the effects of social exclusion, rejection, and ostracism. (Gerber & Wheeler, 2009; Williams, 2007a). It is important to note that, although the concepts of ostracism, social exclusion, and rejection are related, they also differ in important ways. Ostracism is defined as being "ignored and excluded, often without excessive explanation or explicit negative attention" (Williams, 2007a, p 429). Williams (2007a) stated that ostracism typically consists of a series of unfolding events during which the subject is continuously excluded or ignored. In contrast, he conceptualised both social exclusion and rejection as specific events that occur following an interaction, often accompanied by clear statements of dislike.

Essentially, Williams proposes that the key distinguishing feature of ostracism is that it occurs over a prolonged period in which the individual is forced to endure with little or no control over the situation[1].

Ostracism, social exclusion, and rejection are all specific forms of peer influence (Barner-Barry, 1986; Cillessen & Mayeux, 2004; Khatri et al., 2000; Leets & Sunwolf, 2005), and they are prevalent within adolescent social circles. Maxwell and Carrol-Lind (1997) studied the experiences of bullying in a sample of 259 11-13-year-old New Zealand adolescents. They found that relational aggression (which includes ostracism, social exclusion, and rejection) ranked as the third-most-frequently experienced form of bullying (behind direct hitting and direct name calling); 41% of adolescents reporting being ignored or rejected in the past nine months, and 60% had these experiences this at some point in their life time. A number of researchers have documented the use of various forms of social exclusion by adolescents and children as a means of controlling the social behaviour of their peers (Barner-Barry, 1986; Leets & Sunwolf, 2005) or even to control their social environment (Benenson, Hodgson, Heath, & Welch, 2008).

Ostracism, social exclusion, and rejection have been linked to the onset of negative behavioural outcomes during childhood and adolescence. For example, Kuperschmidt, Burchinal, and Patterson (1995) examined the link between peer rejection and delinquency in a sample of 880 children over a 3-year period. In their experiment, school students from third to seventh grade were provided with a list of students from their grade and were asked to nominate the three students who they liked the most, and the three students who they liked the least. This method was repeated four times over the three-year period, and the average "liked-least" scores were used as an indicator of peer rejection. Kuperschmidt et al. (1995) assessed delinquency using three methods. First, children were asked to nominate three grade-mates

[1] Although we have outlined a distinction between the terms *ostracism*, *social exclusion*, and *rejection*, the literature base is still somewhat divided. To date, there appears to be no standard distinction made between the terms ostracism, exclusion, and rejection, and many authors use these terms interchangeably. As a result, when describing some experiments, we have incorporated the term used by the author in their own writing.

who were the most verbally or physically aggressive. Second, they used the delinquency sub-scale of the Youth Self-Report form. Third, teachers were asked to report students who had been in negative contact with police. There was a significant relation between peer rejection and delinquency. Furthermore, if rejection increased over time, the risk of developing delinquent behaviour problems increased as well.

Similarly, Trentacosta and Shaw (2009) investigated the relation between peer rejection, and antisocial behaviour in a sample of 8- to 10-year-old boys who attended a summer camp in the United States. The authors used a peer-nomination system identical to that used by Kuperschmidt et al. (1995) by asking children to rate the three children they "liked most" and the three that they "liked least" from all the members at the camp, with the average "liked-least" scores being used as a measure of peer rejection during the camp. Trentacosta and Shaw collected estimates of delinquency during follow-up interviews conducted when the children were aged between 11 and 12 years old. Delinquency was measured using the Self-Reported Delinquency (SRD) measure; a questionnaire that assesses the nature and frequency of delinquency exhibited by the respondent. Additionally, they obtained maternal and teacher estimates of the boys' antisocial behaviour using the parent and teacher versions of the Child Behaviour Checklist (CBCL). A composite delinquency score was then calculated by averaging and summing the three measures. Trentacosta and Shaw found that individuals who experienced peer rejection during the summer camp were significantly more likely to exhibit antisocial behaviours in early adolescence than those who did not experience rejection. Interestingly, the boys in this study had no previous contact with the other members of the camp, and as Trentacosta and Shaw put it, they "presumably had little contact with their fellow campers upon completion of camp," yet this brief experience of social rejection was still predictive of later delinquency.

Clearly, the experiments described above are correlational in design. Although the data suggest a link between adolescent experiences of ostracism, social exclusion, and rejection and the development of delinquent behaviours, it is impossible to draw any firm conclusions being drawn about a causal relationship between peer rejection and delinquency.

Experimental Studies of Ostracism – A focus on Cyberball.

Although ostracism, social exclusion, and rejection are all important forms of peer influence that warrant further scientific attention (Blackhart, Nelson, Knowles, & Baumeister, 2009), the remainder of this chapter will specifically focus on the effects of ostracism in both adolescence and adulthood. Research into ostracism has largely been guided by Kipling Williams' (1997, 2001) model. Williams argues that ostracism directly affects four fundamental human needs: the need to belong, the need for self-esteem, the need for control, and the need for meaningful existence. Williams, Cheung, & Choi (2000) originally proposed a link between ostracism and the four basic needs, and since then, the four basic needs have featured extensively in ostracism research (Williams, 2007a, For a complete review of the four basic needs, see Appendix A). Figure 1.1 depicts an adaptation of Williams' (1997, 2001) model which outlines the relation between ostracism and the four basic needs.

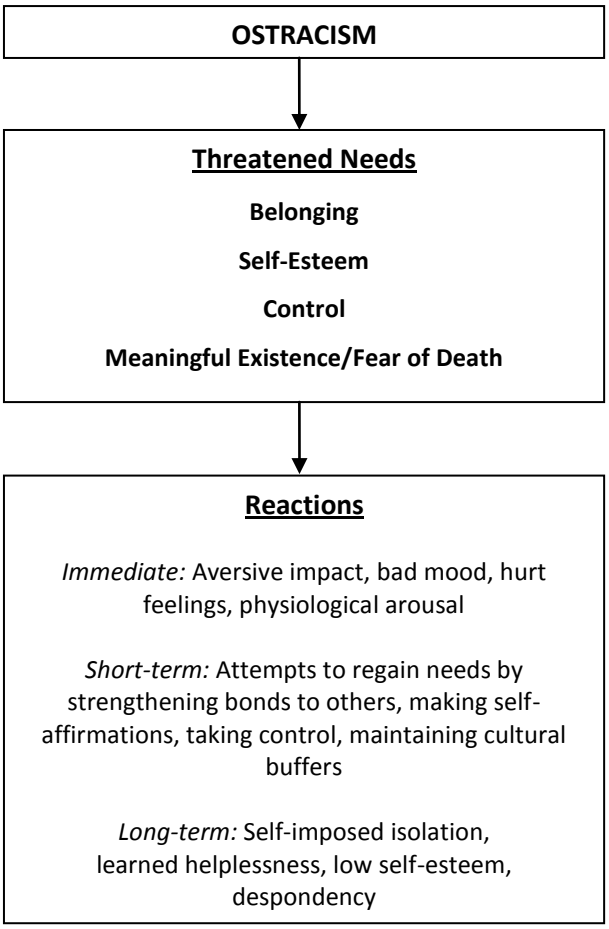

Figure 1.1. A simplified adaptation of Williams' model of ostracism (adapted from Williams, 2001)

Most of the recent empirical work on ostracism has been driven by Williams and his colleagues. Williams began studying the effects of ostracism following his own experience of rejection during an impromptu game of Frisbee. In his paper *Ostracism: The kiss of social death*, Williams (2007b) described his experience:

> Just as suddenly as I was included, I was shut out. They stopped throwing to me; they stopped looking at me. It was as though I was suddenly invisible and had never existed. This experience, with strangers, was surprisingly powerful and negative. I felt terrible and awkward and helpless. (p. 237).

Based on his experience, Williams developed an experimental paradigm that he could use to measure the effects of social ostracism under standardised laboratory conditions (Williams,

2007b). Several different paradigms have been developed over the years, ranging from a real-life game of ball-toss between a participant and several confederates (Williams & Sommer, 1997), to computer-based simulations of a ball-toss game (Williams et al., 2000). Importantly, all of the experiments incorporating these paradigms share two key features: First, consistent with Williams' definition of ostracism, they all involve an enduring period of exclusion and rejection over which the participant has little to no control. Second, the dependant variables that are used to measure the effects of these paradigms are all based on Williams' (1997, 2001) model of ostracism.

Williams and Sommer (1997) created the first ball-toss paradigm of ostracism and used this paradigm to study the effect of ostracism on social loafing. Participants attended the experiment with two strangers who were actually confederates. When the participant and confederates entered the lab, they were informed that they would take part in a "group verbal task." They were told that the experimenter had to finish setting up, and they were instructed to fill out a pre-experimental questionnaire while they waited. The experimenter then left the room and observed the participant and the confederates for 5 minutes through a one-way mirror. During this 5-min period, participants were exposed to one of three conditions: Control, Inclusion, or Ostracism. In the control condition, participants and confederates finished their questionnaires and sat silently for 5 minutes. In the inclusion condition, one confederate procured a ball from a nearby toy chest and began to pass it to both the other confederate and to the participant. Confederates included the participant by bouncing the ball to them and by smiling and making eye contact. The ostracism condition occurred in a similar fashion to the inclusion condition, except that after the first minute of ball-throwing, the confederates began bouncing and tossing the ball only to each other and made no eye contact and did not communicate with the participant for the final four minutes. Williams and Sommer then tested participants on a standard measure of social loafing, in which they were required to generate a

list of words under one of two conditions: a coactive condition in which they were told that the experimenter would be evaluating individual performances, and a collective condition in which they were told that they would be working as a group with the two confederates. Williams and Sommer predicted that ostracism would make individuals feel a lack of belonging, and as a result they would react by socially compensating during the group activity. Specifically, they predicted that ostracised individuals would exhibit increased participation (and therefore generate more words) in the collective condition compared to participants in the coactive condition. They found that ostracism significantly affected females' levels of social compensation, but that ostracism did not significantly affect males' behaviours. Williams and Sommer (1997) concluded that males and females behave differently following ostracism.

Williams et al. (2000) subsequently adapted Williams and Sommer's (1997) original ball-toss paradigm to create a computerized simulation of a ball-toss game. In their programme, participants were required to throw and catch a flying virtual-disc with two other players over the internet. Participants were told that the task measured mental visualisation skills, but the set-up was actually bogus. The two other players did not exist, and disc-tossing was actually controlled by the computer. Ostracism was manipulated by assigning participants to one of four conditions in which the probability of participants being thrown the disc varied. In the *over-inclusion condition*, participants had a 67% chance of receiving the disc, in the *inclusion condition*, participants had a 33% chance of receiving the disc, in the *partial-ostracism condition*, participants had a 20% chance of receiving the disc, and in the *complete-ostracism condition*, participants had a 0% chance of receiving the disc. Following the computer game, participants were required to complete a questionnaire that assessed their mood and the four basic needs (belonging, self-esteem, control, and meaningful existence). Williams et al. found that ostracism negatively affected individuals' mood, self-esteem, and feelings of belonging, but only the

complete ostracism condition yielded a statistically significant effect. They did not find an effect of ostracism on individuals' sense of control or meaningful existence.

In the second experiment of this study, Williams et al. (2000) used a variation of the flying-disc paradigm called Cyberball. Cyberball was similar to the original flying-disc programme in that participants were instructed to play a virtual game of ball-toss with two other computer players who they thought were real people. Participants were randomly assigned to either an inclusion or an ostracism condition. In the *inclusion condition*, participants received the virtual ball for one third of the total throws, whereas in the *ostracism condition*, participants received the ball twice before being completely ostracised by their virtual team mates.

Following Cyberball, the participants took part in a task which they thought was measuring perception. In reality, it was measuring their level of conformity. Participants were told that they were being assigned to a new six-person group, to which they were always allocated as the final member; however, like the Cyberball paradigm, the other group members were actually controlled by the computer program. Participants were asked to identify a target geometric figure embedded in one of six complex figures. Each group member's answers were displayed on the screen, and because the participants were always group member six, they were the final member of the group to answer. After these two computer paradigms, participants were then instructed to complete a post-experiment questionnaire that assessed individuals' sense of belonging.

Williams et al. (2000) found that, as in Experiment 1 of their study, ostracised individuals reported lower levels of belonging compared to those who were included during the Cyberball game. Furthermore, the authors found that individuals from the ostracised condition were more likely to conform to the unanimous incorrect decision of their new group. The authors concluded that individuals who feel that their need to belong has been threatened react by conforming to their peer group in an effort to reaffirm that sense of belonging. Since Williams et al.'s (2000)

study, the Cyberball paradigm has become widely used in numerous scientific studies of ostracism (Bastian & Haslam, 2010; Boyes & French, 2009; Chow, Tiedens, & Govan, 2008; Eisenberger, Lieberman, & Williams, 2003; Gonsalkorale & Williams, 2007; Goodwin, Williams, & Carter-Sowell, 2010; Gross, 2009; Lau, Moulds, & Richardson, 2009; Oaten, Williams, Jones, & Zadro, 2008; Pharo, Gross, Richardson, & Hayne, 2011; Sebastian, Viding, Williams, & Blakemore, 2010; van Beest & Williams, 2006; Warburton, Williams, & Cairns, 2006; Wesselmann, Bagg, & Williams, 2009; Williams et al., 2002; Zadro, Boland, & Richardson, 2006; Zadro, Williams, & Richardson, 2004).

In these laboratory-based studies of ostracism, researchers randomly allocate participants to either an inclusion or ostracism condition during a game of Cyberball. Following completion of the game, participants are then asked to complete questionnaires in which participants are asked to rate their level of agreement with statements on a 5-point Likert scale (1 = not at all, 5 = very much). The statements pertain to their self-reported sense of belonging (for example, “I felt disconnected”), self-esteem (for example, “I felt good about myself”), meaningful existence (for example, “I felt non-existent”), and control (for example, “I felt powerful,”) and provide composite scores of the degree that participants’ basic needs have been negatively affected following ostracism – a phenomenon referred to as *need threat* in the literature. In addition, behavioural measures such as measures of aggression or antisocial behaviour are sometimes included. Table 1.1 provides a summary of all of the studies to date that have investigated the effects of ostracism using the Cyberball paradigm.

Table 1.1
Research Studies Investigating the Effects of Ostracism Using the Cyberball Paradigm.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Williams & Sommer (1997)	*Participant-Confederate Ball-Toss Paradigm*: Control, Inclusion, Ostracism conditions.	96 Males 81 Females All university undergraduate students	*Word generating task*: Collective (Group activity) or Coactive (Individual)	- No social loafing in included participants. - Females displayed social compensation (more words generated) in ostracism condition, males showed no effect.	Males and females appear to respond differently to ostracism in relation to social compensation effects.
Williams, Cheung, & Choi (2000) [Expt 1]	*Virtual-disc paradigm*: Overinclusion, Inclusion, Partial Ostracism, Complete Ostracism conditions.	1486 participants Three age groups: 1) 13-18 (380) 2) 19-25 (542) 3) 26-55 (531) 36% Male 64% Female	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected mood, self-esteem, and belonging in complete ostracism condition. - No effect of ostracism on control or meaningful existence.	Ostracism affects mood, self-esteem, and belonging.
Williams, Cheung, & Choi (2000) [Expt 2]	*Cyberball*: Inclusion or Ostracism condition.	213 participants Modal age range: 19 to 25 years 33 % Males 67% Females	*Post-Cyberball Questionnaire*: Assessed sense of belonging. *Embedded figure task*: Behavioural measure of conformity.	- Ostracised participants reported lower levels of belonging compared to included participants. - Ostracised participants were more likely to conform to the unanimous incorrect decision of their new group.	Ostracism makes individuals more likely to conform with group decisions.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Williams, Govan, Croker, Tynan, Cruickshank, & Lam (2002)	*Cyberball*: Inclusion or Ostracism condition.	390 participants No age or gender given	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected mood, self-esteem, belonging, control, and meaningful existence.	Ostracism negatively affects mood and the four basic needs.
Eisenberger, Lieberman, & Williams (2003)	*Cyberball*: Within-subjects; Inclusion and then Ostracism condition.	Not specified	*fMRI scanning*: Participants underwent fMRI scans while experiencing inclusion or ostracism.	The Anterior Cingulate Cortex (ACC) was more active during ostracism than during inclusion. This area of the brain has been associated with the experience of physical pain in previous research.	The experience of social and physical pain share a common neuroanatomical basis.
Zadro, Williams, & Richardson (2004) [Expt 1]	*Cyberball*: Inclusion or Ostracism condition. *Source of Ostracism Manipulation*: Participants were informed that they were either playing against two human players or two computer players.	62 university undergraduate students 20 Males 42 Females Mean age = 19.9 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Even when participants knew that they were playing against a computer, ostracism negatively affected self-esteem, belonging, control, and meaningful existence. - No effect of the source manipulation; both the computer-ostracised and human-ostracised participants displayed similar low levels of self-esteem, belonging, control, and meaningful existence. - No effect of ostracism on mood.	(See below)

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Zadro, Williams, & Richardson (2004) [Expt 2]	*Cyberball*: Inclusion or Ostracism condition. *Reason for ostracism manipulation*: Participants were again told they were either playing against two human players or two computer players. Half were further told that opponents were following a set script (eliminating negative connotations accompanying ostracism).	77 university undergraduate students 30 Males 41 Females Mean age = 19.6 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected self-esteem, belonging, control, and meaningful existence. - No effect of ostracism on mood. - No effect of source manipulation conditions. -No effect of reason manipulation – even when participants were pre-warned of ostracism, they still reported lower basic needs scores.	Individuals are hypersensitive to ostracism; even experiencing a negative impact when ostracised by an artificial source, and when they are aware that the ostracism is fixed.
Zadro, Boland, & Richardson (2006)	*Cyberball*: Inclusion or Ostracism condition.	56 university undergraduate students with elevated levels of social anxiety Gender not specified Age range = 17 to 59 years Mean age =22.1 years	*Post-Cyberball Questionnaire*: Assessed the four basic needs. *Social Phobia and Anxiety Inventory (SPAI)*: Standardised measure of social anxiety.	- Ostracism negatively affected self-esteem, belonging, control, and meaningful existence. - Significant relation between social anxiety and the persistence of the aversive effects of ostracism; participants with high social anxiety scores took longer to recover from the effects of ostracism than did non-anxious participants.	Individuals who suffer from social anxiety take longer to recover from the effects of ostracism than the general population.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Warburton, Williams, & Cairns (2006)	*Participant-Confederate Ball-Toss Paradigm*: Inclusion or Ostracism condition. *Diminished or restored control manipulation*: Participants were forced to listen to aversive sounds (e.g., high-pitched squeaking) under one of two conditions: 'diminished control' - noise was administered randomly or 'restored control' - participants were able to control when the sounds were administered to them.	40 university undergraduate psychology students 17 Males 23 Females Mean age = 21.58 years	*Hot sauce paradigm*: Behavioural measure of aggression.	- Participants in the ostracised/diminished-control condition displayed increased aggressive behaviour relative to the other conditions. - Participants in the other three conditions (ostracised/restored control, included/diminished control, included/restored control) all exhibited similar levels of aggressive behaviour.	Individuals who are ostracised are more likely to react aggressively, however, that potential for aggressive retaliation can be mediated by restoring control to these individuals.
Van Beest & Williams (2006) [Expt 1]	*€yberball*: Variation on original Cyberball paradigm in which money was deducted from participants every time they were included. Participants randomly assigned to Inclusion or Ostracism condition.	135 university undergraduate students 28 Males 107 Females Mean age = 20.90 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected mood, self-esteem, belonging, control, and meaningful existence. - No interaction effects between ostracism/inclusion and payoff valence – even when ostracism was rewarding it still led to lower basic needs and mood.	(See below)

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Van Beest & Williams (2006) [Expt 2]	*€yberball*: Participants were told that when the game stopped, the person holding the ball would lose (punished) or double (rewarded) their payment. Participants randomly assigned to Inclusion, Over-Inclusion, or Ostracism condition.	167 university students 62 Males 105 Females Mean age = 20.93 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected mood, self-esteem, belonging, control, and meaningful existence. - No interaction effect between ostracism/inclusion and payoff valence.	Even when ostracism is beneficial for an individual, it is still a more painful experience than being included and punished.
Gonsalkorale, & Williams (2007)	*Cyberball*: Inclusion or Ostracism condition. *Personality of competitors manipulation:* Participants were asked to rate their approval of three political parties: The Australian Democrats, Australian Liberals, or Australian KKK (white supremacists). Participants were then told they were playing Cyberball with two members from either their favoured group (in-group), their unfavoured group (rival out-group), or their despised group (despised out-group).	97 university undergraduate students 26 Males 71 Females Mean age = 19.56 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected mood, self-esteem, belonging, control, and meaningful existence. - No interaction between ostracism and personality of competitors.	Even when an individual is ostracised by their despised out-group, it is still an aversive experience.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Chow, Tiedens, & Govan (2008)	*Cyberball*: Inclusion or Ostracism condition.	75 individuals 31 Males 44 Females Age range = 18 - 54 years Mean age = 21.21 years	*Anger and Sadness Questionnaire*: Participants rated their feelings of anger and sadness following Cyberball. *Antisocial response*: Participants were asked to choose a snack to give to their interaction partners. Snacks were either appealing (e.g., M&M's) or unappealing (e.g., Prunes).	- Ostracised participants reported higher levels of anger and sadness than included participants. - Ostracised participants were more likely to give unappealing snacks than included participants. - Feelings of anger mediated antisocial behaviour - higher anger resulted in greater likelihood of giving unappealing snack.	Anger mediates the propensity for antisocial behaviour following ostracism.
Krill, Platek, & Wathne (2008)	*Cyberball*: Inclusion or Ostracism condition.	119 individuals 47 Males, 72 Females Mean age = 32.49 years	*Post-Cyberball Questionnaire*: Assessed the four basic needs. *Empathy Quotient – Short Form (EQ-Short):* Standardised measure assessing participants' level of empathising personality characteristics. *Systemizing Quotient – Short Form (SQ-Short):* Standardised measure assessing participants' level of empathising personality characteristics (their drive to understand a physical system).	- Ostracised participants reported lower levels of Belonging, control, and self-esteem than included participants. No effect on meaningful existence. - Ostracised participants reported higher levels of anger and less enjoyment of Cyberball than included participants. - Empathetic participants reported greater declines in control variable compared to systemisers.	Empathetic personality characteristics mediate the negative effect of ostracism on feelings of control.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Oaten, Williams, Jones, & Zadro (2008) [Expt 1]	*Cyberball*: Inclusion or Ostracism condition.	71 university undergraduate students 23 Males, 50 Females Age range = 18 – 32 years Mean age = 20 years	*Post-Cyberball Questionnaire*: Assessed the four basic needs -- Administered immediately after Cyberball [*Time 1*], and 45 minutes after Cyberball [*Time 2*]. *Fear of Negative Evaluation Scale*: Measure of social anxiety. *Self-Regulatory Behaviour*: Participants asked to taste cookies. Instructions: "eat as much as you need so that you can judge the taste of the biscuits." Weight of cookies consumed was the measure of self-regulatory behaviour [Time 1 & Time 2].	- Ostracism negatively affected self-esteem, belonging, control, and meaningful existence at Time 1 and Time 2. - Ostracised participants displayed deficits in self-regulation (they ate more) at time 1 compared to included participants. Social Anxiety was associated with persistence of this effect at time 2.	(See below)

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Oaten, Williams, Jones, & Zadro (2008) [Expt 2]	*Cyberball*: Inclusion or Ostracism condition.	73 university undergraduate students 26 Males 48 Females Age range = 18-35 years Mean age = 21 years	*Post-Cyberball Questionnaire*: Assessed the four basic needs [Time 1 & Time 2]. *Fear of Negative Evaluation Scale*: Measure of social anxiety. *Self-Regulatory Behaviour*: Participants asked to drink a foul-tasting beverage which they were told had positive health benefits. The amount consumed was the measure of self-regulatory behaviour [Time 1 & Time 2].	- Ostracism negatively affected self-esteem, belonging, control, and meaningful existence at Time 1 and Time 2. -Ostracised participants displayed deficits in self-regulation (they drank less) at time 1 compared to included participants. Social Anxiety was associated with persistence of this effect at time 2.	Self-regulation deteriorates immediately following ostracism. Social anxiety significantly affects the persistence of this effect.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Lakin, Chartrand, & Arkin (2008) [Expt 1]	*Cyberball*: Inclusion or Ostracism condition.	36 university undergraduate students 13 Males 23 Females Age ranges not reported	*Non-conscious Behavioural Mimicry:* After Cyberball, participants were placed in a room with a female confederate who purposefully moved her foot during the interaction. Participants were video-recorded, and the amount of behavioural mimicry (moving their own foot) was coded by an independent observer.	- Excluded participants displayed more non-conscious behavioural mimicry compared to included participants.	(See below)
Lakin, Chartrand, & Arkin (2008) [Expt 2]	*Cyberball with manipulation of players' In-Group/Out-Group status*: Female participants were ostracised during Cyberball. They were led to believe they were playing with female (In-Group) players, or male (Out-Group) players. *Non-Exclusion:* Non-excluded players did not play Cyberball, they were simply asked to complete a questionnaire assessing the extent to which they felt they lived a meaningful existence, and had control of their lives (2 of the Basic Needs).	149 Female university undergraduate students Age ranges not reported	*Non-conscious Behavioural Mimicry*: Confederate was either female (In-Group Confederate) or male (Out-Group Confederate).	- Participants who were excluded by in-group members displayed more non-conscious mimicry compared to those excluded by out-group members and those not excluded. - Participants in the in-group-exclusion condition mimicked an in-group confederate more than an out-group confederate.	Individuals may attempt to recover from exclusion by affiliating with a new individual. Non-conscious mimicry may be one way that individuals try to achieve this. However, non-conscious mimicry may be more prevalent in certain contexts (such as the presence of in-group versus out-group members).

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Lau, Moulds, & Richardson (2009)	*Cyberball*: Inclusion or Ostracism condition. *Vantage Perspective Manipulation*: After Cyberball, participants were asked to mentally recall their experience from one of two perspectives. 1) <u>Field condition</u> - participants were told to recall Cyberball from their own perspective - as if re-experiencing the original situation. 2) <u>Observer condition</u> - participants were told to recall Cyberball from the viewpoint of a detached observer - to be aware of how they would look to a spectator.	56 university undergraduate students 19 Males 37 Females Mean age = 19.07 years Age range = 17–25 years	*Post-Cyberball Questionnaire*: Assessed the four basic needs. Administered both immediately after Cyberball, and 10 minutes after Cyberball.	- Immediately after Cyberball, Ostracised participants in both the Field condition and Observer condition reported lower basic needs scores relative to included participants. - Participants in the Observer condition reported significant improvements on basic needs after 10 minutes whereas participants in Field condition still experienced negative effects.	How individuals remember the experience of ostracism influences the negative emotional impact of the experience. Those who recalled it from their own perspective were worse affected than those who recalled it from an observer perspective.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Wesselmann, Bagg, & Williams (2009)	*Observing Cyberball:* Participants watched a target player during a game of Cyberball. Target player was either *included* or *ostracised*. *Perspective-Taking Manipulation*: Participants were told to take the perspective of the target player (*perspective-taking condition*), or to simply observe the game (*non-perspective-taking condition*).	82 university undergraduate students 39 Males 47 Females Age ranges not reported	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs. Participants were asked to rate both their target player's basic needs and their own basic needs.	- Participants rated ostracised target players as having lower basic needs and mood scores than included target players. - Participants who observed an ostracised target player reported lower basic need scores and mood for themselves compared to those who observed an included player. - Perspective-taking moderated the effects of observing ostracism: participants reported lower basic need scores and lower mood when instructed to take the perspective of an ostracised player.	Ostracism detection is even more powerful than previously suggested. Simply observing ostracism causes declines in individual's basic needs and mood. This effect becomes even greater if we imagine ourselves being in the ostracised individual's perspective.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Boyes & French (2009)	*Cyberball*: Inclusion or Ostracism condition.	89 university undergraduate students 42 Males 47 Females Mean age = 20.44 years Participants pre-screened for neuroticism and recruited in two groups: 1) High neuroticism (n=47) 2) Low neuroticism (n=42)	*The Mood Adjective Checklist*: Measures three bipolar dimensions: 1) energetic arousal (vigorous vs. tired) 2) tense arousal (nervous vs. relaxed) 3) hedonic tone (pleasant vs. unpleasant mood) *Rosenberg Self-Esteem Scale*: 10-item measure of global self-esteem. *Coping inventory for task stressors - situational version*: Measure used for post-task assessment of coping. It consists of 3 sub-scales: 1) task-focused (I worked out a strategy for successful performance) 2) emotion-focused (I became preoccupied with my problem) 3) avoidance (I stayed detached or distanced from the situation)	- Ostracised individuals reported significantly higher levels of tense arousal (i.e., they were more nervous/tense) and significantly lower levels of hedonic tone (i.e., they experienced lower mood), no difference in energetic arousal. - No effects of neuroticism on Mood - Ostracised individuals reported significantly lower levels of self-esteem. - No interaction between neuroticism and self-esteem. - Ostracised participants reported engaging in significantly more emotion-focused coping than included participants. - No differences as a function of neuroticism.	Being ostracised during Cyberball leads to lowered mood and self-esteem. Furthermore, ostracism also elicits an emotion-focused coping response.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Gross (2009)	*Cyberball*: Inclusion or Ostracism condition. *Social or non-social Gameplay*: Participants played a 12-minute computer game either by themselves (*non-social*) or with a confederate whom they could cyber-chat (*social*).	2 Age Groups: 1) 50 adolescents 23 Male 27 Female Age range = 11-15 Mean age = 12.5 2) 60 emerging-adults 28 Male 32 Female Age range = 18-23 years Mean age = 18.4 years	*Single-item measure of self-esteem*: Participants indicated how they felt on a 7-point scale. Administered before Cyberball, after Cyberball, and after gameplay. *Emotion Adjective Measure*: Provides scale scores for 6 emotional states: 1) Perceived relational value ("accepted," "respected," "valued) 2) Dysphoria ("down," "upset," "depressed," "stupid") 3) Shame ("ashamed," "betrayed," "embarrassed") 4) Anger ("frustrated," "irritated," "hostile," "angry," mad") 5) Anxiety ("nervous," "stressed," "tense," "relaxed") 6) Competence ("smart," "confident")	- Ostracised adolescents and emerging-adults both reported lower self-esteem, lower perceived relational value, and greater feelings of dysphoria, shame, and anger. - Cyber-chatting with a stranger resulted in improvements in self-esteem and perceived relational value for both adolescents and emerging-adults. - Adolescents experienced improvements in Dysphoria, Shame, and Anger following social interaction, whereas Emerging-adults experienced no such change.	Online social interaction can ameliorate some of the negative effects of ostracism. Adolescents potentially receive a greater boost from social interaction following ostracism than emerging-adults.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Stillman et al. (2009)	*Cyberball*: Inclusion, Ostracism, and Over-Inclusion conditions.	121 university undergraduate students 40 Males 81 Females Age ranges not reported	*Kunzendorf No Meaning Scale:* Self report measuring assessing degree to which individual views life as meaningless (e.g., "life is a cruel joke")	- Ostracised participants rated life as more meaningless. No difference between included and over-included participants.	Ostracism results in increased feelings of meaningless.
Sebastian, Blakemore, & Charman (2009)	*Cyberball*: Within-subjects; Inclusion and then Ostracism condition.	29 male participants 13 diagnosed with autism spectrum condition (ASC) 16 typically developing (TD) Mean age = 16.9 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs.	- Ostracism negatively affected the four basic needs for both the ASC and TD participants. - Ostracism negatively affected mood in TD participants. - No effect of ostracism on mood in ASC participants.	Ostracism appears to cause a similar degree of need-threat in individuals with ASC as that experienced by the rest of the population. However, individuals with ASC do not appear to experience negative mood following ostracism.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Way, Taylor, & Eisenberger (2009)	*Cyberball*: Within-subjects; Inclusion and then Ostracism condition.	31 Participants 12 Males 19 Females Age ranges not reported	*Genetic coding:* Assays of the A118G polymorphism of the μ-opioid gene in all participants. *fMRI scanning*: Participants underwent fMRI scans while experiencing inclusion or ostracism.	- Ostracism resulted in increased activation in the Dorsal Anterior Cingulate Cortex (dACC) - Participants with the A118G G-allele showed increased ACC activation in response to ostracism (compared to those with the A-allele).	The μ-opioid receptor (specifically the A118G polymorphism) is related to increased neural sensitivity to the experience of social pain.
Goodwin, Williams, & Carter-Sowell (2010)	*Cyberball*: Inclusion or Ostracism condition. *Manipulation of Players' Race*: Half of the participants believed the other players shared their own White or African American racial identities; the other half believed the other players did not share their racial identities.	614 participants of two ethnic groups: 1) 314 "Whites" 160 Males 154 Females Age range = 18-90 years 2) 300 "African American" 148 Males 152 Females Age range = 18-90 years	*Reflexive and Reflective Post-Cyberball Questionnaires*: Assessed mood and the four basic needs. Participants asked to rate both *reflexive needs* (how they felt during Cyberball) and *reflective needs* (how they felt after Cyberball). *Attributions of racial prejudice*: Participants asked to rate how much they believed their ostracism was due to racial prejudice.	- Ostracism negatively affected mood, self-esteem, belonging, control, and meaningful existence. - Reflexive needs were significantly more affected than reflective needs. - African American participants' reflexive needs were more threatened when ostracised by White Players, while White participants showed no effect of Players' Race. -When participants attributed ostracism to racial prejudice, it impeded their recovery.	Membership in a stigmatized social group moderates reflexive reactions to ostracism. Attributing ostracism to racial prejudice impedes individuals' recovery from that experience.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Bastian & Haslam (2010)	*Cyberball*: Inclusion or Ostracism condition.	71 university undergraduate students 23 Males 48 Females Ages range = 17-56 years Mean age = 19.87 years	*Post-Cyberball Questionnaire*: Assessed the four basic needs. *Ratings of Human Nature and Human Uniqueness*: Participants rated themselves and other players on 52 personality traits of *Human Nature* (e.g., warmth, or mechanical & cold) and *Human Uniqueness* (e.g., rational & logical, or unsophisticated). In addition, participants rated others' perceived view of them of the 52 traits.	- Ostracism negatively affected self-esteem, belonging, control, and meaningful existence. - Participants' self-ratings of Human Nature were significantly lower when ostracised. - Participants attributed less Human Uniqueness traits to themselves when ostracised. - Participants rated others as having less Human Nature when they had been ostracised by them. - Participants attributed more Human Uniqueness qualities to others who ostracised them than to those who included them. - When excluded, participants felt that others viewed them as having less positive and more negative Human Nature traits, but no difference in Human Uniqueness.	Ostracism causes people to feel "less human." They also see those who ostracise them as "less human," and believe that they are perceived as being "less human."

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Sebastian, Viding, Williams, & Blakemore (2010)	*Cyberball*: Within-subjects; Inclusion and then Ostracism condition.	77 female participants divided into three groups: 1) *Young adolescents* (Mean age = 12.8) 2) M*id-adolescents* (Mean age = 15.0) 3) A*dults* (Mean age = 27.4)	*Mood rating scale*: Assessed positive and negative mood - [Administered 3 times; before inclusion, after inclusion, after ostracism]. *Post-Cyberball Questionnaire*: Assessed the four basic needs - [Administered 2 times; after inclusion, after ostracism].	- Both adolescent groups reported significantly lower mood after ostracism than after either baseline or inclusion. Adults reported no change. - All participants reported lower basic needs scores after ostracism compared to after inclusion. - Mid-adolescents reported significantly lower levels of self-esteem after both inclusion and ostracism compared to other age groups.	Adolescents may be hypersensitive to ostracism in terms of the effect it has on their mood and self-esteem.
DeWall, et al. (2010) [Expt 1]	*Acetaminophen*: Participants asked to ingest a daily dose of acetaminophen (a common pain medication) or placebo for 21 days.	62 university undergraduate students 14 Males 48 Females Age not specified	*Hurt Feelings Scale*: Participants were required to report the level of social pain they experience each day by rating their agreement with the statement "today, being teased hurt my feelings."	- Participants who took acetaminophen reported decreased levels of hurt feelings over the 3-week period, while placebo participants reported no change.	Acetaminophen – a common pain relief medication may in fact alleviate social pain as well as physical pain.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
DeWall, et al. (2010) [Expt 2]	*Acetaminophen*: Participants asked to ingest a daily dose of acetaminophen or placebo for 21 days. *Cyberball*: Within-subjects; Inclusion and then Ostracism condition.	25 university undergraduate students 9 Males 16 Females Age not specified	*fMRI scanning*: Participants underwent fMRI scans while experiencing inclusion or ostracism.	- Ostracism resulted in increased activation in the Dorsal Anterior Cingulate Cortex (dACC) - Participants who took acetaminophen showed less dACC activation in response to ostracism compared to participants who took placebo.	The experience of social and physical pain share a common neuroanatomical basis. In addition to reducing sensations of physical pain, pain-relief medication may alleviate the experience of social pain.
Zöller, Maroof, Weik, & Deinzer (2010)	*Cyberball*: Inclusion, Ostracism, or Technical Default conditions.	89 female university students Ages range = 18-35 years Mean age not reported	*Profile of Mood Scales:* Self-report questionnaire assessing mood. *Salivary Cortisol:* Participants assessed for salivary cortisol levels following Cyberball.	- Ostracised participants reported significantly higher feelings of anger and depression compared to included participants. - No effect of Cyberball condition on cortisol secretion.	Ostracism negatively affects mood, but appears to have no effect on salivary cortisol levels in healthy females.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Lustenberger & Jagacinski (2010)	*Cyberball*: Inclusion or Ostracism condition.	227 university undergraduate students 95 Males 132 Females Median age = 19 years	*Self-report measures of mood and intrinsic motivation:* Participants assessed on several questionnaires assessing mood and self-reported levels of intrinsic motivation. *Word search activity [Behavioural measure of motivation]:* Participants asked to form complete words from a 4 × 4 grid of letters. Participants received 1 point for each letter from every word they formed. Post-test performance: Participants were administered the task following Cyberball Intrinsic Motivation: Participants were asked to continue the task during a 6-minute period of 'down-time' in the experiment. The degree to which they continued to perform the task was used as a measure of intrinsic motivation	- Ostracised participants reported less positive mood directly after Cyberball compared to included participants. - Ostracised participants performed significantly worse on word-search activity compared to included participants. - No difference between ostracised and included participants on the behavioural measure of intrinsic motivation. - Indirect effect of ostracism on self-reported intrinsic motivation – Ostracised participants reported lower feelings of positive mood, which in turn predicted increased feelings of intrinsic motivation.	Ostracism appears to affect task performance. However, it does not appear to have a direct effect on intrinsic motivation. There does, however, appear to be a mediating effect of mood on self-reported intrinsic motivation. Ostracism results in lower positive mood, which in-turn results in lower self-reported intrinsic motivation.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Wirth, Lynam, & Williams (2010)	*Cyberball*: Inclusion or Ostracism condition.	76 university students. 57 Males 19 Females Mean age = 21 years	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs. *Single-item measure of social pain*: Participants rated their agreement with the statement "It was a painful experience." *Five-Factor Model Rating Form*: self-report measure assessing traits consistent with Cluster A, Cluster B, and Cluster C personality disorders.	- Ostracism caused individuals to feel more social pain, greater need-threat, and less positive mood. - Ostracised participants who possessed higher levels of Cluster A Personality Disorder traits (Schizotypal, Schizoid, and Paranoid) were buffered against the negative impact of ostracism - feeling less social pain, greater basic need satisfaction, and more positive mood.	Ostracism causes social pain and negatively affects the four basic needs. However, it appears that personality traits consistent with Cluster A personality disorders actually act to buffer an individual against the negative effects of ostracism.
Jamieson, Harkins, & Williams (2010) [Expt 1]	*Cyberball*: Inclusion or Ostracism condition.	33 university students. 17 Males 16 Females Age not reported	*Post-Cyberball Questionnaire*: Assessed the four basic needs. *Anti-Saccade Task*: Participants are required to inhibit a reflexive tendency and ignore a visual stimulus while focusing their visual gaze on a pre-determined location. Used as a measure of cognitive performance.	- Ostracised individuals reported significantly higher need-threat compared to included individuals. - Ostracised individuals exhibited more (incorrect) reflexive saccades compared to included individuals.	(See below)

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Jamieson, Harkins, & Williams (2010) [Expt 2]	*Cyberball*: Inclusion or Ostracism condition. *Evaluation manipulation*: Participants were either told that they would or would not be able to compare their performance on the cognitive task with the other Cyberball players.	68 university students. 27 Males 41 Females Age not reported	*Post-Cyberball Questionnaire*: Assessed the four basic needs. *Anti-Saccade Task*: See above	- Ostracised individuals reported significantly higher need-threat compared to included individuals. - No effect of evaluation manipulation on need threat - Ostracised individuals exhibited more (incorrect) reflexive saccades compared to included individuals. - Following a reflexive saccade, ostracised individuals in the evaluation condition were quicker to revert their eyes to the target stimuli compared to those in the non-evaluation condition, and at a similar level to those who were included.	Ostracism negatively affects cognitive performance. However, when individuals are provided an opportunity to evaluate their performance compared to other players, they are motivated to perform at a similar level to included individuals.

Author(s)	Experimental Paradigm(s)	Sample	Measures	Results	Conclusions
Pharo, Gross, Richardson, & Hayne (2011)	*Cyberball*: Inclusion or Ostracism condition.	120 participants (60 Males, 60 Females) divided into three groups: 1) Adolescents (Mean age = 15.7) 2) Emerging Adults (Mean age = 18.4) 3) Young Adults (Mean age = 24.5)	*Post-Cyberball Questionnaire*: Assessed mood and the four basic needs. *Single Item measure of self-esteem*: Participants indicated how they felt on a 7-point scale. Administered both before and after playing Cyberball.	- Ostracism negatively affected self-esteem, belonging, control, meaningful existence, and mood. - Ostracised adolescents and emerging adults experienced lower basic needs scores than the young adults. - Ostracised adolescents and emerging adults experienced a larger decline in self-esteem relative to young adults (with ostracised emerging adults reporting the largest decline).	Emerging adults appear to be the most sensitive to the effects of ostracism. The emerging adults in this sample where all experiencing a major life-transition and this may have contributed to their increased sensitivity.

Ostracism Affects Individuals' Four Basic Needs and Mood

Table 1.1 represents a comprehensive overview of all of the experimental work to date that has incorporated the Cyberball paradigm to examine the effects of ostracism. The evidence regarding ostracism and the effect that it has on an individual's psychological well-being is extensive. For example, in all of the studies in Table 1.1 in which researchers investigated the relation between ostracism and the four basic needs (belonging, self-esteem, control, and meaningful existence), ostracism was consistently found to have a negative impact on participants' self-reported levels of these four basic needs (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Gross, 2009; Jamieson et al., 2010; Krill et al., 2008; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; Sebastian et al., 2009; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Wirth et al., 2010; Zadro et al., 2006; Zadro et al., 2004). Similarly, ostracism has consistently been shown to lead to a decrease in individuals' self-reported mood levels (Boyes & French, 2009; Gonsalkorale & Williams, 2007; Gross, 2009; Lustenberger & Jagacinski, 2010; Pharo et al., 2011; Sebastian et al., 2009; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Wirth et al., 2010).

The effects of these declines in mood, self-esteem, belonging, control, and meaningful existence are explained in Williams' (1997, 2001) model of ostracism (see Figure 1.1). Williams (1997, 2001) conceptualised the repercussion of ostracism in terms of both short-term and long-term consequences. He proposed that in the short-term, individuals attempt to fortify their damaged needs in order to repair their own feeling of self-worth. Interestingly, Williams (2007a, 2007b) noted that individuals will react in varied ways in their attempts to regain these feelings. For example, ostracised individuals can either respond in a pro-social manner, such as conforming to a group decision (Williams et al., 2000), or in an anti-social manner, such as reacting aggressively toward another individual (Warburton et al., 2006). In contrast, Williams (2007b) proposes that while individuals attempt to repair the damage over the short-term, the

effects of long-term exposure to ostracism are dire. In several unpublished experiments, Williams and his colleagues conducted interviews with individuals who have experienced long-term ostracism under non-experimental conditions (Williams, 2007b). Based on these reports, Williams (2001, 2007b) proposed that long-term exposure to ostracism (and therefore long-term deprivation of the four basic needs) leads an individual to seek isolation from others. He suggested that rather than attempting to regain their sense of well-being, individuals learn to become socially withdrawn, begin experiencing feelings of helplessness and worthlessness, and become prone to developing negative psychological symptoms such as depression, suicidal ideation, suicide attempts, and eating disorders (Williams, 2007b).

Over What Period of Time Does Ostracism Affect Us?

Researchers have demonstrated that ostracism leads to a decline in an individual's four basic needs and their mood. Several other researchers have examined how long these negative effects persist for an individual who experiences ostracism. For example, Zadro et al. (2006) assessed the relation between ostracism and social anxiety. Social anxiety is the experience of personal unease and discomfort regarding social situations and is typically accompanied by shyness and social awkwardness (Reber & Reber, 2001). Individuals who suffer from clinically significant levels of social anxiety typically find social interactions aversive and often endeavour to avoid them wherever possible (American Psychiatric Association, 2000). Using the Cyberball paradigm, university undergraduate students were randomly assigned to either an inclusion condition or an ostracism condition. Following Cyberball, participants completed a questionnaire that assessed the four basic needs. Participants also completed a number of other psychological measures including the Social Phobia and Anxiety Inventory (SPAI) – a well validated measure of social anxiety. Consistent with prior research using the Cyberball paradigm, Zadro et al. (2006) found that ostracism had a significant negative effect on participants' four basic needs. Overall, the ostracised participants displayed significantly lower scores on all basic needs measures than

did included participants. Furthermore, Zadro et al. found a significant relation between social anxiety and the persistence of the aversive effects of ostracism. Specifically, participants with high social anxiety scores took longer to recover from the effects of ostracism than did non-anxious participants.

Lau et al. (2009) investigated the relation between persisting effects following ostracism and individual's memory of the experience. Participants were told that they would be playing Cyberball against other players over a network, but in actual fact the other players were controlled by a computer. Participants were then randomly assigned to either an ostracism or inclusion condition. Following Cyberball, participants were asked to mentally recall their experience from one of two perspectives: A *field perspective*, in which they were told to recall Cyberball from their own perspective -- as if re-experiencing the original situation, or an *observer perspective*, in which they were told to recall Cyberball from the viewpoint of a detached observer -- to be aware of how they would look to a spectator. Immediately after, participants were administered a post-Cyberball questionnaire assessing the four basic needs, and then a second time, 10 minutes after first recalling Cyberball. Lau et al. found that immediately after Cyberball, ostracised participants in the field condition and observer condition both reported lower basic needs scores relative to included participants. However, they found that participants in the observer condition reported significant improvements after 10 minutes, whereas participants in field condition still experienced negative effects. Lau et al. concluded that the way an individual remembers the experience of ostracism can influence the negative emotional impact of the experience.

In another study, Gross (2009) looked at the persisting effects of ostracism and potential ways to ameliorate these effects. Adolescent (mean age 12.5 years) and emerging-adult (mean age 18.4) participants were assigned to either the ostracism or the inclusion condition in the Cyberball paradigm. Following Cyberball, participants played a 12-minute computer game either

by themselves (*non-social condition*) or with a confederate with whom they could cyber-chat (*social condition*). Participants were assessed on a single-item measure of self-esteem (Robins, Hendin, & Trzesniewski, 2001) which was administered prior to Cyberball, immediately after Cyberball, and after the social/non-social game-play. In addition, participants were administered an Emotion Adjective Measure (EAM), which assessed 6 emotional states: Perceived relational value ("accepted," "respected," "valued), Dysphoria ("down," "upset," "depressed," "stupid"), Shame ("ashamed," "betrayed," "embarrassed"), Anger ("frustrated," "irritated," "hostile," "angry," mad"), Anxiety ("nervous," "stressed," "tense," "relaxed"), and Competence ("smart," "confident"). Participants completed the EAM immediately after Cyberball, and again after the 12 minutes of game-play. Gross (2009) found that following Cyberball, ostracised individuals reported lower self-esteem, lower perceived relational value, and greater feelings of dysphoria, shame, and anger; these findings were obtained with both the adolescent and emerging-adult participants. Furthermore, Gross found that ostracised adolescents and emerging-adults in the social game-play condition reported improvements in self-esteem and perceived relational value relative to those in the non-social condition, and that adolescents experienced additional improvements in feelings of dysphoria, shame, and anger. Gross (2009) concluded that online social interaction appears to ameliorate the persisting negative effects of ostracism, and that adolescents potentially receive a greater boost from this kind of social experience than do emerging-adults.

Taken together, researchers have shown that although ostracism is an extremely negative experience, there are several factors that can mediate the severity of these effects. First, heightened levels of social anxiety are associated with a significantly worse recovery rate following ostracism (Zadro et al., 2006). Second, the way in which an individual remembers the experience of ostracism can affect their recovery (Lau et al., 2009). Third, social interaction

following ostracism appears to help individuals recover from the negative effects, particularly for young adolescents (Gross, 2009).

Ostracism Affects Physiological Responses

Researchers have also investigated the physiological responses associated with ostracism. For example, Eisenberger et al. (2003) tested participants' neural response to Cyberball using functional magnetic resonance imaging (fMRI). Participants were told that they were playing Cyberball with two other players who were also undergoing fMRI scanning, however, as in previous Cyberball experiments, the two other players were controlled by the computer. In the first condition, participants were included during a game of Cyberball with their two virtual teammates, followed by a second phase in which they were ostracised by the other players. Eisenberger et al. compared participants' neural activation during inclusion to their neural activation during ostracism, and found that ostracism resulted in increased activation of the Anterior Cingulate Cortex (ACC) – an area of the brain that has been associated with the experience of physical pain in previous research. Eisenberger et al. concluded that the experience of social and physical pain share a common neural basis.

In another study, DeWall et al. (2010) conducted two experiments investigating the effect of pain-relief medication on the experience of social pain. In their first experiment, participants consumed a daily dose of acetaminophen – a common pain-relief medication – or a placebo. In addition, they were asked to record their daily experiences of social pain over a 3-week period using Leary and Springer's (2001) *Hurt Feelings Scale*. DeWall et al. found that participants who took acetaminophen reported significant decreases in their experience of hurt feelings over three weeks compared to those who took a placebo. In their second experiment, participants were randomly assigned to take a daily dose of acetaminophen or placebo for three weeks before coming into the laboratory. Upon entering the laboratory, participants were asked to play Cyberball while in an fMRI scanner. Similar to the method employed by Eisenberger et al.

(2003), participants were told that they were playing with two other players, and experienced both inclusion and ostracism. Like Eisenberger el al. (2003), DeWall et al. (2010) found that ostracism resulted in increased activation of the ACC, however, they found that acetaminophen alleviated this response. Participants who had taken acetaminophen for the three weeks leading up to the experiment exhibited less activation of the ACC in response to ostracism compared to those who had consumed the placebo. DeWall et al. concluded that acetaminophen may in fact alleviate the experience of social pain as well.

Interestingly, Way, Taylor, and Eisenberger (2009) investigated whether specific genetic markers could account for susceptibility to the experience of social pain. Using a methodology similar to Eisenberger el al. (2003) and DeWall et al. (2010), Way et al. (2009) examined whether variations in the μ-opioid receptor gene could account for individual differences in rejection sensitivity. They chose to focus on the A118G polymorphism of the μ-opioid gene because previous research had documented a link between μ-opioid receptors and the experience of physical pain (Kieffer & Gavériaux-Ruff, 2002). Participants were asked to play Cyberball while undergoing an fMRI scan, and they experienced both inclusion and then ostracism. The researchers found that participants with an A118G G-allele (which has been linked to reduced pain tolerance) showed increased activation in the ACC during ostracism compared to those with the variant A-allele. They concluded that the μ-opioid receptor, specifically the A118G polymorphism, is related to increased neural sensitivity to the experience of social pain (Way et al., 2009).

Ostracism Affects Behavioural Responses

In addition to the effects of ostracism on an individual's basic-needs and their mood, a number of researchers have also shown that short-term ostracism can lead to significant changes in an individual's behaviour (Chow et al., 2008; Oaten et al., 2008; Warburton et al., 2006; Williams & Sommer, 1997). Williams and Sommer's (1997) original research on ostracism

showed that face-to-face ostracism led females to exhibit social compensation during a group activity, whereas males showed no such response. Subsequent research on ostracism and behavioural responses has examined the effects of ostracism on aggressive behaviour (Warburton et al., 2006), antisocial behaviour (Chow et al., 2008), self-regulatory behaviour (Oaten et al., 2008), behavioural mimicry (Lakin et al., 2008), and intrinsic motivation (Lustenberger & Jagacinski, 2010).

For example, Warburton et al. (2006) investigated the relation between ostracism and aggressive behaviour. They recruited participants under the guise that they were taking part in an experiment on taste preference. They incorporated the participant-confederate ball-toss paradigm first used by Williams and Sommer (1997). Participants were placed in a room with two confederates (one male and one female) and the confederates commenced an apparently impromptu game of ball toss, during which the participant was either included, or inexplicably ostracised. Following the ball-toss paradigm, participants were placed in a separate room to complete the remainder of the experiment. Participants were then told that they would have to undergo "sensory saturation," and were then subjected to a series of aversive sounds (such as chalk squeaks on a blackboard and metal scraping on metal) in one of two conditions: Diminished Control or Restored Control. In the diminished control condition, participants had to listen to the aversive sounds with no control over when they were administered. In contrast, in the restored control condition, participants were able to control when the sounds were administered to them via a remote control.

After experiencing the ostracism/inclusion and control/no-control manipulations, participants were asked to prepare a food sample for the other confederates (recall that they believed the experiment was examining taste preference). As part of the food preparation, participants were required to add a sample of hot sauce and were given control over how much hot sauce they added. The amount of hot sauce added to the food sample was used as a

measure of aggressive behaviour. Warburton et al. (2006) found that those participants in the ostracised/no-control condition displayed increased aggressive behaviour relative to the other conditions. Participants in the ostracised/no-control condition administered more than four times as much hot sauce to the confederates compared to participants in the other three conditions who administered approximately the same amount of hot sauce to the confederates. The authors interpreted this finding in reference to Williams' (1997, 2001) model of ostracism; individuals who are ostracised experience a diminished sense of control, and are in turn more likely to exhibit aggressive behaviour towards others. However, the potential for aggressive retaliation can be mediated by restoring control to these individuals.

In another study, Chow et al. (2008) examined the relation between ostracism and antisocial behaviour, and the mediating role of anger. Participants were recruited to take part in what they believed to be a study of impression formation. They entered the lab individually, and were placed in a private room in front of a computer. They were told that the experimenters were looking at "how people formed impressions of others when the only interaction was computer mediated." Consistent with other Cyberball experiments, participants were told that they would be playing a virtual game of ball toss with two other human players, however, as before, the other players were controlled by the computer. Participants were then introduced to the Cyberball game, and were randomly assigned to either an inclusion condition or an ostracism condition. Following Cyberball, participants completed a questionnaire that assessed their feelings of anger and sadness. Participants were then instructed to choose a snack for each of their two Cyberball partners, and they were given free rein to choose from a selection of both appealing snacks (such as M&M chocolates) and unappealing snacks (such as prunes). The number of unappealing snacks they chose was used as a measure of anti-social behaviour. Chow et al. found that participants who were ostracised were significantly more likely to choose unappealing snacks for their partners than were included participants. Furthermore, they found

that feelings of anger were a significant mediator in the relation between ostracism and antisocial behaviour, that is, the angrier that participants felt, the more likely they were to choose unappealing snacks for their partners. By contrast, they found no relation between participants' feelings of sadness and their snack choices. Chow et al. (2008) concluded that ostracism leads to an increased propensity for anti-social behaviour, and that this behaviour is related to feelings of anger following exclusion.

Oaten et al. (2008) conducted two experiments in which they investigated the relation between ostracism and self-regulatory behaviour -- the ability to self-monitor and to inhibit undesirable behaviours. In their first experiment, participants were subjected to either inclusion or ostracism during a game of Cyberball and were then asked to fill-out a post-Cyberball questionnaire that assessed the four basic needs, before being asked to taste test some cookies. The cookie-eating paradigm has been previously used as a measure of self-regulatory behaviour (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Tice, Bratslavsky, & Baumeister, 2001). In the cookie-eating paradigm, participants are given free rein to eat as much as they wanted; because cookies are an unhealthy food (and therefore individuals should not eat too many of them), the number of cookies consumed is argued to be indicative of self-regulatory behaviour. Because Oaten et al. (2008) wanted to investigate the persistence of negative effects following ostracism, participants were tested on the basic needs questionnaire and the cookie-eating paradigm both immediately after Cyberball (Time 1) and 45 minutes later (Time 2). In addition, because social anxiety had previously been shown to affect the persistence of negative emotions following ostracism (Zadro et al., 2006), participants were also administered the Fear of Negative Evaluation Scale – a well-validated measure of social anxiety (Watson & Friend, 1969). Oaten et al. (2008) reported two main findings. First, ostracised participants reported lower levels of self-esteem, belonging, control, and meaningful existence compared to included participants at both Time 1 and Time 2 regardless of their level of social anxiety. Second, ostracised participants

displayed deficits in self-regulation (they ate more cookies) at Time 1 compared to included participants, and higher levels of social anxiety were associated with continued deficits in self-regulation at Time 2.

In their first experiment, Oaten et al. (2008) showed a relation between ostracism and a diminished ability to inhibit an undesirable behaviour (eating unhealthy cookies). In their second experiment, they examined the relation between ostracism and participants' ability to enable a desirable but unpleasant behaviour. They used a design similar to Experiment 1, testing participants at both Time 1 and Time 2, and investigating the mediating effects of social anxiety. Participants were again tested on a post-Cyberball questionnaire which assessed the four basic needs, however, in contrast to Experiment 1, participants' ability to consume an unpleasant-tasting, but apparently healthy beverage was used as a measure of self-regulatory behaviour. The unpleasant-beverage paradigm has also been used in prior studies of self-regulation (Baumeister et al., 2005; Muraven & Slessareva, 2003). Participants were given an unpleasant tasting beverage that they were told had positive health benefits and they were allowed to drink as much or as little as they liked. The amount of beverage consumed was used as a measure of self-regulatory behaviour. Oaten et al. replicated the findings obtained in their first experiment: First, ostracism negatively affected self-esteem, belonging, control, and meaningful existence at Time 1 and Time 2. Second, ostracised participants displayed lower levels of self-regulation (they drank less beverage) at Time 1 compared to included participants, and higher levels of social anxiety were associated with continued deficits in self-regulation at Time 2. Oaten et al. (2008) concluded that ostracism results in a significant deterioration in self-regulation, both in terms of inhibiting behaviours and enabling behaviours. Furthermore, as in previous research (Zadro et al., 2006), they found that higher levels of social anxiety were associated with a persistence of the negative effects that follow ostracism.

Lakin, Chartrand, and Arkin (2008) carried out two experiments investigating the relation between ostracism and non-conscious behavioural mimicry -- the tendency to mimic another individual's behaviour with no conscious awareness of one's actions. Previous research has documented a link between behavioural mimicry and increased positive rapport (Chartrand, Maddux, & Lakin, 2005), therefore Lakin et al. proposed that ostracised individuals may display increased non-conscious mimicry in an attempt to buffer their sense of social affiliation. Thirty six university undergraduate participants were either ostracised or included during Cyberball, and were then placed in a room with a female confederate who they were asked to carry out a seemingly menial task with by describing a series of photos to her. The session was video-recorded, and the confederate purposefully moved her foot in a steady fashion during the interaction. The sessions were later coded by an independent observer, and the amount of time that each participant spent moving their foot was used as a measure of non-conscious behavioural mimicry. Lakin et al. (2008) found that ostracised participants were significantly more likely to mimic the confederate's foot movements compared to included participants. Furthermore, when interviewed after the session, participants reported having no conscious awareness of their mimicking behaviour.

In a second experiment, Lakin et al. recruited a sample of 149 female university students and tested them using a similar methodology to their first experiment, with several notable differences. First, they led the female players to believe that they were playing Cyberball with either a group of female players (therefore creating an in-group of players) or a group of male players (out-group). Similarly they manipulated the sex of the confederate so that participants were either placed in a room with a female confederate (in-group) or a male confederate (out-group). In addition, they measured participants' psychological well-being using a self-report questionnaire which assessed the four basic needs. Like in their first experiment, Lakin et al. found that ostracism caused a significant increase in non-conscious mimicry, however, the sex of

the other players was a significant predictor of non-conscious mimicry; participants who believed that they were ostracised by in-group players displayed significantly more non-conscious mimicry compared to those who believed that they were ostracised by out-group players. Furthermore, the sex of the confederate influenced the degree of mimicry that participants exhibited if they were ostracised by an in-group member; that is, participants in the in-group ostracism condition mimicked an in-group confederate more than an out-group confederate, whereas no such effect was present for those in the out-group ostracism condition. To explain their finding, Lakin et al. looked at the relation between participants' basic needs scores and their behavioural responses. They found that a feeling of belonging was significantly related to the relation between in-group ostracism and in-group mimicry. Specifically, although all participants experienced belongingness threat after ostracism, there was a significant correlation between belongingness and mimicry when participants were excluded by female (in-group) players and subsequently interacted with a female (in-group) confederate. Lakin et al. (2008) proposed that this demonstrated the importance of belongingness in behavioural mimicry –those participants who felt a strong sense of belonging to their ostracism group were significantly more likely to mimic the behaviour of another confederate who shared the same group membership status (in this case being female).

In summary, researchers have shown a link between ostracism, and a number of negative behavioural outcomes. Specifically, researchers have found links between ostracism and increased social compensation (Williams & Sommer, 1997), increased aggression (Warburton et al., 2006), increased anti-social behaviour (Chow et al., 2008), decreased self-regulation (Oaten et al., 2008), and increased non-conscious mimicry (Lakin et al., 2008).

Does it Matter Who Ostracises You?

While it is well established that ostracism is a potent negative social experience, questions remain about whether it is consistently potent across all situations. A number of

researchers have conducted experiments to examine whether the conditions under which ostracism is experienced can affect the outcome for the individual. For example, Zadro et al. (2004) conducted two experiments to establish the minimum conditions required to produce effects on an individual's primary needs. Using Cyberball, Zadro et al. explicitly told participants that they were either playing against two human players or two computer players. Even when participants knew that they were playing against a computer, they displayed a significant decline in all four basic needs (belongingness, self-esteem, control, and meaningful existence) relative to those individuals who were included. Furthermore, there was no difference in the degree of this effect as a function of the source manipulation; both the computer-ostracised and human-ostracised participants displayed the same magnitude of decline on the four basic needs. In a second experiment, Zadro et al. (2004) informed half of the participants that their opponents (either human- or computer-controlled) were following a set script, effectively eliminating any negative connotations that could accompany ostracism. Despite this, participants still displayed significant negative effects on the four basic needs relative to those individuals in the inclusion condition. Based on their findings, Zadro et al. (2004) concluded that ostracism is an extremely powerful social experience. In fact, the data suggest that ostracism is such an aversive experience, that individuals appear to be hypersensitive to its effects, experiencing a negative impact when ostracised by an artificial source, and when they are aware that the ostracism is fixed.

In another experiment, Gonsalkorale and Williams (2007) compared the effect of being ostracised by a favoured in-group to the effect of being ostracised by a despised out-group. Participants were led to believe they were playing Cyberball against either a favoured in-group, such as the Australian Democrats political party, or a despised out-group, the Australian Ku Klux Klan (KKK). Using a post-Cyberball questionnaire, Gonsalkorale and Williams found that Ostracism negatively affected participants' mood, self-esteem, belonging, control, and

meaningful existence, regardless of the source of the ostracism. That is, even when an individual believed they were being ostracised by a despised out-group, it was no less aversive than being ostracised by their favoured in-group.

In another study, Wesselmann et al. (2009) investigated the effect of merely observing another individual being ostracised on their emotional well-being. Participants were asked to observe an individual being either ostracised or included during a game of Cyberball under one of two conditions: A perspective-taking condition, in which they were instructed to take the perspective of the target player, or a non-perspective-taking condition in which they were simply instructed to observe the overall game. Using a post-Cyberball questionnaire, Wesselmann et al. asked participants to rate both their target player's basic needs and their own basic needs. They found that participants rated ostracised target players as having lower basic needs and mood scores than included target players, and those who observed a target player being ostracised actually reported lower basic need scores and mood for themselves compared to those who observed an included player. Furthermore, Wesselmann et al. found that perspective taking moderated the effects of observing ostracism. Participants who were instructed to take the perspective of an ostracised player reported lower basic need scores and lower mood compared to those in the non-perspective-taking condition. Wesselmann et al. (2009) concluded that ostracism is an extremely potent social experience; simply observing someone else being ostracised caused a decrease in an individual's basic needs and mood.

In another study, Goodwin et al. (2010) examined the relation between ostracism and perceptions of racial prejudice. They recruited Caucasian and African American participants and led them to believe that they were playing Cyberball with players from either their own racial group, or a conflicting racial group. Using a post-Cyberball questionnaire, Goodwin et al. found that African American participants reported lower basic needs and mood when they believed they were being ostracised by Caucasian players, whereas Caucasian participants showed no

effect of the player-race manipulation. Goodwin et al. concluded that being a member of a stigmatized racial group increased an individual's sensitivity to ostracism by another racial group, whereas no such effect occurred when an individual belonged to a majority racial group.

Overall, the data suggest that ostracism is an extremely negative experience under a number of circumstances. Researchers have shown that you feel bad if you are ostracised by a computer (Zadro et al., 2004), a despised out-group (Gonsalkorale & Williams, 2007), a racial majority (Goodwin et al., 2010), or even if you just observe another individual being ostracised (Wesselmann et al., 2009).

Developmental Differences in The Effects of Ostracism

Although people of all ages appear to be affected by ostracism, there is some evidence to suggest that certain age groups may be more or less affected. For example, adolescence is a developmental stage during which the majority of an individual's social support is gained from their peers (Storch et al., 2005; Sullivan et al., 2006). Consequently, one of the primary desires during adolescence is to identify with a peer group and to be socially accepted (Sullivan et al., 2006). Adolescence could therefore be a period of human development during which individuals are extremely sensitive to the effects of ostracism. Gross (2009) found that while adolescents and emerging-adults were both negatively affected by ostracism, adolescents potentially received a greater subsequent boost to their sense of well-being from online social-interaction than emerging-adults.

In another study with adolescents, Sebastian et al. (2010) used a within-subjects design on the Cyberball paradigm to assess the effects of ostracism on young adolescents (mean age = 12.8 years), mid-adolescents (mean age = 15 years), and adults (mean age = 27.4 years). Participants were asked to play Cyberball twice; they were initially exposed to the inclusion condition followed by the ostracism condition. Participants were also administered a mood rating scale, three times: before inclusion, after inclusion, and after ostracism. They then

completed a post-Cyberball questionnaire assessing the four basic needs at two time points: after inclusion, and after ostracism. Sebastian et al. found that ostracism resulted in a decline in the four basic needs for all three age groups. Furthermore, the young adolescents and the mid-adolescents reported a decline in their mood after ostracism while the adults reported no changes. In addition, when they specifically focussed on self-esteem effects, Sebastian et al. found that the mid-adolescents reported lower levels after being both included and ostracised compared to the other two age groups. Overall, the authors suggested that adolescents may be hypersensitive to the effects of ostracism in terms of their mood and self-esteem.

Recently, we have conducted research within our own laboratory focussing on age-related changes in participants' sensitivity to the effects of ostracism (Pharo et al., 2011) In that study, we recruited groups of adolescent (mean age = 15.7 years), emerging-adult (mean age 18.4 years), and young adult (mean age 24.5 years) participants. The participants were all recruited as groups of four friends, and were told that they would play Cyberball with each other over a computer network. Participants were assessed using the single-item measure of self-esteem (Robins et al., 2001) both before and after Cyberball, as well as a post-Cyberball questionnaire assessing the four basic needs. Overall, we found that similar to previous research, ostracism negatively affected participants' four basic needs and their mood. However, when we compared the age groups, we found that ostracised adolescents and emerging-adults experienced lower basic needs scores than did the young adults. Furthermore, by comparing participants' pre-Cyberball and post-Cyberball self-esteem scores, we found that the ostracised emerging-adults and adolescents reported larger declines in self-esteem compared to the young adults, with the emerging-adults reporting the largest decline in self-esteem. Overall, we concluded that emerging-adults may be hypersensitive to the negative effects of ostracism relative to adolescents and young adults.

To date, researchers have indicated that there may be certain developmental groups who exhibit an increased susceptibility to the effects of ostracism. Gross (2009) found that adolescents (mean age of 12.5 years) potentially recover faster from the negative effects of ostracism when they are given a chance to socially interact with another stranger. Sebastian et al. (2010) found that mid-adolescents (mean age of 15 years) in particular may exhibit an increased susceptibility to the effects of ostracism on self-esteem, while Pharo et al. (2011) found that emerging adults (mean age of 18.4 years) may be particularly susceptible to ostracism, but that adolescents (mean age of 15.7 years) were also more susceptible than young adults. Taken together, the data provide an incomplete picture of the developmental trajectory of individuals' sensitivity to ostracism. While some researchers have found that young- to mid-adolescence may be a period during which individuals are hypersensitive to ostracism (Gross, 2009; Sebastian et al., 2010), others have found that emerging-adulthood may be the critical developmental phase (Pharo et al., 2011). Importantly, all of the researchers to date have consistently found that relative to young adulthood, adolescents and emerging-adults appear to be more sensitive to the effects of ostracism.

Aim of the Present Research

There is an extensive body of literature detailing the negative effect that ostracism has on an individual's psychological well-being. Researchers have also documented a relation between ostracism and a various behavioural outcomes including increased social compensation, increased aggression, increased anti-social behaviour, a decreased capacity for self-regulatory behaviour, and increased non-conscious mimicry. Furthermore, several recent studies have outlined developmental differences in individuals' susceptibility to the negative effects of ostracism, with a general consensus that adolescents and emerging-adults display increased sensitivity relative to adults. The overall goal of the present research was to further

investigate the effect that ostracism has on individuals' behaviour and psychological well-being. Specifically, we conducted 3 experiments to test several unique predictions.

In Experiment 1, we tested a specific prediction of Williams' (1997, 2001) model of ostracism - that individuals who experience ostracism experience an innate desire to re-gain their lost sense of control, and may attempt to re-establish control by "taking a leadership role in a situation or exerting control over the lives of others" (Williams, 2001, p. 64). To do this, we recruited samples of adolescents, emerging-adults, and young-adults and tested them using a group-leadership nomination paradigm following inclusion or ostracism during Cyberball.

In Experiment 2, we assessed the relation between the experience of ostracism and participants' propensity for risk-taking behaviour. Using a sample of emerging-adults, participants were either included or ostracised during Cyberball before being tested on a laboratory-based analogue of risk-taking behaviour - The Balloon Analogue Risk Task (BART; Lejuez et al., 2002).

Finally, for Experiment 3, we had two aims: First, we assessed the relation between the experience of ostracism and participants' propensity for aggressive behaviour using the Taylor Competitive Reaction Time Task (CRT; Epstein & Taylor, 1967). Second, we tested the effects of being ostracised by different sources – a group of close friends or a group of strangers. We recruited participants in group of four close friends or groups of four strangers and had them experience either inclusion or ostracism during Cyberball. They were then assessed with a questionnaire assessing the four basic needs, before being asked to play the CRT.

Chapter 2

Taking Control: Asserting Leadership Over a Social Group Following Ostracism

Ostracism is defined as the act of being ignored or excluded by one's peers (Williams, 2007a). Williams (2007a) has argued that the key distinguishing feature of ostracism is that it occurs over a prolonged period of time during which the individual is forced to endure the exclusion with little or no control over the situation. Ostracism is a common-occurring social phenomenon, particularly among school-aged children and adolescents (Maxwell & Carroll-Lind, 1997). Adolescents and children use ostracism as a means of controlling the social behaviour of their peers (Barner-Barry, 1986; Leets & Sunwolf, 2005) and to control their social environment, by doing things such as reducing the number of peers in a social circle (Benenson et al., 2008). Ostracism is not a pleasant social experience and is likely to be somewhat hurtful for individuals who are experiencing it (Williams, 2007a). Researchers have consistently shown that ostracism causes a decline in individuals' psychological well-being (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004), and results in neurological responses similar to those accompanying sensations of physical pain (DeWall et al., 2010; Eisenberger et al., 2003).

Much of the experimental work on ostracism to date has been guided by Williams' (1997, 2001) theoretical model; according to this model, ostracism negatively affects four basic human needs: the need to belong, the need for self-esteem, the need for control, and the need for meaningful existence. The most common laboratory-based paradigm that has been used to study ostracism is called Cyberball (Williams et al., 2000; Williams & Jarvis, 2006). In Cyberball, participants are told that they are playing a simple game of ball-toss with other participants over a computer network but the other players are actually controlled by a computer. Participants are randomly assigned to either an inclusion condition (in which they receive an equal number of

ball-throws as the other players) or an ostracism condition (in which they receive only two ball-throws before being completely ostracised by their virtual team-mates). Using Cyberball, a number of researchers have shown that ostracism causes individuals to experience a decline in well-being in relation to these four basic needs (Bastian & Haslam, 2010; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; Sebastian et al., 2010; van Beest & Williams, 2006; Warburton et al., 2006; Wesselmann et al., 2009; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004). Researchers have also found that ostracism can lead to behavioural changes including increased aggression (Warburton et al., 2006), increased antisocial behaviour (Chow et al., 2008), and decreased self-regulatory behaviour (Oaten et al., 2008).

One aspect of Williams' (1997, 2001) model that has received increased experimental attention is the issue of control over the environment. Williams proposed that ostracism directly affects an individual's perception of control because it denies the ostracised target social feedback from the situation. For example, while a verbal argument is an unpleasant event, it still involves a level of reciprocal communication that allows an individual to maintain some degree of control or direction over their situation (Williams & Zadro, 2005). In contrast, ostracism denies the recipient any social exchange, and subsequently, any power over their circumstances. As a result, ostracised individuals can feel that they lack control, which is believed to contribute to the negative consequences experienced following ostracism (Williams, 2001; Williams & Zadro, 2005). Williams (1997, 2001) predicted that individuals who experience ostracism experience an innate desire to re-gain their lost sense of control, and that they may attempt to re-establish control by "taking a leadership role in a situation or exerting control over the lives of others" (Williams, 2001, p. 64).

Feelings of control have been examined in a number of different psychological studies. Researchers have found that a sense of control is extremely important for an individual's

psychological well-being (Moradi & Hasan, 2004; Norton et al., 2005; Ruggiero & Taylor, 1997). For example, experimenters have found that feelings of control over a situation can reduce the number of negative symptoms experienced by individuals with chronic illness such as cancer (Norton et al., 2005), and can reduce the negative psychological impact for victims of racial discrimination (Moradi & Hasan, 2004; Ruggiero & Taylor, 1997). In fact, theorists have long posited that a general feeling of control may act to buffer individuals from the negative psychological impact of stressful life events (Pearlin & Schooler, 1978).

Experimenters have also demonstrated a strong link between feelings of control and negative experiences following ostracism. For example, Warburton et al. (2006) investigated the relation between ostracism and aggressive behaviour. Specifically, they examined the effect of restoring or further restricting an individual's sense of control following ostracism. Restricting a participant's sense of control increased their propensity for aggressive retaliation, while restoring a participant's sense of control diminished their level of aggressive retaliation. Similarly, Gross (2009) found that by allowing participants an opportunity to cyber-chat with another individual after they had been ostracised (therefore giving them control over a different social situation) actually decreased the negative emotional impact that ostracism had on the participant.

Taken together, these results suggest that increasing the degree of control that individuals have over their environment following ostracism can lead to improvements in their behaviour and psychological well-being. In all of the research conducted to date, however, the experimenter arranged the situation so that the participant had no choice over whether they experienced increased control following ostracism. To the best of our knowledge, no research has examined whether, if given the opportunity, individuals will actively seek to take control following exposure to ostracism. Williams' (1997, 2001) has hypothesized that individuals who

experience a diminished sense of control following ostracism will attempt to regain control by asserting their leadership in an alternative setting.

The purpose of the present experiment was to test this hypothesis by giving participants an opportunity to take control of a social situation following their experience of ostracism. Participants were told that they were playing Cyberball with other players over a computer network, and were randomly assigned to either an inclusion or an ostracism condition. Following Cyberball, participants were asked to nominate either themselves or one of their three other Cyberball players for group leadership in an upcoming group activity. Consistent with Williams (1997, 2001), we hypothesized that those individuals who reported a diminished sense of control following ostracism would be more likely to nominate themselves for group leadership. In addition, researchers have found that adolescents and emerging adults may be more susceptible to the negative effects of ostracism (Gross, 2009; Pharo et al., 2011; Sebastian et al., 2010). Given this, we also compared the performance of three different age groups: adolescents (15- to 17-year-olds), emerging-adults (18- to 22-year-olds), and young adults (23- to 27-year-olds).

Method

Participants

A total of 40 (20 males, 20 females) 13- to 16-year-old adolescent participants (mean age = 14.75 years, *SD* = .98), 40 (20 males, 20 females) 18- to 20-year-old emerging-adult participants (mean age = 19 years, *SD* = .75) and 40 (20 males, 20 females) 23- to 27-year-old young-adult participants (mean age = 23.78 years, *SD* = 1.29) took part in this experiment. The emerging-adult participants were all University students who were recruited through the Psychology Department at the University of Otago, Dunedin, New Zealand, and satisfied a small portion of course assessment by completing a worksheet based on the experiment. The adolescent participants were high school students from various schools in Dunedin, New Zealand. The young-adult participants were either post-graduate students at the University of Otago, or young professionals working in Dunedin. The adolescent and young-adult participants were recruited via word of mouth and were each paid $12.50 (NZ) for their participation.

Measures

There were three phases of the experimental procedure: 1) a pre-Cyberball phase, 2) a Cyberball phase, and 3) a post-Cyberball phase.

Pre-Cyberball Phase

In the pre-Cyberball phase, participants' self-esteem was assessed.

Self-Esteem

Pre-Cyberball self-esteem levels were assessed using Robins, et al.'s (2001) single-item measure of global self-esteem, in which participants rated their level of agreement with the statement, "My self esteem is high" using a 5-point Likert scale (1 = not at all, 5 = very much so).

Cyberball Phase

Cyberball

Ostracism was manipulated using the computer programme 'Cyberball' (Williams et al., 2000). As described extensively in Chapter 1, Cyberball is a computer-based ball-tossing game in which individuals play virtual ball-toss with three other individuals. In the present experiment, participants were told that they were playing with other people over a computer network, but in fact, the three other players were controlled by the computer. Before commencing, participants had their photo taken and loaded onto the computer. When Cyberball started, participants could see their own photo and corresponding name, as well as the photos and names of three other 'players' of the same sex, and a similar age. The player photos were obtained from a different city in New Zealand so as to ensure that none of the participants recognised any of the players. The computer players were given fictional names which were randomly selected from a list of the 100 most popular male and female names in New Zealand (Huggies, n.d.). In the event that a participant had the same name as one of the computer players, a substitute name was randomly selected from the list.

The game began with one of the computer players throwing the ball to either the participant or another computer player. When the participant received the ball, he or she was able to click the mouse on the picture of one of the other players, throwing that person the ball. There were two experimental conditions; inclusion or ostracism. Participants in the inclusion condition were thrown the ball approximately 25% of the time. Participants in the ostracism condition, on the other hand, were thrown the ball only twice, right at the beginning of the game, and then received no further ball throws from that point on. Instead, those in the ostracised condition were forced to sit through all of the trials, watching as the three other players threw the ball amongst themselves. In both conditions, the game lasted 40 trials which took approximately 5 minutes to complete.

Post-Cyberball Phase

Group Nomination Paradigm

In line with Williams' theory, we were interested in examining whether ostracised individuals would exhibit an increased desire to regain control of their social situation following Cyberball. To do this, we devised a novel task that allowed participants to demonstrate their desire to regain control over a social situation; we gave participants an opportunity to vote for a group leader "for an upcoming group task" after they had finished playing Cyberball. Participants were presented with a list of four names, their own and the three computer players (who they believed to be real people). Participants were instructed to rank the four names in order of "most preferred leader" to "least preferred leader." Participants were explicitly told that they could nominate themselves if they wished. If participants voted themselves as most preferred leader, this was used as an indication of their desire to re-affirm their sense of control. The group nomination task was devised because, despite an extensive search of the psychological literature, no other laboratory-based behavioural measure of control could be found. Although the procedure that we used here was novel, it does fit Williams' (2001) prediction that, following ostracism, individuals will attempt to regain their lost sense of control.

Post-Cyberball Questionnaire

After nominating a group leader, participants' completed the post-Cyberball questionnaire originally developed by Williams et al. (2002) that assessed the four basic needs (belongingness, self-esteem, control, and meaningful existence). The post-Cyberball questionnaire contained 25 items and like the pre-ostracism self-esteem measures, participants were required to rate their level of agreement with various statements on a 5-point Likert scale (1 = not at all, 5 = very much). The post-Cyberball questionnaire included a total of 10 subscales: sense of belonging (three items, for example, "I felt disconnected"), degree of hurt feelings (1 item, "My feelings were hurt"), self-esteem (3 items, for example, "I felt good about myself"),

meaningful existence (3 items, for example, “I felt non-existent”), control (3 items, for example, “I felt powerful”), anger (1 item, “I felt angry”), and mood (8 items, for example, “My mood was happy”). There were also three manipulation checks to confirm participants’ perception of their inclusion status: “I was ignored,” “I was excluded,” and a percentage estimation of total ball throws that they received (see Appendix B for a copy of the post-Cyberball questionnaire). The post-Cyberball questionnaire has been shown to have good internal consistency across the four primary needs subscales; belongingness, self-esteem, control, and meaningful existence (Cronbach’s α = .91; Zadro et al., 2006).

Procedure

When they arrived in the laboratory, participants were asked to read an information sheet and sign a consent form. Participants under the age of 15 were also required to have signed parental consent before they could proceed in the experiment.

In line with previous cover stories used in Cyberball research (Williams, 2007a), participants were told that they would be taking part in an experiment assessing their ability to mentally visualise a virtual-reality scenario. They were told that they would play a brief computer game with three other players over a computer network which involved a simple game of ball-toss. Participants were informed that they would not meet the other players prior to the experiment because we did not their mental visualisation to be influenced by prior face-to-face contact. After providing informed consent, participants were seated in front of a computer which administered the remainder of the instructions to them.

Participants were first administered the pre-Cyberball self-esteem measure. Once they had completed the pre-Cyberball self-esteem measure, participants were introduced to the Cyberball computer game. Participants were shown the introductory screen for Cyberball (see Appendix C) and told that they would be playing a simple ball-toss game with three other players over a computer network. Participants were told to read the instructions on the introductory

screen and to pay particular attention to the instruction that they should mentally visualise the entire experience. This was done to distract the participants from the true nature of the game.

After playing Cyberball, participants were administered the post-Cyberball measures (the group leadership nomination paradigm and the post-Cyberball questionnaire). Participants were then de-briefed on the true nature of the experiment and were free to leave.

Coding

Participants' scores on the pre-ostracism self-esteem measure were coded by obtaining their single-item rating; a high score corresponded to a high level of self-esteem.

Participants' scores on the post-Cyberball questionnaire were calculated by obtaining the sum of participants' ratings for each of the independent factors measured (sense of belonging, degree of hurt feelings, self-esteem, meaningful existence, control, anger, mood, and their perception inclusion status). There were several items in the post-Cyberball questionnaire that were presented in a negative frame: belonging, meaningful existence, anger, and bad mood, where a high rating indicated a negative attitude. As a result, these items were reverse coded, with a score of one being coded as a score of five, and a score of five being coded as a score of one. A high score on the post-Cyberball questionnaire items therefore always reflected a more positive attitude, whereas a low score indicated a negative attitude.

Results

Method of analysis

All data, unless otherwise specified, was analysed using 3 (Age Group: Adolescents, Emerging Adults, Young Adults) × 2 (Ostracism Condition: Ostracised, Included) analyses of variance (ANOVAs). Any significant effects were further analysed using post hoc Student Newman-Keuls tests ($p < .05$)[2].

Manipulation Checks

The first step in the analysis was to determine whether participants correctly detected that they were ostracised or included during Cyberball. Recall that there were three manipulation checks included in the post-Cyberball questionnaire. As shown in Table 2.1 (top panel), participants in the ostracism condition reported that they felt significantly more ignored and more excluded than did participants in the inclusion condition. Participants in the ostracism condition also reported that they received fewer throws of the ball during the game than did participants in the inclusion condition. There were no main effects of age group and no interactions for any of the manipulation checks. Taken together, these data indicate that participants in the ostracism condition correctly detected that they had been ostracised during the game.

Emotional State Measures

We also examined participants' scores on several measures of emotional state from the post-Cyberball questionnaire: hurt feelings, anger, bad mood, and good mood. As shown in Table 2.1 (bottom panel), there was a significant difference in participants' scores on all four variables as a function of ostracism condition. Specifically, participants in the ostracism condition

[2] We have used Cohen's (1988) measures of effect size to indicate the meaningfulness of significant effects; for *F*-tests and *t*-tests, effect size = *d.* According to Cohen, effect sizes of *d* = .20 indicate a 'small' effect, effect sizes of *d* = .50 indicate a 'medium' effect, and effect sizes of *d* = .80 indicate a 'large' effect.

reported having more hurt feelings, more feelings of anger, higher bad mood, and lower good mood scores than did participants in the included condition. There was no main effect of age group and no interactions on any of the emotion measures.

Basic Needs

The next step in the analysis was to examine participants' scores on the measures of four basic needs; Belonging, Self-esteem, Control, and Meaningful Existence. Following previous research on ostracism, first we examined the internal consistency of the basic need measures. The internal consistency across the basic needs scores was acceptable (Cronbach's alpha = .80), therefore the average of the four basic needs scores was calculated to create an overall basic needs score for each participant. Table 2.2 shows participants' mean scores on each of the four basic needs, and their overall average basic needs score as a function of their age group and ostracism condition.

Table 2.1

Means (Standard Errors), Ranges, F-values, and Effect Sizes (d) Between Ostracised and Included Participants on the Peer Manipulation Check Measures and the Post-Cyberball Emotion Measures. For the Emotion Measures, a High Score Indicates a Greater Experience of That Emotion.

			Included (n = 57)		Ostracised (n = 63)			
		Max Score	Mean Score	Range	Mean Score	Range	*F*	*d*
Manipulation Checks	I was ignored	5	1.74 (.13)	1-5	3.67 (.15)	1-5	98.22**	1.88
	I was excluded	5	1.60 (.11)	1-4	3.70 (.14)	1-5	148.63**	2.27
	What percentage of throws do you think you received?	-	26.75 (1.70)	10-100	10.61 (1.26)	1-68	58.76**	1.43
Emotional State Measures	Hurt feelings	5	1.32 (.09)	1-4	2.11 (.16)	1-5	18.61**	.80
	Anger	5	1.46 (.11)	1-5	2.22 (.15)	1-5	15.77**	.74
	Bad mood	20	6.40 (.38)	4-15	9.95 (.48)	4-20	31.80**	1.05
	Good mood	20	15.82 (.37)	9-20	12.78 (.39)	4-20	30.80**	1.03

**$p < .01$.

Table 2.2

Means (Standard Errors) and Range of Scores on the Four Basic Needs Measures, and Overall Basic Needs Scores Between Adolescents, Emerging-Adults, and Young-Adults as a Function of Their Ostracism Condition. A Lower Score Indicates a Greater Aversive Impact of Ostracism.

		Adolescents				*Emerging-Adults*				*Young-Adults*			
		Included (n = 19)		Ostracised (n = 21)		Included (n = 19)		Ostracised (n = 21)		Included (n = 19)		Ostracised (n = 21)	
	Max Score	Mean Score	Range	Mean Score	Range	Mean Score	Range	Mean Score	Range	Mean Score	Range	Mean Score	Range
Belonging	15	11.79 (.53)	7-15	8.19 (.83)	3-15	12.40 (.34)	10-15	7.62 (.51)	5-15	11.63 (.54)	5-15	6.95 (.59)	3-12
Self-Esteem	15	10.21 (.70)	3-15	8.86 (.56)	3-13	11.10 (.51)	6-15	8.19 (.34)	5-11	10.53 (.51)	6-14	8.14 (.68)	3-15
Control	15	8.58 (.49)	5-12	6.48 (.46)	3-10	7.75 (.60)	5-12	5.14 (.35)	3-8	7.53 (.57)	3-11	6.00 (.68)	3-15
Meaningful Existence	15	12.53 (.48)	9-15	9.14 (.85)	3-15	13.75 (.39)	10-15	9.52 (.60)	4-15	12.89 (.50)	8-15	9.24 (.70)	3-14
Average Basic Needs	15	10.78 (.37)	8-14	8.17 (.56)	3-12	11.25 (.26)	9-14	7.62 (.31)	4-11	10.64 (.35)	6-13	7.58 (.49)	3-14

The Belonging and Meaningful Existence basic needs are shown reverse scored.

Figure 2.1 shows participants' overall basic needs score as a function of ostracism condition and age group. As shown in Figure 2.1, there was a main effect of ostracism condition, $F(1, 119) = 87.01$, $p < .01$, $d = 1.74$. Participants in the included condition had significantly higher basic needs scores than did participants in the ostracised condition. There was no effect of age group and no interaction.

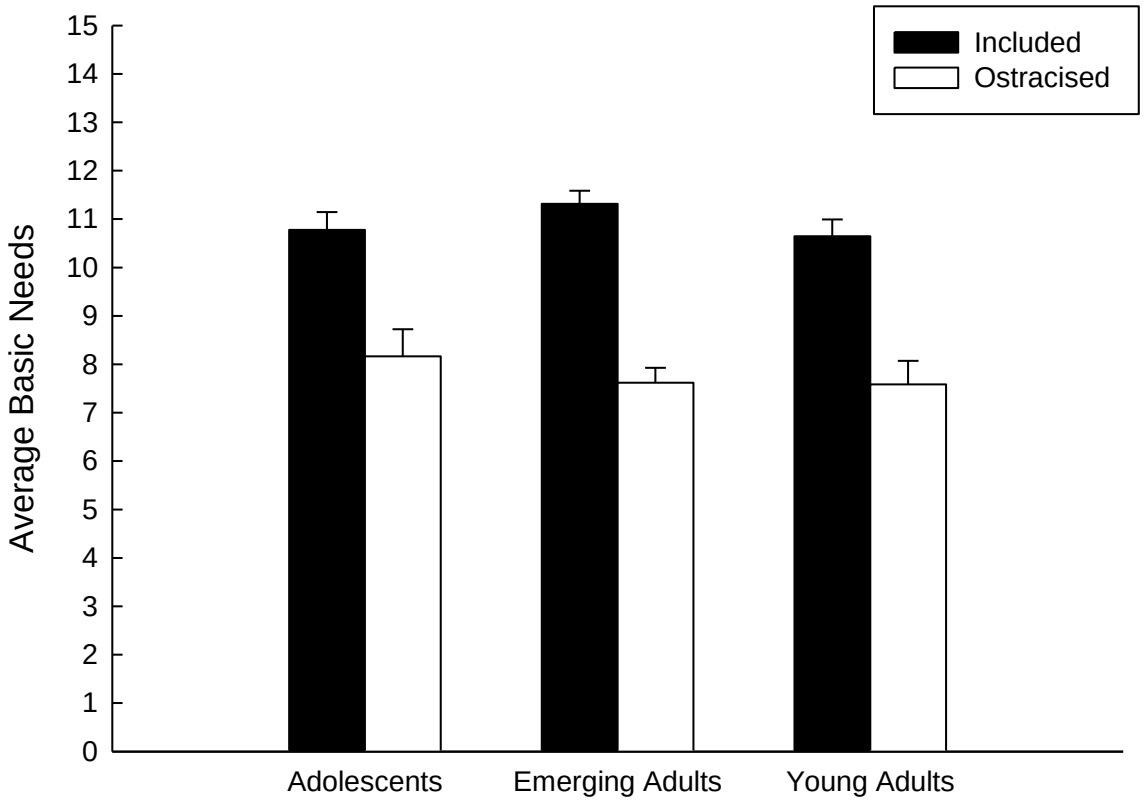

Figure 2.1. Participants' overall basic needs score (+1*SE*) as a function of ostracism condition and age group.

Self-Esteem

Recall that participants' self-esteem was assessed both before and after they played Cyberball. This procedure allowed us to examine whether any post-Cyberball differences in self-esteem between the groups (ostracised or included) was due to ostracism per se, rather than to differences in initial levels of self-esteem. In the present experiment, we measured participants'

pre- and post-Cyberball self-esteem using Robins et al. (2001) single-item measure of global self-esteem, and compared this item with a single item from the post-Cyberball questionnaire with the same wording; "My self-esteem was high." We analysed the self-esteem data using a 3 (Age) × 2 (Ostracism Condition) × 2 (Phase: pre-Cyberball, post-Cyberball) ANOVA with repeated measures over Phase. Any significant effects were further analysed using post hoc Student Newman-Keuls tests ($p < .05$). The analysis revealed a main effect of phase, $F(1, 114) = 5.62$, $p < .05$, $d = .44$, but no other significant effects or interactions. As shown in Figure 2.2, overall, participants' self-esteem declined from pre-Cyberball measurement to post-Cyberball measurement; however, there was not a significant decline in participants' self-esteem as a function of their ostracism condition or their age group.

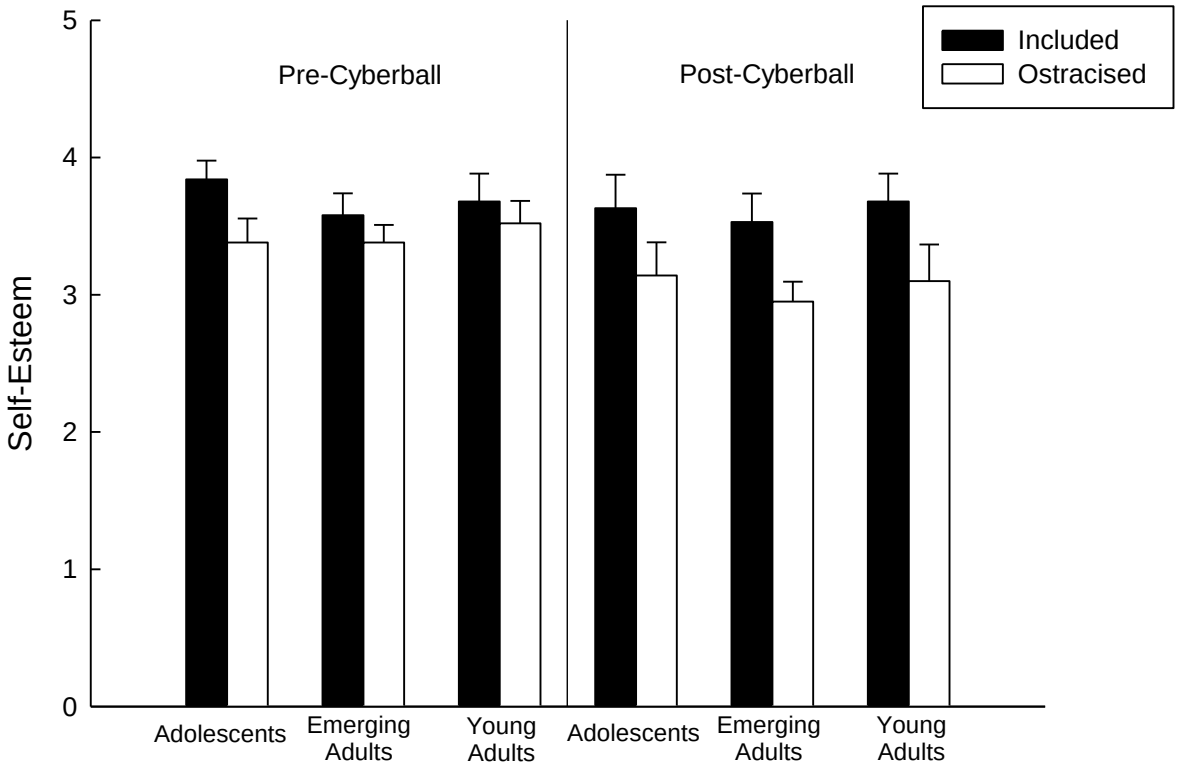

Figure 2.2. Pre-Cyberball and post-Cyberball self-esteem scores (+1*SE*) as a function of age group and ostracism condition.

Group Nomination Paradigm

We were also interested in determining whether ostracised individuals would attempt to regain control of their situation by nominating themselves for group leadership following the Cyberball game. To assess this, we first conducted a chi-square test on the number of participants who nominated themselves as a leader as a function of age group and ostracism condition. Overall, there were no significant differences with respect to age group or ostracism condition, χ^2 (2, N = 120) = .10, *ns*. Regardless of age group or ostracism condition, participants were equally likely to nominate themselves to be the group leader, with 30% of included participants and 38% of ostracised participants nominating themselves.

Despite an overall lack of effect of ostracism on participant's self-nomination scores, we were still interested in examining whether there were differences on the basic needs scores between those individuals who nominated themselves for leadership and those who nominated another player. To do this, we divided our sample into two groups: included and ostracised participants. Table 2.3 shows ostracised and included participants' basic needs scores as a function of whether they nominated another player or themselves for group leadership. Using simple *t*-tests, we compared the basic needs scores of those individuals who nominated themselves for group leadership and those who nominated someone else in both the included group and the ostracised group. As shown in Table 2.3, there was a significant difference in self-esteem scores between ostracised participants who nominated themselves for leadership and ostracised participants who nominated another player, $t(61) = 2.42$, $p < .05$, $d = .64$. That is, ostracised participants who nominated themselves reported lower levels of self-esteem compared to those who nominated another player. There were no other significant differences in basic needs scores for either the included participants (largest $t(55) = .95$, *ns*) or the ostracised participants (largest $t(61) = .76$, *ns*).

Table 2.3

Means (Standard Errors), Ranges, t-values, and Effect Sizes (d) on the Four Basic Needs Measures Between Ostracised and Included Participants as a Function of Their Group Leadership Nomination Choice. A Lower Score Indicates a Greater Aversive Impact on the Basic Needs.

		Included						Ostracised					
		Nominate Other (N = 40)		Nominate Self (N = 17)				Nominate Other (N = 39)		Nominate Self (N = 24)			
	Max Score	Mean Score	Range	Mean Score	Range	*t*	*d*	Mean Score	Range	Mean Score	Range	*t*	*d*
Belonging	15	12.05 (.32)	3-15	11.71 (.57)	3-15	.56	-	7.41 (.49)	3-15	7.89 (.61)	3-15	.59	-
Self-Esteem	15	10.78 (.39)	3-15	10.12 (.66)	3-12	.89	-	8.87 (.41)	3-15	7.38 (.41)	3-12	2.42*	.64
Control	15	8.05 (.41)	3-15	7.71 (.55)	3-10	.48	-	6.05 (.43)	3-15	5.58 (.38)	3-10	.75	-
Meaningful Existence	15	13.25 (.32)	3-15	12.76 (.50)	3-15	.82	-	9.46 (.53)	3-15	9.04 (.66)	3-15	.50	-

*$p < .05$.

Given that we found a relation between self-esteem and group leadership in our ostracised participants, we were interested in determining whether these individuals actually experienced a greater decline in their self-esteem compared to those who nominated another player for leadership. That is, we wanted to compare the decline in ostracised participants' self-esteem scores as a function of whether they nominated themselves or another for group leadership. We therefore calculated the magnitude of the change in self-esteem for each ostracised participant by subtracting his or her pre-Cyberball self-esteem score from his or her post-Cyberball self-esteem score. A positive change score indicated that participants' self-esteem increased pre-Cyberball to post-Cyberball; a negative change score indicated that participants' self-esteem decreased pre-Cyberball to post-Cyberball. The analysis revealed a significant difference (albeit a modest effect) in self-esteem change scores between the ostracised participants who nominated another player for leadership (M = -.13, SE = .17) compared to those who nominated themselves (M = -.75, SE = .24); Ostracised participants who nominated themselves for group leadership exhibited greater declines in their self-esteem from pre-Cyberball to post-Cyberball $t(61) = 2.19$, $p < .05$, $d = .34$.

Discussion

A number of researchers have demonstrated a strong link between ostracism and general declines in psychological well-being across the four basic needs, including the feeling of control (Bastian & Haslam, 2010; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; Sebastian et al., 2010; van Beest & Williams, 2006; Warburton et al., 2006; Wesselmann et al., 2009; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004). Williams (1997, 2001) proposed that following a decline in well-being, individuals will try to buffer their sense of well-being by attempting to re-affirm those needs that have been threatened. One prediction that emerges from this theory is that ostracised individuals will exhibit an increased desire to take control of a situation in order to make themselves feel better (Williams, 2001). The present experiment was designed to test this prediction. Specifically, we assessed whether participants would attempt to exert leadership over a social situation following an experience of ostracism.

Overall Effects of Ostracism

Consistent with prior research (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004), we found that ostracised participants reported significantly lower values on the four basic needs (belonging, self-esteem, control, and meaningful existence) compared to included participants. Adolescent, emerging-adult, and young-adult participants who were ostracised all displayed significantly more need threat relative to the included participants. Ostracism was also found to influence participants' self-reported mood levels, with ostracised participants reporting more hurt feelings, more feelings of anger, a stronger bad mood, and lower feelings of good mood than included participants.

In the present experiment, we obtained two surprising findings: First, there were no significant differences in ostracism sensitivity as a function of age group, and second, we found no pre- to post-Cyberball effect of ostracism on participants' self-esteem ratings

Developmental Differences in Sensitivity to Ostracism

Research conducted within our own laboratory (Pharo et al., 2011), and elsewhere (Gross, 2009; Sebastian et al., 2010) has shown that, compared to young-adults, adolescents and emerging-adults appear to be at an increased risk of experiencing negative effects following ostracism. In the present experiment, however, we found no such effect; the adolescent, emerging-adult, and young-adult participants were all equally negatively affected by the experience of ostracism. This result is somewhat unexpected, and does not support prior findings. One possible explanation for this result may lie in the timing of the recruitment of the participants in this experiment. As outlined in Pharo et al. (2011) the emerging-adult sample in that experiment were all first-year university students recruited and tested at the beginning of their first semester – a period of transition that is particularly important in an individual's social development. In contrast, the adolescent and emerging-adult participants in the present experiment were recruited over the course of an academic year and therefore they may have been more established in their social circles, and more socially confident. Taken together, the results of the present experiment and those obtained in prior research highlight the fact that age-related changes in participants' sensitivity to ostracism sensitivity is complex; the magnitude of the effect is apparently influenced by a number of developmental and social factors.

Changes in Self-esteem

Pharo et al. (2011), and Gross (2009) also documented a decline in participants' post-Cyberball self-esteem ratings following ostracism. In the present experiment, although we found that participants' self-esteem levels declined overall when they were measured at the post-Cyberball phase, this decline did not differ as a function of ostracism condition. This finding is

somewhat surprising and is difficult to explain given both prior research (Gross, 2009; Pharo et al., 2011), and subsequent research in this thesis (see Chapters 2 and 3). Although there was not the predicted effect of ostracism condition on self-esteem, within the ostracism condition, the degree of decline in self-esteem did predict participants' willingness to nominate themselves for group membership (see below).

Ostracism and Leadership

Contrary to our original expectations, and the predictions outlined by Williams (2001), as a group, ostracised participants were no more likely to nominate themselves for group leadership than were the included participants, with 30% of included participants and 38% of ostracised participants nominating themselves for group leadership. Despite reporting declines on all four basic needs, ostracised individuals were no more likely to attempt to regain their sense of control by taking leadership in a group situation. Although there was no overall group difference in leadership scores, those individuals in the ostracism condition who *did* nominate themselves for group leadership reported significantly lower self-esteem scores compared to those ostracised participants who nominated another player for group leadership. Furthermore, there was no significant difference in self-esteem scores in the included participants as a function of their self-nomination choice. Therefore, those individuals in the ostracism condition who experienced the largest negative effects on their self-esteem actually displayed an increased desire to exert leadership over their group.

Our results have several important implications for current models of ostracism. First, Williams (2001) predicted that, following ostracism, individuals will attempt to regain their lost sense of control (Williams, 2001, p. 64). In our sample, however, despite the fact that ostracised participants reported a significant decline on all four of the basic needs measures (including their sense of control), they were no more likely to nominate themselves for a position of leadership than the included participants. Furthermore, even when we looked only at participants as a

function of whether they did or did not nominate themselves for group leadership, we found no difference in their basic needs scores, including their need for control. The one predictive relation that we did identify involved self-esteem. In our ostracised participants, those participants who chose to take leadership over their situation had lower self-esteem scores following ostracism than did participants who chose to nominate themselves as the leader. This finding suggests that these individuals with particularly low self-esteem may have been attempting to restore their diminished sense of self-esteem by exerting leadership over other members of their group; a finding that is consistent with Williams' (2001) theory.

The present findings have important implications for the treatment of individuals who have experienced ostracism. In the present experiment, ostracised individuals were given the opportunity to engage in a behaviour that could potentially enhance their psychological well-being, but not all of them took that opportunity. Consistent with this finding, Williams and Nida (2011) have argued that individuals who experience real-world ostracism often engage in self-imposed social withdrawal as a mean of coping with their hurt feelings, which ultimately leads to high levels of depression, and suicidality. In terms of practical application, our data suggest that some ostracised individuals will need to be encouraged to take control when the opportunity presents itself; they may not simply step up on their own.

In the present experiment, low self-esteem following ostracism was related to the propensity of participants to nominate themselves for group leadership. The term self-esteem refers to an individual's perception of his or her own self-worth (Reber & Reber, 2001), and it is viewed by many psychologists to be an essential determinant of perceived competence, and general mental well-being (Leary, Tambor, Terdal, & Downs, 1995; Sommer, 2001; Williams & Zadro, 2001). Theorists commonly agree that an individual's self-esteem is largely influenced by their evaluation from others, with high self-esteem resulting from perceived social acceptance (Leary et al., 1995). From this perspective, it is argued that ostracism has a negative impact on an

individual's self-esteem because it challenges their perception of acceptance, which in turn leads to a perception of inferiority relative to others (Leary et al., 1995; Williams, 2001).

Theorists also commonly agree that following ostracism, individuals will go to great lengths to restore their self-esteem (Leary et al., 1995; Sommer, 2001; Williams, 2001; Williams & Nida, 2011). For example, Williams and Nida (2011) have argued that one of the first responses to ostracism is for an individual to evaluate their situation and to determine whether re-inclusion is a viable option in their social setting. Then, if re-inclusion is possible, Williams and Nida argue that negative feelings of belonging and self-esteem will drive an individual to strive for re-inclusion by participating in behaviours that could foster positive social interactions with other people (Williams & Nida, 2011). Furthermore, Williams (2001) argued that, following ostracism, individuals may attempt to regain their lost self-esteem by increasing their own sense of self-importance (Williams, 2001, p. 64).

Consistent with Williams' theoretical argument, there are several studies showing a relation between leadership and improved self-esteem (Beinecke & Spencer, 2007; Grasso & Haber, 1996; Martel, 1992). For example Martel (1992) examined the efficacy of an after-school leadership training programme in a group of Canadian high school students. Participants attended a series of eight workshops in which they learned a number of leadership and interpersonal skills including communication, group-dynamics, decision-making, problem-solving, values clarification, personal development, and planning. In addition, participants completed several self-report measures assessing both leadership qualities and self-esteem. Martel (1992) compared the results to those of a wait-list control group, and found that those students who had undergone the eight workshops reported significantly higher leadership traits and significantly higher levels of self-esteem. Martel (1992) concluded that leadership training has a positive influence on participants' overall self-esteem. It is also relevant to note that a number of psychological treatments aimed at improving patients' self-esteem attempt to foster

interpersonal skills consistent with those personal qualities found in a good leader such as communication skills, problem-solving, and decision-making (Beck, 2005; Taylor & Montgomery, 2007).

In conclusion, the literature suggests that assigning leadership roles does improve one's self-esteem; however, it remains to be determined whether assigning leadership roles will ameliorate the negative effect of ostracism on individuals' self-esteem and general psychological well-being. In the present experiment, individuals who experienced the greatest negative impact of ostracism on their self-esteem were most likely to nominate themselves as a group leader, and this poses an interesting starting point for researchers to investigate this issue further.

Chapter 3

The Relation Between Ostracism and Risk-Taking Behaviour in Emerging Adulthood.

Ostracism – the experience of being ignored or excluded by one's peers – is a potent negative social experience (Williams & Nida, 2011). As discussed in Chapter 1, researchers have consistently documented a strong negative effect of ostracism on four facets of individuals' psychological well-being--their self-esteem, sense of control, feelings of belonging, and sense of a meaningful existence--which are collectively known as the four basic needs (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Gross, 2009; Jamieson et al., 2010; Krill et al., 2008; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; Sebastian et al., 2009; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Wirth et al., 2010; Zadro et al., 2006; Zadro et al., 2004).

In addition to the psychological effects of ostracism, researchers have also established a link between ostracism and a number of negative behavioural outcomes (Chow et al., 2008; Oaten et al., 2008; Warburton et al., 2006). For example, ostracism has been linked to increased social compensation (Williams & Sommer, 1997), an increased propensity for aggressive behaviour (Warburton et al., 2006), increased anti-social behaviour (Chow et al., 2008), a decreased capacity for self-regulatory behaviour (Oaten et al., 2008), and increased non-conscious mimicry (Lakin et al., 2008).

One aspect of behaviour that has received surprisingly little scientific attention in the field of ostracism research is the potential link between ostracism and risk-taking behaviours. From a developmental perspective, risk-taking is highly relevant because the rapid increase in a number of risk-taking behaviours such as substance abuse, unprotected or promiscuous sex, and reckless driving behaviour are some of the main contributors to the dramatic increase in

morbidity and mortality rates during adolescence and emerging-adulthood (Arnett, 1992; Moffitt, 1993). Furthermore, peer influence during this developmental period is one of the biggest external predictors of a number of risk-taking behaviours including alcohol abuse (Guo et al., 2009), smoking (Ali & Dwyer, 2009; Bauman et al., 2001), and drug use (Andrews et al., 2002; Barber et al., 1999; Maxwell, 2002). Given the importance of peers during adolescence and emerging-adulthood, interactions involving peers, including negative interactions like ostracism, might play an important role in risk taking. Despite the potential link between ostracism and risk taking, very few researchers have examined the relation between the two.

In one notable study, Twenge, Catanese, and Baumeister (2002) documented a relation between social exclusion – a social experience that shares a number of parallels with ostracism – and an increased propensity for risk-taking. On the basis of these data, we might predict that ostracism would lead to an increase in risky behaviour. Alternatively, given what we know about the effects of ostracism on self-esteem, we might also predict that ostracism would lead to a decrease in risky behaviour. Ostracism has consistently been shown to have a negative effect on individuals' self-esteem (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Gross, 2009; Jamieson et al., 2010; Krill et al., 2008; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; Sebastian et al., 2009; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Wirth et al., 2010; Zadro et al., 2006; Zadro et al., 2004). Furthermore, low self-esteem has been shown to be related to lower levels of risk-taking behaviour (Spear, 2000; Vavrik, 1997). For example, Vavrik (1997) assessed self-esteem in two groups of young male drivers aged 16 to 21 years: a high-risk group of drivers who had two or more at-fault accidents in their last 1-2 years of driving, and a low-risk group of drivers. Vavrik found that the low-risk drivers scored significantly lower than did high-risk drivers on measures of self-esteem, affiliation, desirability, dominance, and exhibition. Therefore, given that ostracism leads to lower levels of self-esteem, and that lower levels of self-esteem have been

related to decreased risk-taking behaviour, we might predict that ostracism would reduce an individual's propensity for risky-behaviour.

In the present experiment, we assessed the relation between ostracism and risk-taking under experimental conditions using a laboratory-based analogue of risk-taking behaviour – The Balloon Analogue Risk Task (BART; Lejuez et al., 2002). Furthermore, given that we failed to find any age-related differences in participants' sensitivity to the effects of ostracism in Chapter 2, and based on the fact that previous experiments have shown that emerging-adults may be particularly sensitive to the effects of ostracism (Pharo et al., 2011), we chose to focus our investigation on the emerging-adult age group.

Method

Participants

A total of 80 (40 males, 40 females) 18- to 20-year-old emerging-adult participants (mean age = 18.59 years, *SD* = .95) took part in this experiment. Due to technical difficulties, two female participants were unable to complete the experiment; their data were therefore removed from the analysis leaving a total sample of 78 participants (40 males, 38 females). Participants were instructed to attend the experiment with three of their close friends of the same sex. Participants were recruited in this manner to ensure that all individuals were similarly affiliated with the other people in their group. The participants were all students at the University of Otago, Dunedin, New Zealand, and they were paid between $13 and $25 (NZ) for their participation in the experiment.

Measures

There were three phases of the experimental procedure: 1) a pre-Cyberball phase, 2) a Cyberball phase, and 3) a post-Cyberball phase.

Pre-Cyberball Phase

In the pre-Cyberball phase, participants' peer affiliation, self-esteem, involvement in real-life risk-taking behaviours, and risky personality traits were assessed.

Peer Affiliation

Peer affiliation was assessed using Doosje, Spears, and Koomen's (1995) 4-item measure of peer affiliation, in which participants rate their level of agreement with 4 statements of peer affiliation such as "I see myself as a member of the group that I came in with today" using a 7-point Likert scale (1 = do not agree at all, 7 = agree completely).

Self-Esteem

As in Chapter 2, pre-Cyberball self-esteem levels were assessed using Robins, et al.'s (2001) single-item measure of global self-esteem.

Real-Life Risk taking

Participants completed a two-part self-report questionnaire, the *Life Experiences Questionnaire (LEQ)*, that was designed to assess the degree of risk-taking behaviour that they had engaged in during their lifetime. The first part of the LEQ consisted of the Zuckerman and Kuhlman Life Experiences Questionnaire (ZK-LEQ; Zuckerman & Kuhlman, 2000). Participants were asked to answer questions about their degree of involvement in 5 areas of risky behaviour: cigarette smoking (4 items, e.g., "At what age did you begin smoking?"), drug use (4 items, e.g., "How often have you used marijuana or hashish during the past year?"), sexual behaviour (3 items, e.g., With how many different persons have you had sexual intercourse with during the last 12 months?), driving an automobile (6 items, e.g., "Have you ever driven at a speed in excess of 20 kmph over the legal speed limit?), and being a passenger in an automobile (4 items, e.g., "How often have you been a passenger in a car with an unlicensed, or a learner/restricted-licensed driver who is breaking the conditions of their license?").

The second part of the LEQ comprised a modified and shortened version of the Self-Report Early Delinquency scale (SRED; Moffitt & Silva, 1988), which was originally designed to capture self-reports of illegal and antisocial behaviours from New Zealand adolescents. The Modified Self-Report Early Delinquency scale (M-SRED) consisted of 9 items, which assessed participants' degree of involvement in the areas of school delinquency, vandalism and sabotage, theft, trespass, fighting and weapons use, and animal cruelty.

Risky Personality

Participants also completed the Zuckerman and Kuhlman Personality Questionnaire – Short Form (ZKPQ-SF; Zuckerman et al., 1993). The ZKPQ consists of 35 true/false questions and generates five personality ratings: Impulsive Sensation-Seeking (ImpSS), Neuroticism-Anxiety (N-Anx), Aggression-Hostility (Agg-Host), Activity (Act), and Sociability (Sy). Research has shown that

high scores on the ImpSS, Agg-Host, and Sy categories are indicative of a high risk-taking personality type (Zuckerman & Kuhlman, 2000).

Cyberball Phase

Cyberball

As in Chapter 2, ostracism was manipulated using *Cyberball* (Williams et al., 2000). In the present experiment, participants were told that they were playing Cyberball over a computer network with the other members of their group, in reality the other three players were all controlled by the computer. Similar to the methodology described in Chapter 2, participants were represented by their photo, and above it, the name, "You." The other three computer-controlled characters were represented by the photos of the other three group members and the names, "Player 1," "Player 2," and "Player 3." Participants were randomly allocated in equal numbers to either the ostracism group or to the inclusion group such that within each group of four, there were two included and two ostracised participants.

Post-Cyberball Phase

Post-Cyberball Questionnaire

After playing Cyberball, participants' four basic needs were assessed using the same post-Cyberball questionnaire described in Chapter 2.

Balloon Analogue Risk Task

Participants were also asked to play the Balloon Analogue Risk Task (BART; Lejuez et al., 2002) – a laboratory-based computer game used to assess risk-taking behaviour. The BART simulates blowing up a balloon, where the risk of the balloon exploding increases with each click of the mouse. This behavioural task was developed for use as an assessment of risk-taking tendencies in conjunction with other assessment methods such as self-report questionnaires (Lejuez et al., 2002).

Each participant was asked to carefully read the onscreen written instructions before beginning the game. They were then presented with full written instructions, followed by a bullet-point summary of the same instructions. Participants each completed 30 trials, and on each trial, they were presented with a new un-inflated balloon. Participants were instructed that they would see 30 balloons, one after the other, and that for each balloon, they could pump the balloon up by clicking (using the mouse) on a box that was presented on the screen.

Participants were told that some balloons might pop after only one pump, but that others might not pop until they filled the whole screen. Participants earned 2 cents per pump, but when a balloon popped, they lost all the money that they earned on that balloon. To collect the money from a balloon, they had to stop pumping the balloon before it popped, and click on the box labelled "Collect $$$." A new balloon appeared once a balloon had popped, or the participant chose to collect the money that had been earned on that balloon.

The total money accrued was shown to the participants on the screen and was adjusted each time the participant clicked "Collect $$$," but participants were not shown how much they were earning on each balloon. Participants were paid the full amount they earned on the game. On each trial, the computer recorded the number of pumps per balloon.

Procedure

Consistent with previous cover stories that have been used in Cyberball research in the past (Williams et al., 2000), after arriving at the laboratory, participants were told that they would be taking part in an experiment that was designed to assess their ability to mentally visualize a virtual-reality scenario. They were told that they would play a brief computer game with the three other members of their group over a computer network which involved a simple game of ball-toss. Participants were told that small mug-shot photographs would be taken and uploaded to the computer network so that players could see where the other participants were on the game. Photos were taken of all the group members, and then we loaded their photos

onto the computer system. After the experimenter returned, participants were taken to separate rooms, and were seated in front of a computer which presented the remainder of the instructions to them.

Participants were first administered the remaining pre-Cyberball measures (peer affiliation, self-esteem, LEQ, and ZKPQ-SF). Once they had completed the pre-Cyberball measures, participants were introduced to the Cyberball computer game. Participants were told to read the introductory screen instructions and to pay particular attention to the instruction that they should mentally visualize the entire experience. This was done to distract the participants from the true nature of the game. After playing Cyberball, participants were administered the post-Cyberball measures (post-Cyberball questionnaire, BART). Participants were then debriefed on the true nature and purpose of the experiment and were free to leave.

Coding

Participants' peer-affiliation scores were obtained by adding each participant's ratings across all items. Participants' scores on the pre-ostracism self-esteem measure were coded by obtaining their single item rating. A high score corresponded to a high level of peer-affiliation or self-esteem. Participants' responses on the ZKPQ-SF were coded according to the guidelines provided (Zuckerman et al., 1993).

Participants' scores on part one of the LEQ were obtained by allocating scores on a five-point scale ranging from zero to four for each section item. A score of four was given for high-end risk-taking, while a score of zero constituted no presence of risk-taking behaviour. For example, on one of the Driving items, participants were asked how often they had driven without a license or broken the conditions of a learners or restricted license. If participants answered 'never,' then they received a score of 0, as no risk was associated with this behaviour. Conversely, participants who responded '7 or more times' received a score of 4.

The scoring of participants' responses on the second section of the LEQ (the M-SRED) was conducted in a similar manner to the scoring of part one of the LEQ, although the scale options differed in order to match the different item response options. For example, on the Vandalism item, participants were asked if they had ever illegally damaged property; three responses were possible: 'never,' 'yes – once,' or 'yes – more than once.' These responses received scores of 0, 2, and 4, respectively.

As described in Chapter 2, participants' scores on the post-Cyberball questionnaire were calculated by obtaining the sum of participants' ratings for each of the independent factors measured (sense of belonging, degree of hurt feelings, self-esteem, meaningful existence, control, anger, mood, and their perception inclusion status).

Participants' scores on the post-Cyberball questionnaire item, "My self-esteem was high," were used as a measure of post-Cyberball self-esteem (with a high score indicating a high level of self-esteem). Finally, for the BART, we calculated 2 scores for each participant: 1) participant's total number of balloon pumps during the game, and 2) the average number of pumps per balloon.

Results

Method of analysis

All data, unless otherwise specified, were analyzed using a *t*-test to compare differences between ostracised and included participants on all of the measures[3].

Peer Affiliation

Participants were asked to attend the experiment with three close friends. Participants in both the included condition (M = 23.26, *SE* = .78) and ostracism condition (M = 23.85, *SE* = .75) reported high levels of peer affiliation with the other members of their group (maximum possible score = 28), and their degree of affiliation did not differ as a function of their experimental group, $t(76) = .56$, *ns*.

Manipulation Checks

Recall that there were three manipulation checks included in the post-Cyberball questionnaire. The manipulation checks were analyzed to check that participants correctly perceived that they had been included or ostracised. As shown in Table 3.1 (top panel), participants in the ostracism condition reported that they felt significantly more ignored and more excluded than did participants in the inclusion condition (smallest *t* was for feeling ignored, $t(76) = 10.68$, $p < .01$, $d = 2.45$). Participants in the ostracism condition also reported that they received fewer throws of the ball during the game than did participants in the inclusion condition, $t(76) = 10.14$, $p < .01$, $d = 2.33$. Taken together, these data indicate that participants in the ostracism condition correctly detected that they had been ostracised during the game.

[3] We have used Cohen's (1988) measures of effect size to indicate the meaningfulness of significant effects; for *F*-tests and *t*-tests, effect size = *d.* According to Cohen, effect sizes of *d* = .20 indicate a 'small' effect, effect sizes of *d* = .50 indicate a 'medium' effect, and effect sizes of *d* = .80 indicate a 'large' effect.

Emotional State Measures

We also examined participants' scores on several measures of emotional state from the post-Cyberball questionnaire: hurt feelings, anger, bad mood, and good mood. As shown in Table 3.1 (bottom panel), there was a significant difference in participants' scores on all four variables as a function of ostracism condition. Specifically, participants in the ostracism condition reported having more hurt feelings, more feelings of anger, higher bad mood, and lower good mood scores than did participants in the included condition (smallest t was for good mood, $t(76) = 4.50$, $p < .01$, $d = 1.03$).

Basic Needs

The next step in the analysis was to examine participants' scores on the measures of four basic needs; Belonging, Self-Esteem, Control, and Meaningful Existence. Following previous research on ostracism, we examined the internal consistency of the basic need measures. The internal consistency across the basic needs scores was high (Cronbach's alpha = .86), therefore the average of the four basic needs scores was calculated to create an overall basic needs score for each participant. Table 3.2 shows participants' mean scores on each of the four basic needs, and their overall average basic needs score as a function of ostracism condition (ostracised or included). As shown in Table 3.2, there was a significant difference between ostracised and included participants' basic needs scores, with ostracised participants consistently reporting a greater aversive impact on their basic needs (smallest t was for Self-Esteem, $t(76) = 5.21$, $p < .01$, $d = 1.20$).

Table 3.1

Means (Standard Errors), Ranges, t-Values, and Effect Sizes (d) Between Ostracised and Included Participants on the Manipulation Check Measures and the Post-Cyberball Emotion Measures. For the Emotion Measures, a High Score Indicates a Greater Experience of That Emotion.

			Included (n = 38)		Ostracised (n = 40)			
		Max Score	Mean Score	Range	Mean Score	Range	*t*	*d*
Manipulation Checks	I was ignored	5	1.34 (.11)	1-4	4.03 (.22)	1-5	10.68**	2.45
	I was excluded	5	1.34 (.09)	1-3	4.22 (.18)	1-5	13.71**	3.13
	What percentage of throws do you think you received?	-	24.34 (1.28)	8-60	8.29 (.94)	2-25	10.14**	2.33
Emotional State Measures	Hurt feelings	5	1.21 (.09)	1-3	2.85 (.23)	1-5	6.67**	1.54
	Anger	5	1.32 (.09)	1-3	2.35 (.17)	1-5	5.35**	1.23
	Bad mood	20	5.63 (.33)	4-13	9.58 (.66)	4-18	5.25**	1.20
	Good mood	20	16.50 (.46)	9-20	12.58 (.73)	4-20	4.50**	1.03

**$p < .01$.

Table 3.2

Means (Standard Errors) Ranges, t-Values, and Effect Sizes (d) on the Four Basic Needs Measures and Overall Basic Needs Scores Between Ostracised and Included Participants. A Lower Score Indicates a Greater Aversive Impact of Ostracism.

		Included (n = 38)		Ostracised (n = 40)			
	Max Score	Mean Score	Range	Mean Score	Range	*t*	*d*
Belonging	15	12.82 (.34)	3-15	7.08 (.54)	3-15	8.94**	2.05
Self-esteem	15	11.32 (.37)	6-15	8.23 (.46)	3-15	5.21**	1.20
Control	15	7.87 (.47)	3-15	4.88 (.33)	3-10	5.29**	1.21
Meaningful existence	15	13.47 (.32)	8-15	9.55 (.55)	3-15	6.08**	1.39
Average Basic Needs	15	11.37 (.24)	8-14	7.43 (.39)	3-13	8.46**	1.95

**$p < .01$.

The Belonging and Meaningful Existence basic needs are shown reverse scored.

Self-Esteem

As described earlier, we assessed participants' self-esteem both before and after they played Cyberball. This allowed us to examine whether any post-Cyberball differences in self-esteem between the groups (ostracised or included) was due to ostracism per se, rather than the two groups having different initial levels of self-esteem. We measured participants' pre-Cyberball self-esteem using Robins, et al.'s (2001) single-item measure of global self-esteem and compared this to a single item from the post-Cyberball questionnaire with the same wording; "My self-esteem was high." We analyzed the self-esteem data using a 2 (Ostracism Condition: Ostracised, Included) × 2 (Phase: pre-Cyberball, post-Cyberball) analysis of variance (ANOVA) with repeated measures over Phase. Any significant effects were further analyzed using post hoc Student Newman-Keuls tests ($p < .05$). There were main effects of ostracism condition, $F(1, 76) = 4.33$, $p < .05$, $d = .48$, and phase, $F(1, 76) = 8.31$, $p < .01$, $d = .66$. However, these was qualified by a Phase × Ostracism Condition interaction, $F(1, 76) = 12.68$, $p < .01$, $d = .82$. As shown in Figure 3.1, ostracised participants exhibited a decline in their self-esteem ratings following Cyberball, while included participants showed no change at all.

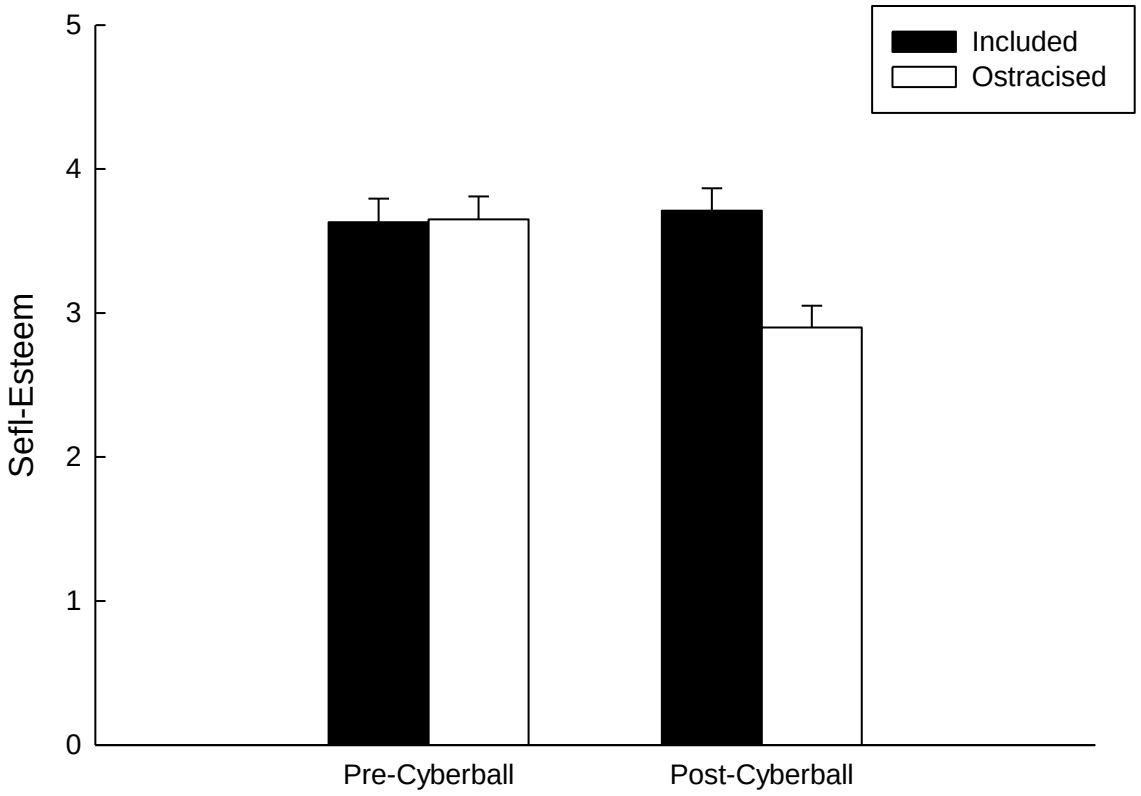

Figure 3.1. Pre-Cyberball and post-Cyberball self-esteem scores (+1*SE*) as a function of ostracism condition.

Risk-Taking

To examine the link between ostracism and risk-taking, we first wanted to ensure that all participants were equivalent in terms of their general propensity for risk-taking. To do this, we compared ostracised and included participants' scores on each of the items of the LEQ (Smoking, Drugs, Sex, Risky Driving Behaviour, Risky Passenger Behaviour, Antisocial Behaviour, and Positive Risk-taking Behaviour), and on the ZKPQ measures of risky personality. There were no significant differences between included and ostracised participants on any of these measures (largest *t* was for the Driving section of the LEQ, $t(74) = 1.41$, *ns*). Thus, any group differences on the laboratory-based measure of risk taking, the BART cannot be attributed to group differences in the propensity to take risks more generally or to group differences in risky personality.

We then examined the difference between ostracised and included participants' risk-taking scores as measured on the BART. Participants received two risk-taking scores on the BART: 1) their total number of balloon pumps during the game, and 2) the average number of pumps per balloon. Table 3.3 shows participants' total number of pumps and their average number of pumps as a function of ostracism condition. As shown in Table 3.3, there was a significant difference between ostracised and included participants' total pumps score, $t(76) = 2.27$, $p < .05$, $d = .52$. Participants in the ostracism condition made approximately 100 fewer total balloon pumps over the course of the game compared to participants in the included condition. Furthermore, there was a significant difference between the average number of balloon pumps that were made by ostracised and included participants ($t(76) = 2.08$, $p < .05$, $d = .48$), with ostracised participants making fewer average pumps per balloon compared to included participants.

Table 3.3
Means (Standard Errors) Ranges, t-values, and Effect Sizes (d) on the Total Number of Pumps and Average Number of Pumps on the BART for Ostracised and Included participants. A Higher Score Indicates a Greater Level of Risk-Taking Behaviour.

	Included (n = 38)		Ostracised (n = 40)			
	Mean Score	Range	Mean Score	Range	*t*	*d*
Total number of pumps	788.68 (39.14)	50-1224	678.08 (29.59)	217-1058	2.27*	.52
Average number of pumps	41.09 (2.43)	2-70	34.86 (1.79)	9-60	2.08*	.48

*$p < .05$.

Discussion

Researchers have shown that ostracism negatively affects participants' self-reported levels of belongingness, self-esteem, control, and meaningful existence; aspects of human nature which Williams (2001) referred to as basic needs. Researchers have also documented a link between ostracism and a number of negative behavioural outcomes including increased social compensation (Williams & Sommer, 1997), increased aggression (Warburton et al., 2006), increased anti-social behaviour (Chow et al., 2008), decreased self-regulation (Oaten et al., 2008), and increased non-conscious mimicry (Lakin et al., 2008). Furthermore, researchers have reported a link between rejection, and increased risk-taking (Twenge et al., 2002). However, to date, no studies have examined this relation using an ostracism paradigm. The aim of the present experiment was to investigate the relation between ostracism and risk-taking in the laboratory.

Ostracism and Self-Reported Well-Being

Consistent with the findings from previous research (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004), we found a strong effect of ostracism on participants' self-reported levels of the four basic needs (belonging, self-esteem, control, and meaningful existence); participants who were ostracised displayed significantly greater need-threat relative to the included participants. Ostracism also influenced participants' self-reported mood levels; participants in the ostracism condition reported experiencing a greater degree of hurt feelings, anger, bad mood, and lower feelings of good mood compared to participants in the included condition. Furthermore, by comparing pre- and post-Cyberball levels of self-esteem, we found a significant relation between ostracism and participants' self-esteem; prior to playing Cyberball, there was no difference in self-esteem between participants in the inclusion and ostracism

conditions. However, after playing Cyberball, ostracised participants reported a significant decrease in their self-esteem levels while participants in the inclusion condition did not. These findings add to the already large body of literature documenting the strong negative effect that laboratory-based experiences of ostracism have on an individual's psychological well-being. As Williams (2007a) has frequently argued, ostracism is painful.

Ostracism and Risk-Taking.

Having established a clear negative effect of ostracism on participants' psychological well-being, we next examined whether ostracism would influence participants' propensity for risk-taking behaviour. Interestingly, based on prior research, we could predict that the effect of ostracism on risk-taking might be either positive or negative. Given the relation between peer influence and risk-taking behaviour, we could hypothesize that ostracism may lead to an *increase* in risk-taking behaviour. Alternatively, given that elevated self-esteem and risk-taking are related, and that ostracism has been shown to negatively impact on individuals' self-esteem ratings, we could also hypothesize that ostracism would lead to a *decrease* in risk-taking. In the present experiment, we found a significant negative effect of ostracism on risk-taking. That is, ostracised individuals were less likely to take risks on the BART compared to included participants.

The negative relation between ostracism and risk-taking behaviour suggests that ostracism might contribute to introverted behaviour. As Williams and Nida (2011) point out, the negative psychological impact of ostracism can cause an individual to withdraw from the outside world, and over the long-term, to exhibit a form of learned helplessness. This notion is further supported by the fact that the ostracised participants in our experiment reported significant declines in their self-esteem. There are a number of studies documenting the link between low self-esteem and learned helplessness (Brewin, 1986; Brewin & Furnham, 1986; Heyman, Dweck, & Cain, 1992; McMullen & Krantz, 1988; Sinha & Gupta, 2006). Furthermore, researchers have

also shown a positive relation between higher levels of self-esteem and increased motivation (McGregor, Gailliot, Vasquez, & Nash, 2007; Murphy & Roopchand, 2003). It seems that low self-esteem, at least in part, played a role in the decreased levels of risk-taking behaviour that was exhibited by our ostracised sample.

Reduced Risk-Taking – Implications.

The relation between ostracism and risk-taking that was observed in this experiment is intriguing. Risk-taking behaviour is largely considered to be a negative behaviour. As mentioned previously, risk-taking is believed to account for the large increase in morbidity and mortality during adolescence and emerging-adulthood (Arnett, 1992; Moffitt, 1993). From this perspective, the fact that we observed a decrease in risk-taking could, in some ways, be considered a positive outcome of an otherwise negative experience. However, it is important to acknowledge that although risk-taking is generally considered in the context of negative behaviours, there is also evidence that a moderate degree of risk-taking may lead to some positive developmental advantages. For example, Maggs, Almeida, and Galambos (1995) found that higher levels of antisocial and risk-taking behaviours in 11- to 15-year-old adolescents was associated with higher levels in peer involvement and social acceptance. Similarly, Shedler and Block (1990) investigated the long-term relation between drug use and psychological adjustment in a longitudinal sample who were followed from preschool to 18 years of age. They found that adolescents who "experimented" with marijuana (classified as those who used marijuana once a month or less) actually displayed greater social functioning during childhood and greater social adjustment during adolescence compared to abstainers and frequent drug-users. Furthermore, the abstainer and the experimenter groups showed identical high school grade point averages. These findings suggest that those adolescents who participate in mainstream, peer-approved levels of risky behaviour, such as experimental or social marijuana use, tend to be socially adept, confident, and popular individuals. Conversely, in Shedler and Block's study, adolescents who

used drugs frequently were maladjusted and socially alienated. Interestingly, those participants who, by age 18, had never experimented with any drug were relatively anxious, emotionally limited, and lacking in social skills in comparison to experimenters. It is important to note that this by no means condones the use of drugs or that moderate forms of delinquent behaviour should be encouraged. However, if there are positive outcomes associated with these behaviours, then understanding the constructive as well as the destructive aspects of delinquent behaviour is important.

While an isolated incident of decreased risk-taking behaviour (as observed in this experiment) is not necessarily a negative outcome, if this finding is considered in the context of long-term exposure to ostracism, then the data start to paint a grimmer picture. Williams and Nida (2011) have argued that long-term exposure to ostracism results in social withdrawal. It may be that a decreased propensity for risk-taking is one of many mechanisms that underlie this overall withdrawal. By decreasing their propensity for risk-taking, ostracised individuals may reduce their chances to engage in positive risk, which, in turn, may have a negative impact on their social interaction.

Chapter 4

Ostracism and Aggressive Behaviour. A Comparison of The Effects of Being Ostracised by Close Friends or Strangers

As discussed extensively in prior chapters, ostracism is the experience of being excluded or ignored by others (Williams, 2007). Using a computer programme called Cyberball (Williams et al., 2000), researchers have consistently shown that ostracism causes individuals to experience decreased well-being across at least four facets of psychological functioning – belonging, self-esteem, control, and meaningful existence; these four facets are collectively referred to in the ostracism literature as the four basic needs (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004).

In addition to the effect of ostracism on the four basic needs, ostracism has also been linked to a number of negative behavioural outcomes including increased aggression (Warburton et al., 2006). For example, Warburton et al. (2006) used a variation of Lieberman, Solomon, Greenberg, and McGregor's (1999) hot-sauce allocation paradigm to investigate the relation between ostracism and aggressive behaviour. Using a real-life analogy of the Cyberball game originally devised by Williams and Sommer (1997), Warburton et al. (2006) placed participants in a room with two confederates who began playing an apparently impromptu game of ball toss during which the participant was either included, or inexplicably ostracised. Participants were then subjected to a series of aversive sounds under one of two conditions: A Diminished control condition, in which participants had to listen to the aversive sounds with no control over when they were administered, or a Restored control condition, in which participants were able to control when the sounds were administered to them. After experiencing the ostracism/inclusion

and control/no-control manipulations, participants were asked to prepare a food sample for the other confederates. Part of the food preparation process required participants to allocate a sample of hot sauce for a confederate to consume, and the amount of hot sauce added was used as a measure of aggressive behaviour. Warburton et al. (2006) found that those participants in the ostracised/no-control condition displayed increased aggressive behaviour whereas those who were ostracised but given restored control following ostracism displayed no increase in aggression.

In addition to the effects of ostracism on aggression, a number of researchers have documented a link between other forms of rejection and increased aggression (Buckley, Winkel, & Leary, 2004; DeWall, Twenge, Gitter, & Baumeister, 2009; Kirkpatrick, Waugh, Valencia, & Webster, 2002; Twenge, Baumeister, Tice, & Stucke, 2001). For example, Twenge et al. (2001) examined the relation between rejection -- a social experience that shares a number of parallels with ostracism -- and aggressive behaviour using the Taylor Competitive Reaction-Time Task (CRT; Epstein & Taylor, 1967), a task that is commonly used to assess the effects of violent media on aggressive behaviour. In the CRT task, participants are led to believe that they are competing with a real-life opponent over a computer network, whereas in reality, their opponent is controlled by the computer. Participants are required to push a button following a prompt, with the fastest participant then being offered the opportunity to set the intensity and the duration of a white noise blast that is delivered to the other (losing) participant. The intensity and duration of the noise blast is then used as an objective measure of aggression.

In the Twenge et al. study, university undergraduates were assigned to a group with 4-6 other strangers; group members became acquainted for 15 minutes using a set of social questions as a guide. Participants were then isolated and were asked to nominate two people from the group with whom they would like to carry out further work. The participants were then asked to write a short essay on their opinion of a topical issue; abortion. After writing the essay,

participants were provided bogus feedback about the group allocation. Half of the participants were told that “everyone chose you as someone they would like to work with” (the inclusion condition) while the other half of the participants were told, “no one chose you as someone they would like to work with” (the rejection condition). After rejection or inclusion, participants were given bogus feedback on their essay by an anonymous third person; all participants received a negative evaluation. Participants were then asked to play against their critic on a computer game which was designed to assess reaction times (the CRT).

Twenge et al. (2001) found that participants who had been rejected displayed a significantly higher level of aggression toward their bogus opponent than did participants who were included. This finding was obtained despite the fact that both the included and rejected participants received a negative evaluation from their bogus opponent. This result suggests that rejected individuals are more aggressive towards individuals who criticise, or evaluate them negatively. In a follow-up experiment, participants received neither positive nor negative feedback on their essay, therefore making the bogus opponent a neutral target. Even when the target was neutral, rejected individuals were still more aggressive than those who were included. Taken together, these studies support the idea that ostracism (Warburton et al., 2006) and rejection (Twenge et al., 2001) lead to an increase in aggressive behaviour. Furthermore, a number of other researchers have since documented a link between rejection and increased aggressive behaviour using both the hot-sauce paradigm (Kirkpatrick et al., 2002) and other measures of aggressive behaviour (Buckley et al., 2004; DeWall et al., 2009).

While it has been repeatedly shown that ostracism leads to negative psychological and behavioural outcomes, it is less clear what factors might increase or decrease the magnitude of these effects. Several researchers have attempted to address this question by investigating the minimum conditions under which the negative effects of ostracism might be observed. For example, some researchers have examined whether manipulating the perceived source of

ostracism can affect the impact that ostracism has on an individual (Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Williams & Zadro, 2001; Zadro et al., 2004). Using Cyberball, Zadro et al. (2004) conducted a series of experiments to establish the minimum conditions required to produce effects on an individual's psychological well-being. In their first experiment, Zadro et al. explicitly told participants that they would be playing Cyberball with either two human players or two computer players. They found that even when participants knew that they were playing against a computer, they experienced a significant decline in their psychological well-being if they were ostracised. In a second experiment, Zadro et al. found that even when participants were specifically pre-warned that they would be ostracised, they still experienced significant declines in their psychological well-being. Furthermore, in both of these experiments, the magnitude of the negative effect of ostracism did not differ as a function of the source of the ostracism. That is, participants were negatively affected to the same degree whether they believed they were being ostracised by human players or by computer players.

In another experiment involving Cyberball, Gonsalkorale and Williams (2007) told participants that they were playing the game against either a favoured in-group, such as the Australian Democrats political party, a rival out-group, such as the Australian Republican political party (these in-group/out-group political parties were manipulated depending on the participant's own political affiliation), or against a despised out-group, the Australian Ku Klux Klan (KKK). Remarkably, ostracism had a negative effect on participants' well-being across all three groups. That is, participants felt worse even when they believed that they were being ostracised by a despised out-group. Furthermore, the magnitude of this negative effect was largely the same across all three groups. Specifically, participants reported the same magnitude of negative effect on their sense of belonging, self-esteem, and meaningful existence whether they believed they were being ostracised by a favoured in-group, a rival out-group, or a despised out-group. They did, however, find that although overall there was still a negative effect of

ostracism on participants' sense of control, the effect was smaller when participants believed that they were being ostracised by a despised out-group compared to when they believed that they were being ostracised by a rival out-group or a favoured in-group.

Researchers have also examined the effects of being ostracised by different kinds of groups. For example, as discussed in Chapter 1, Goodwin et al. (2010) used Cyberball to assess the effect of being ostracised by players from either their own racial group, or from a different racial group. They found that African American participants were more negatively affected by ostracism when they believed they were playing with Caucasian players, whereas Caucasian participants showed no effect of the player race manipulation. Goodwin et al. concluded that being a member of a stigmatized racial group increased an individual's sensitivity to ostracism by another racial group.

In another experiment, Wittenbaum, Shulman, and Braz (2010) investigated the effects of being ostracised by in-group and out-group members using a group discussion paradigm. Wittenbaum et al. asked groups of 3 participants to view fictitious letters from an advice column first as individuals, and then to discuss the letters as a group. The letters that were discussed during the group phase were manipulated so that only two of the three group members had previously viewed the letter during the 'individuals' phase. Therefore, the third group member was effectively ostracised during the group-discussion phase because he or she had no prior experience with that particular letter. In addition, the authors also manipulated the gender of the groups so that the ostracised individual was either ostracised by two members of the opposite sex (out-group members) or by a member of the same sex and a member of the opposite sex (mixed). Following the group discussion, Wittenbaum et al. assessed participants' basic needs using a questionnaire similar to that typically used in conjunction with the Cyberball paradigm. They found that ostracism in this paradigm also had a negative impact on participants' basic needs. Furthermore, they found that the magnitude of the impact was influenced by the

composition of the discussion group. Specifically, participants found ostracism to be more hurtful when they were ostracised by a mixed group consisting of one same-sex member (in-group) and one opposite-sex member (out-group), compared to those who were ostracised by two opposite-sex group members (out-group).

Taken together, the data discussed so far demonstrate that, at least under some conditions, the perceived source of ostracism can be an important factor in the magnitude of the negative impact of being excluded. Importantly, all of the research described so far has examined the effects of being ostracised by strangers. This aspect of the paradigm does have external validity -- ostracism can and does occur at the hands of strangers. For example, individuals commonly ignore strangers if they are sitting next to them on a plane or a bus (Williams & Zadro, 2001). In the real-world, however, ostracism also occurs commonly at the hands of people who are familiar to the individual -- for example, receiving the silent-treatment from a relationship partner, or being cast out by a group of children at school, or by colleagues in the work place (Williams, Forgas, Hippel, & Zadro, 2005). Although ostracism by people unknown to us is obviously hurtful as indicated by a growing set of studies, ostracism at the hands of a friend or a loved one could potentially be more even hurtful (Williams & Zadro, 2001).

Williams and his colleagues have reported a link between the nature of the interpersonal relationship of the individuals involved and the magnitude of the effect of ostracism. Using the Sydney Ostracism Record (SOR), a self-report measure of ostracism in day-to-day life, Williams and his colleagues found that the relationship between the target and the source of ostracism influenced the effects of ostracism (Williams & Zadro, 2001). Specifically, ostracism by a person with whom participants had a close relationship increased the magnitude of the effect of ostracism on the participant's psychological well-being relative to ostracism by a person with whom participants had a neutral relationship. This work suggests that ostracism is particularly potent when the source is a relationship partner, close friend, or a relative, whereas ostracism

from an ordinary friend or stranger does not produce as great an effect (Williams & Zadro, 2001). However, to date, none of this work has been published in a peer-reviewed journal. Furthermore, the SOR relies on self-report data following participants' experiences of ostracism in the real-world. While collecting real-world data is highly important, the diary method may also pose some potential disadvantages in terms of bias. It is possible that asking participants to recall day-to-day experiences of ostracism could in fact make them over-sensitized and hyper-vigilant to the experience, therefore, causing them to over-estimate the degree to which they experience ostracism in their daily lives (Williams, 2001). Conversely, the effort associated with filling out the diary form could in fact act as a deterrent for individuals, therefore resulting in an under-estimation of their experiences of ostracism (Williams, 2001). Given these potential confounds, it is important to test these effects both in a real-world setting, as well as in a controlled laboratory setting under conditions in which the degree of ostracism experienced can be directly controlled.

With these issues in mind, the aim of the present research was two-fold: First, we attempted to replicate and extend the findings of Warburton et al. (2006) by examining the effects of Cyber-ostracism (as opposed to the face-to-face ostracism manipulation incorporated by Warburton et al.) on aggression. Second, recall that in Chapter 2 we led participants to believe they were being included or ostracised by complete strangers, while in Chapter 3 participants believed they were being included or ostracised by their close friends. In the present experiment, we therefore aimed to directly compare whether there was a difference in the effect of being ostracised by friends and strangers under controlled laboratory conditions. To do this, participants were recruited into the experiment in groups of four participants. The groups either consisted of four close friends, or four individuals who were strangers to one another. Participants were told that they would play Cyberball with the three other players over a computer network. Each participant was placed in a separate room and was randomly assigned

to either an inclusion or an ostracism condition; two members of each group were always included while the other two were always ostracised. Following Cyberball, participants completed a questionnaire to assess their psychological well-being, and participated in the CRT - a behavioural measure of aggression.

Method

Participants

A total of 84 (44 males, 40 females) 18- to 20-year-old emerging-adult participants (mean age = 19 years, *SD* = .90) took part in this experiment. Due to technical issues, 3 participants were excluded from the analysis, leaving a final sample of 81 participants (43 males, 38 females). Participants were recruited in one of two ways. Participants who were recruited in groups of friends were instructed to attend the experiment with three of their close friends of the same sex. Participants were recruited in this manner to ensure that all individuals were similarly affiliated with the other people in their group. Participants who were recruited in groups of strangers were each recruited individually, and asked to attend the experiment at a designated time; they participated with three other participants of the same sex who they had not previously met. Participants were recruited in this manner to ensure that all participants were equally non-affiliated with their group members. The participants were all students at the University of Otago, Dunedin, New Zealand, and either used their participation to fulfil a small portion of their internal assessment requirement or they were paid $13.00 (NZ) for their participation in the experiment.

Measures

As in the previous experiments, there were three phases of the experimental procedure: 1) a pre-Cyberball phase, 2) a Cyberball phase, and 3) a post-Cyberball phase.

Pre-Cyberball Phase

In the pre-Cyberball phase, participants' peer affiliation and self-esteem were assessed.

Peer Affiliation

As in Chapter 3, peer affiliation was assessed using Doosje, et al.'s (1995) 4-item measure of peer affiliation.

Self-Esteem

As in Chapters 2 and 3, pre-Cyberball self-esteem levels were assessed using Robins et al.'s (2001) single-item measure of global self-esteem.

Cyberball Phase

Cyberball

As before, ostracism was manipulated using the computer programme 'Cyberball' (Williams et al., 2000). As in Chapter 3, the participants were told that they were playing Cyberball over a computer network with the other members of their group, but in reality, the other three players were all controlled by the computer. Within each group of 4 participants, two were randomly allocated to the ostracism group, and two were randomly allocated to the inclusion group.

Post-Cyberball Phase

Post-Cyberball Questionnaire

As in Chapters 2 and 3, participants' basic needs (belongingness, self-esteem, control, and meaningful existence) were assessed using the post-Cyberball questionnaire developed by Williams et al. (2002).

Competitive Reaction-Time Task

Aggressive behaviour following inclusion or exclusion in Cyberball was assessed using the Competitive Reaction-Time Task (CRT; Epstein & Taylor, 1967). Participants were told that they would compete against an opponent to see who could respond fastest to a stimulus that would

appear on a computer screen. They were led to believe that their opponent would be a randomly selected member of their group, but in reality, all opponents were controlled by the computer. They were told that whoever responded the fastest would be given the opportunity to determine the intensity of a blast of white noise that would be delivered through headphones to their losing opponent. On win trials, participants chose the intensity of the burst of white noise using a scale ranging from 0 to 10. On lose trials, participants were told that they would receive a blast of white noise from their opponent. Participants were able to see on their computer screen, the intensity level of the white noise that their 'opponent' selected. There were a total of 25 trials of which the participant won 13 and lost 12; the patterns of wins and losses and the intensity of noise blasts delivered to the participant was the same across all participants.

Procedure

Consistent with previous cover stories that have been used in Cyberball research in the past (Williams et al., 2000), after arriving at the laboratory, participants were told that they would be taking part in an experiment that was designed to assess their ability to mentally visualise a virtual-reality scenario. They were told that they would play a brief computer game with the three other members of their group over a computer network which involved a simple game of ball-toss. Participants were told that small mug-shot photographs would be taken and uploaded to the computer network so that players could see where the other participants were on the game. Photos were taken of all the group members, and participants were left in a room while the experimenter loaded their photos onto the computer system. After the experimenter had uploaded their photos, participants were taken to separate rooms, and each seated in front of a computer which administered the remainder of the instructions to them.

Participants were first administered the pre-Cyberball measures (peer affiliation and self-esteem). Once they had completed the pre-Cyberball measures, participants were introduced to

the Cyberball computer game. Participants were shown the introductory screen for Cyberball (see Appendix C) and were told that they would be playing a simple ball-toss game with three other players over a computer network. Participants were told to read the introductory instructions and to pay particular attention to the instruction that they should mentally visualise the entire experience. This was done to distract the participants from the true nature of the game.

After Cyberball, participants were administered the post-Cyberball measures (post-Cyberball questionnaire, competitive reaction-time task). Participants were then de-briefed on the true nature of the experiment and were free to leave.

Coding

Participants' peer-affiliation scores were obtained by adding each participant's ratings across all items. Participant's scores on the pre-ostracism self-esteem measure were coded by obtaining their single item rating; a high score corresponded to a high level of self-esteem.

Participants' scores on the post-Cyberball questionnaire were calculated by obtaining the sum of participants' ratings for each of the independent factors measured (sense of belonging, degree of hurt feelings, self-esteem, meaningful existence, control, anger, mood, and their perception inclusion status).

In addition, participants' scores on the post-Cyberball questionnaire item, "My self-esteem was high," were used as a measure of post-Cyberball self-esteem (with a high score indicating a high level of self-esteem). For the CRT, the mean intensity level that each participant set on each trial following a 'lose' trial, and the mean intensity level set following each 'win' trial were averaged to give two mean aggression scores; an intensity-lose score and an intensity-win score.

Results

Method of Analysis

All data, unless otherwise specified, were analysed using a 2 (Participant Group: Friends, Strangers) × 2 (Ostracism Condition: Ostracised, Included) analysis of variance (ANOVA). Any significant effects were further analysed using post hoc Student Newman-Keuls tests ($p < .05$)[4].

Peer Affiliation

As described earlier, participants were asked to attend the experiment with either three close friends or with three strangers. This procedure was used to ensure that participants in the close friends condition were in fact closely affiliated with the other participants in their group compared to those in the strangers condition. Our analysis revealed that participants in the Friends condition reported a significantly higher level of peer affiliation (M = 25.62, *SE* = .41) than did participants in the Strangers condition (M = 15.10, *SE* = .82), $F(1, 80) = 134.55$, $p < .01$, $d = 2.61$. There was no other significant main effect or interaction for peer affiliation (largest $F(1, 80) = 1.35$, *ns*, power = .21).

Manipulation Checks

Recall that there were three manipulation checks included in the post-Cyberball questionnaire. The manipulation checks were therefore analysed to examine the difference between the groups. As shown in Table 4.1 (top panel), participants in the ostracism condition reported that they felt significantly more ignored and more excluded than did participants in the inclusion condition (smallest *F* was for feeling ignored, $F(1, 80) = 117.24$, $p < .01$, $d = 2.44$). Participants in the ostracism condition also reported that they received fewer throws of the ball during the game than did participants in the inclusion condition, $F(1, 80) = 105.73$, $p < .01$, $d = 2.31$. There were no other main effects and no interactions for any of the manipulation checks

[4] We have used Cohen's (1988) measures of effect size to indicate the meaningfulness of significant effects; for *F*-tests and *t*-tests, effect size = *d.* According to Cohen, effect sizes of $d = .20$ indicate a 'small' effect, effect sizes of $d = .50$ indicate a 'medium' effect, and effect sizes of $d = .80$ indicate a 'large' effect.

(largest $F(1, 80) = .94$, *ns*, power = .16). Taken together, these data indicate that participants in the ostracism condition correctly detected that they had been ostracised during the game.

Emotional State Measures

As before, we also examined participants' scores on several measures of emotional state from the post-Cyberball questionnaire: hurt feelings, anger, bad mood, and good mood. As shown in Table 4.1 (bottom panel), there was a significant difference in participants' scores on all four variables as a function of ostracism condition. Specifically, participants in the ostracism condition reported having more hurt feelings, more feelings of anger, higher bad mood, and lower good mood scores than did participants in the included condition (smallest F was for Anger, $F(1, 80) = 4.53$, $p < .05$, $d = .48$). There were no other main effects or interactions on any measure.

Basic Needs

The next step in the analysis was to examine participants' scores on the measures of four basic needs; Belonging, Self-esteem, Control, and Meaningful Existence. Following previous research on ostracism, we examined the internal consistency of the basic need measures. The internal consistency across the basic needs scores was high (Cronbach's alpha = .86), therefore the average of the four basic needs scores was calculated to create an overall basic needs score for each participant. Table 4.2 shows participants' mean scores on each of the four basic needs, and their overall average basic needs score as a function of ostracism condition (ostracised or included) and friendship group.

Next, we analysed participants' overall basic needs scores for between-group differences. Figure 4.1 shows participants' overall basic needs score as a function of ostracism condition (ostracised or included), and friendship group (friends or strangers). As shown in Figure 4.1, there was a main effect of ostracism condition, $F(1, 80) = 63.68$, $p < .01$, $d = 1.80$. Participants in the included condition had significantly higher basic needs scores than did

participants in the ostracised condition. There were no other main effects and no interactions (largest $F(1, 80) = 3.40$, *ns*, power = .45).

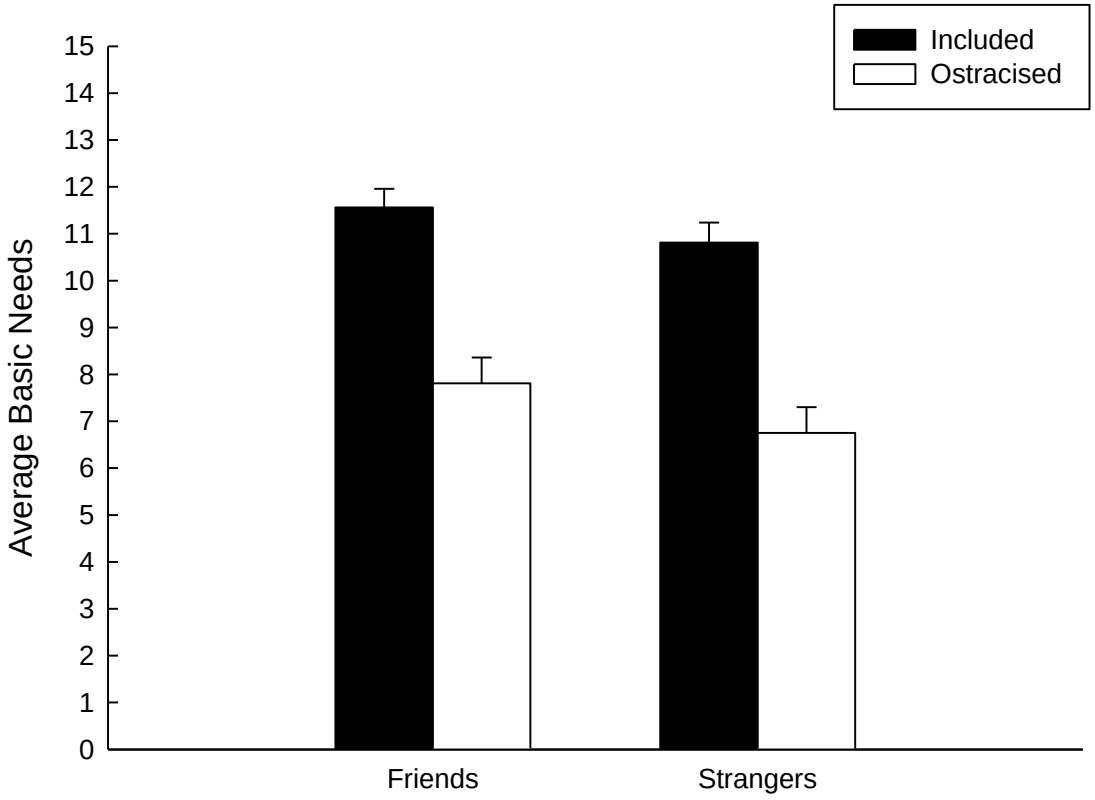

Figure 4.1. Participants' overall basic needs score (+1*SE*) as a function of ostracism condition and friendship group.

Table 4.1

Means (Standard Errors), Ranges, F-values, and Effect Sizes (d) Between Ostracised and Included Participants on the Manipulation Check Measures and the Post-Cyberball Emotion Measures. For the Emotion Measures a High Score Indicates a Greater Experience of That Emotion.

			Included (n = 40)		Ostracised (n = 41)			
		Max Score	Mean Score	Range	Mean Score	Range	*F*	*d*
Manipulation Checks	I was ignored	5	1.55 (.16)	1-5	4.07 (.17)	1-5	117.24**	2.44
	I was excluded	5	1.40 (.15)	1-5	4.02 (.15)	1-5	144.85**	2.71
	What percentage of throws do you think you received?	-	25.18 (1.35)	8-63	8.29 (.94)	1-25	105.73**	2.31
Emotional State Measures	Hurt feelings	5	1.23 (.11)	1-5	2.49 (.21)	1-5	29.31**	1.22
	Anger	5	1.48 (.14)	2-5	1.98 (.17)	1-4	4.53*	.48
	Bad mood	20	6.25 (.48)	4-19	10.32 (.64)	4-18	25.99**	1.15
	Good mood	20	15.70 (.56)	4-20	12.46 (.65)	6-20	15.21**	.88

*$p < .05$, **$p < .01$.

Table 4.2

Means (Standard Errors) and Range of Scores on the Four Basic Needs Measures, and Overall Basic Needs Scores Between Ostracised and Included Participants Recruited as Groups of Close Friends or Groups of Strangers. A Lower Score Indicates a Greater Aversive Impact of Ostracism.

		Friends				Strangers			
		Included (n = 20)		Ostracised (n = 22)		Included (n = 20)		Ostracised (n = 19)	
	Max Score	Mean Score	Range	Mean Score	Range	Mean Score	Range	Mean Score	Range
Belonging	15	12.80 (.42)	9-15	7.23 (.72)	3-14	12.00 (.73)	3-15	6.47 (.58)	3-12
Self-esteem	15	11.65 (.48)	8-15	8.68 (.75)	3-15	10.50 (.68)	3-15	7.58 (.60)	3-12
Control	15	8.60 (.59)	5-14	5.55 (.61)	3-14	7.50 (.53)	3-12	5.05 (.49)	3-10
Meaningful existence	15	13.20 (.59)	7-15	9.77 (.74)	3-15	13.25 (.68)	3-15	7.89 (.83)	3-14
Average Basic Needs	15	11.56 (.40)	8-14	7.81 (.55)	4-14	10.81 (.43)	6-14	6.75 (.55)	4-12

The Belonging and Meaningful Existence basic needs are shown reverse scored.

Self-Esteem

As described earlier, we assessed participants' self-esteem both before and after they played Cyberball. This allowed us to examine whether any post-Cyberball differences in self-esteem between the groups (ostracised or included) was due to ostracism per se, rather than the two groups having different initial levels of self-esteem. We compared participants' pre-Cyberball self-esteem using Robins et al.'s (2001) single-item measure of global self-esteem to their score on a single item from the post-Cyberball questionnaire with the same wording; "My self-esteem was high." We analysed the self-esteem data using a 2 (Participant Group: Friends/Strangers) × 2 (Ostracism Condition: Ostracised, Included) × 2 (Phase: pre-Cyberball, post-Cyberball) ANOVA with repeated measures over Phase. Any significant effects were further analysed using post hoc Student Newman-Keuls tests ($p < .05$). The analysis revealed a main effect of phase, $F(1, 77) = 10.11$, $p < .01$, $d = .72$, which was qualified by a Phase × Ostracism Condition interaction $F(1, 77) = 13.29$, $p < .01$, $d = .82$. As shown in Figure 4.2, ostracised participants exhibited a decline in their self-esteem ratings following Cyberball, while included participants showed no change at all. There were no other main effects and no other interactions (largest $F(1, 77) = .24$, *ns*, power = .08).

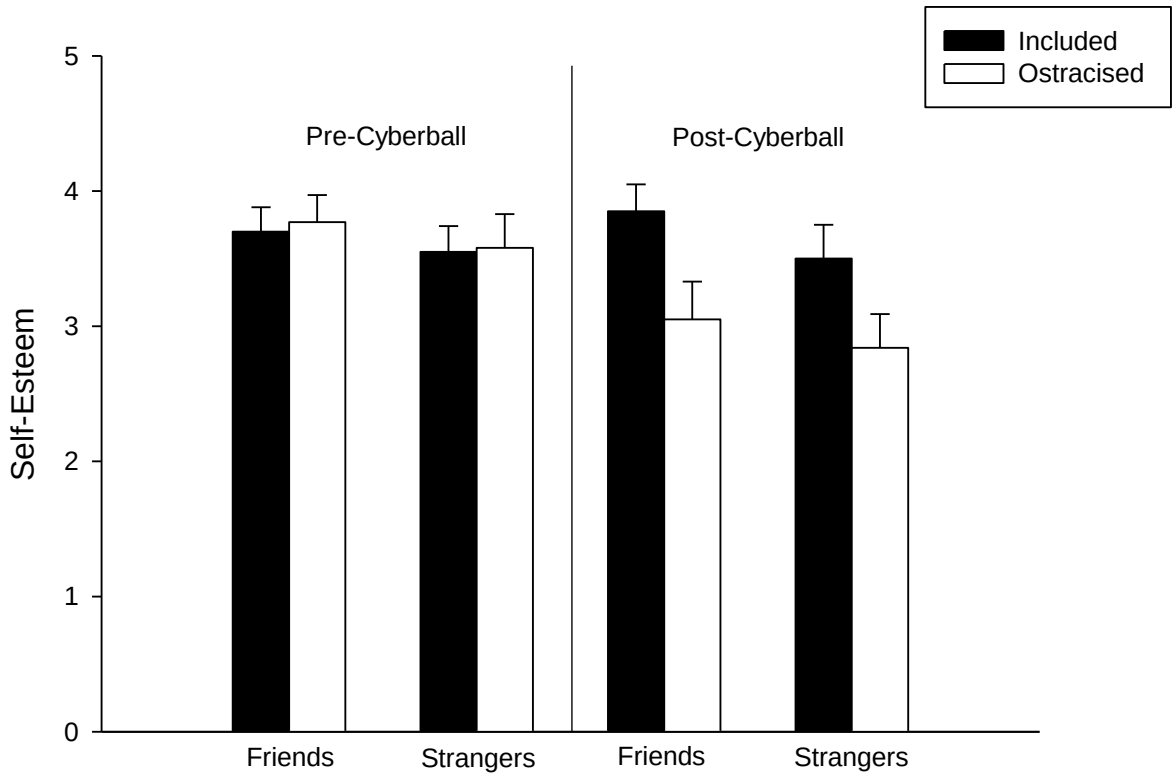

Figure 4.2. Pre-Cyberball and post-Cyberball self-esteem scores (+1*SE*) as a function of friendship group and ostracism condition.

Aggression

The next step in the analysis was to examine participants' aggression scores as measured on the CRT. Participants received two mean aggression scores: (1) average intensity following win trials (Intensity-Win) and (2) average intensity following lose trials (Intensity-Lose). Figure 4.3 shows participants' mean intensity scores following win trials and lose trials as a function of ostracism condition (ostracised or included), and friendship group (friends or strangers). As shown in Figure 4.3, there was a main effect of friendship condition on both Intensity-Win scores and Intensity-Lose scores (smallest *F* was for Intensity-Win, $F(1, 80) = 5.12$, $p < .05$, $d = .51$). Participants in the close friends condition displayed significantly higher aggression on both the win trials and the lose trials regardless of their ostracism condition. There were no other main effects and no interactions (largest $F(1, 80) = 1.73$, *ns*, power = .26).

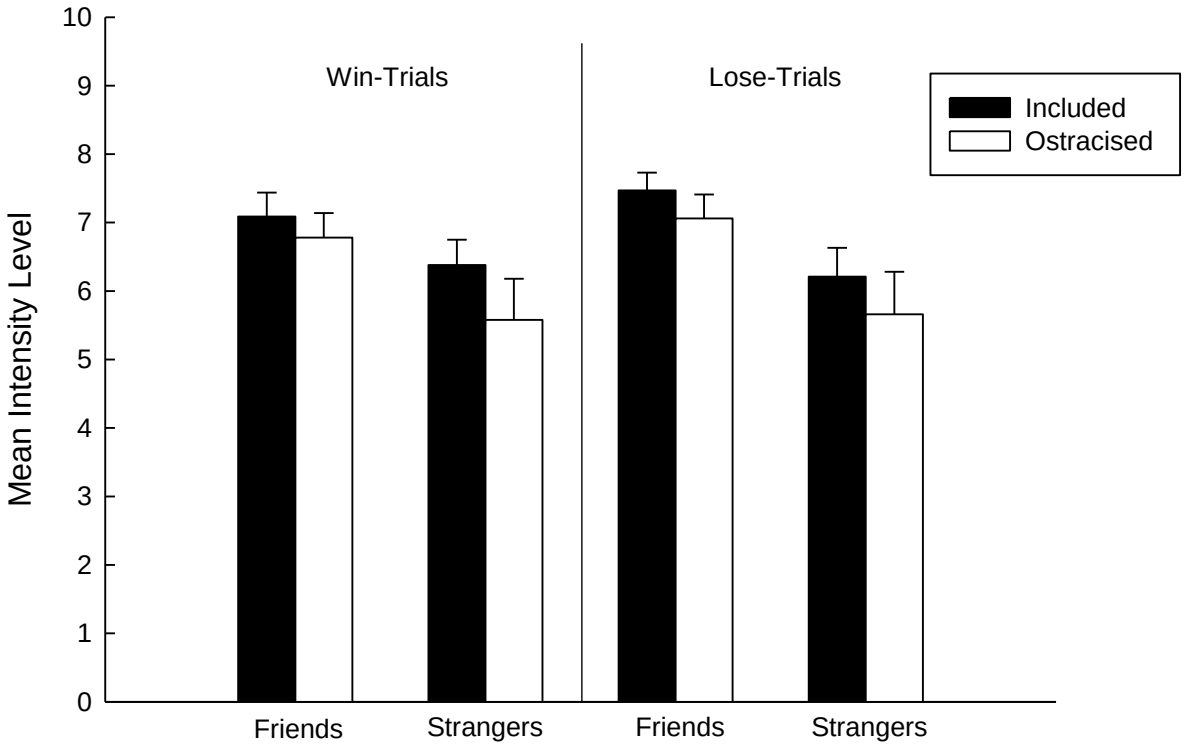

Figure 4.3. Participants' mean intensity levels (+1*SE*) for win-trials and lose-trials as a function of ostracism condition and friendship group.

Discussion

Ostracism has been shown to have a negative effect on individuals' self-reported levels of belongingness, self-esteem, control, and meaningful existence; aspects of human nature which Williams (2001) referred to as basic needs. Furthermore, it has been hypothesised that being ostracised by friends or loved ones could potentially be more even hurtful (Williams & Zadro, 2001). The aim of the present experiment was to assess the effects of Cyberball on aggressive behaviour and to compare the effects of ostracism by friends and strangers.

Overall Effects of Ostracism

Consistent with previous research (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004; Chapters 2 and 3 of this thesis), we found a strong relation between ostracism and participants' self-reported levels of well-being on the four basic needs (belonging, self-esteem, control, and meaningful existence). Participants who were ostracised by their friends or by strangers displayed significantly more need threat relative to the included participants. Ostracism was also found to influence participants' self-reported mood levels; participants in the ostracism condition reported experiencing a greater degree of hurt feelings, anger, bad mood, and lower feelings of good mood than did participants in the included condition. Furthermore, consistent prior research conducted both in our own laboratory (Pharo et al., 2011), and elsewhere (Gross, 2009), by comparing pre- and post-Cyberball levels of self-esteem, we found a significant relation between ostracism and participants' self-esteem: Prior to playing Cyberball, there was no difference in self-esteem between participants in the inclusion and ostracism conditions, however, after playing Cyberball, ostracised participants reported a significant decrease in their self-esteem levels while participants in the inclusion condition did

not. However, unlike prior research (Warburton et al., 2006), we found no relation between ostracism and participants' propensity for aggressive retaliation toward their peers.

Ostracism and Aggressive Behaviour

In previous studies, researchers have reported that socially-excluded individuals are more likely to display aggressive behaviour in a laboratory setting (Buckley et al., 2004; Kirkpatrick et al., 2002; Twenge et al., 2001; Warburton et al., 2006). For example, Warburton et al. (2006) found that ostracised individuals displayed higher levels of aggression than included participants, but that the effect was mediated by giving individuals an opportunity to exert control over their environment before the hot sauce paradigm. Similarly, Twenge et al. (2001) found that participants who had been rejected displayed a significantly higher level of aggression (as measured with the CRT) toward their bogus opponent than did participants who were included, despite the fact that both groups of participants received a negative evaluation from their opponent.

The findings of Warburton et al. (2006) and Twenge et al. (2001) support the notion that ostracism can lead to an increased propensity for aggressive behaviour, with Warburton et al. suggesting that this propensity can dissipate if an individual is allowed to regain control over their environment. In the present experiment, however, we failed to replicate these earlier findings. Participants in our sample were no more or less aggressive on the CRT as a function of their ostracism experience. We did observe an effect of the friendship manipulation on participants' aggression scores; overall, participants played the CRT more aggressively if they believed that they were playing against a close friend as opposed to a stranger, however, there was no difference between the ostracised and included participants with this effect.

The fact that we failed to find an effect of ostracism on aggression is somewhat surprising as a number of studies have outlined a link between various forms of social exclusion and aggression (Buckley et al., 2004; DeWall et al., 2009; Kirkpatrick et al., 2002; Twenge et al.,

2001; Warburton et al., 2006). DeWall et al. (2009) outlined the importance of hostile cognitions as a mediator of the effects of social exclusion on aggression. That is, they found that social exclusion results in a hostile cognitive bias (such as an increased propensity to rate the ambiguous actions of another person as hostile) which mediates the relation between exclusion and aggression. Importantly, DeWall et al. distinguished between negative emotions (such as anger or sadness) and hostile cognitive biases, pointing out that while a consistent relation between emotion and exclusion has yet to be proven, they have found evidence for a mediating effect of hostile cognitions on participants' propensity for aggressive retaliation following exclusion. The mediating effect of hostile cognitions may account for the lack aggressive behaviour in our ostracised sample; although we found significant increases in negative emotion and decreases in positive emotion following ostracism, we did not measure participants' cognitive biases, and therefore we cannot conclusively say whether they did or did not experience hostile cognitions.

Another possible explanation for our negative findings is that the link between ostracism and aggression may not be as straightforward as previously stated. In reviewing the previous literature, only one study (Warburton et al., 2006) has incorporated a pure ostracism manipulation, while the others (Buckley et al., 2004; DeWall et al., 2009; Kirkpatrick et al., 2002; Twenge et al., 2001) have used various other rejection paradigms. Williams (2007a) points out that ostracism is unique relative to other experiences of social exclusion, in that the individual is forced to endure the experience with no control over their environment or experience, and that this may have important implications for the study of aggressive behaviour in response to social exclusion. It may be that the link between aggression and ostracism is different to the link found between aggression and other forms of social exclusion; understanding the relation between ostracism and aggression requires further research.

The Source of Ostracism

In the present experiment, we found a consistent negative effect of ostracism on participants' psychological well-being, but the magnitude of that effect did not vary as a function of the source of the ostracism. That is, ostracism was equally hurtful regardless of whether the source was three close friends or three strangers.

The finding that the source of the ostracism did not have an effect on participants' well-being was a somewhat unexpected result, and the finding is not in line with what we might intuitively expect. It seems plausible to assume that being ostracised by three close friends would be more hurtful for an individual compared to being ostracised by three strangers whom they had never met before. Also, this finding is not consistent with the predictions outlined by Williams and Zadro (2001) who suggested that the source of ostracism does matter to an individual. Although the finding that the source of the ostracism did not matter was inconsistent with our prediction, a closer look at the ostracism literature suggests that this result is again, not entirely surprising. Several researchers have attempted to minimise the negative impact of ostracism in the laboratory with limited success. For example, Zadro et al. (2004) found that even when participants knew they were being ostracised by a computer, they still found it to be an aversive experience. Similarly, van Beest and Williams (2006) manipulated the Cyberball paradigm so that participants were rewarded with a monetary incentive if they were ostracised during the game. Despite the positive monetary benefit of being ostracised, they still found that participants reported negative psychological well-being if they were ostracised. Our results, and the results from Zadro et al. (2004) and van Beest and Williams (2006) all suggested the same thing. No matter what the circumstances, ostracism hurts.

In conclusion, the present findings raise questions about current views of ostracism. Although some researchers have proposed that the source of ostracism influences the degree to which an individual is negatively affected by the experience, to the best of our knowledge, this

proposition has yet to be tested in an experimental setting. We found that there was no significant difference in the magnitude of the effect when an individual was ostracised by close friends or by strangers. It is still possible that other forms of close relationships may prove to be more influential. As suggested by Williams and Zadro (2004), it may be that if someone is ostracised by a relationship partner, a family member, or someone who holds greater power, it could be a more aversive experience than being ostracised by a friend or a stranger. These possibilities remain to be tested.

Chapter 5

General Discussion

The overall aim of the current research was to investigate the effects of ostracism on adolescent and emerging-adults' psychological well-being and behaviour. In Experiment 1, we recruited a sample of adolescents, emerging-adults, and young-adults, and examined whether ostracism would make participants more or less likely to attempt to regain control over a social situation by nominating themselves for group leadership. For Experiment 2 and Experiment 3, we chose to focus our investigations on the emerging-adult population. In Experiment 2, we examined the relation between ostracism and risk-taking behaviour. Finally, in Experiment 3, we examined the relation between ostracism and aggressive behaviour, and we investigated the effect of being ostracised by a group of close friends compared to a group of strangers.

Ostracism and The Four Basic Needs

In all three of our experiments, we found a consistent negative effect of ostracism on participants' self-reported levels of well-being as measured by the four basic needs. Furthermore, the size of the effect of ostracism on participants' basic needs was uniformly large across all three of our experiments (smallest d = 1.20; see Chapters 2, 3, and 4). Williams et al. (2000) originally investigated the effects of ostracism on the four basic needs and reported a negative effect of ostracism on participants' feelings of belonging and self-esteem. Since that seminal work, numerous researchers have reported a robust negative effect of ostracism on participants' four basic needs (Bastian & Haslam, 2010; Boyes & French, 2009; Gonsalkorale & Williams, 2007; Goodwin et al., 2010; Jamieson et al., 2010; Lau et al., 2009; Oaten et al., 2008; Pharo et al., 2011; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Zadro et al., 2006; Zadro et al., 2004). In Experiment 2 and Experiment 3, we also found a significant change in participants' self-esteem as a result of their ostracism experience. That is, in both of these experiments, participants displayed no difference in self-esteem ratings prior to playing

Cyberball, however, after playing Cyberball, ostracised participants reported significant declines in their self-esteem while included participants reported no such change. Williams (2007a) asserts that the strong effect of ostracism on participants' four basic needs demonstrates the consistent level of personal distress that ostracism causes. Furthermore, Williams (2007b) suggested that long-term negative declines in an individual's four basic needs can lead to social withdrawal and psychological problems such as depression and suicidal behaviour. The present research supports these findings and assertions.

Ostracism and Mood

In the present research, we also found a consistent negative effect of ostracism on participants' self-reported mood levels. Similar to findings regarding ostracism and the four basic needs, a number of researchers have reported a strong negative effect of ostracism on participants' self-reported mood (Boyes & French, 2009; Gonsalkorale & Williams, 2007; Gross, 2009; Lustenberger & Jagacinski, 2010; Pharo et al., 2011; Sebastian et al., 2009; van Beest & Williams, 2006; Williams et al., 2000; Williams et al., 2002; Wirth et al., 2010). Like our findings regarding ostracism and the four basic needs, the present research supports the negative link between ostracism and individuals' mood and further supports the idea that ostracism causes a significant level of personal distress in those recipients who are unlucky enough to experience it (Williams, 2007a).

Specific Experimental Aims

In addition to the overall effects of ostracism on participants' four basic needs and mood, the present research revealed a number of novel findings. First, in Experiment 1, we found that although there was no overall difference in participants' propensity to nominate themselves as a leader, those individuals in the ostracism condition who *did* nominate themselves for group leadership had significantly lower self-esteem scores compared to those ostracised participants who nominated another player for group leadership. This finding suggests that those

participants who experienced the largest negative effect of ostracism displayed an increased desire to exert leadership over their peer group. Second, in Experiment 2, we found a significant negative effect of ostracism on participants' propensity for risk-taking behaviour. Ostracised participants exhibited significantly less risk-taking compared to included participants, suggesting a link between ostracism and introverted behaviour. Third, in Experiment 3, we found a consistent negative effect of ostracism on participants' psychological well-being, but the magnitude of that effect did not vary as a function of the source of the ostracism. That is, ostracism was equally hurtful regardless of whether the source was three close friends or three strangers. Also in Experiment 3, despite research citing a link between ostracism and aggressive behaviour (Warburton et al., 2006), we found no link between ostracism and aggressive behaviour as measured by the Taylor CRT. Taken together, these experiments provide further insight into the cognitive and behavioural responses that are associated with the experience of ostracism.

Implications of The Present Research

Research on ostracism and social rejection has important implications for the study of bullying. According to Riebel, Jager, and Fischer (2009) typical definitions of bullying identify four key criteria that have to be fulfilled. First, the instigator has to have clear intention to hurt the victim in some physical, psychological, or social way. Second, those hurtful actions need to occur repeatedly over a period of time. Third, there has to be an imbalance of power between the bully and the victim, causing the victim(s) to be or to feel unable to defend themselves. Fourth, as a result of this power imbalance, the victim develops a sense of helplessness in their ability to deal with or escape the situation. The term "bullying" typically elicits images of physical or verbal aggressive acts such as hitting, or name calling. However, it is important to recognise that, based on the above criteria, ostracism is also a form of bullying – one that can have dramatic consequences for the victims.

Maxwell and Carrol-Lind (1997) surveyed a sample of 11-13-year-olds on their experiences of school-related bullying. They found that ostracism ranked third in the most-frequently experienced forms of bullying (behind hitting and name calling). Specifically, 41% of their sample reported being a recipient of at least one instance of ostracism in the past nine months, and 60% had experienced ostracism at some point in their life time. Furthermore, when they investigated the degree of emotional pain that participants associated with various forms of bullying, the authors found that *emotional bullying* (namely teasing and exclusion) was the most hurtful form of bullying. For example, one adolescent was quoted as saying "getting the silent treatment was the worst thing that happened to me."

Similarly, the study of ostracism is also relevant to the issue of parental neglect, with evidence to suggest that social exclusion in infancy can be extremely damaging for recipients. For example, numerous studies have documented a link between the experience of childhood neglect and diminished cognitive and neurological development, as well as the development of a host of behavioural problems (for a complete review, see Perry, 2002). Data from longitudinal studies also suggests that children who are exposed to emotional and psychological neglect – defined by such acts as ignoring the child's need for stimulation, verbally assaulting the child, or isolating the child from others – exhibit a greater level of developmental problems (such as cognitive deficits, behavioural problems, and interpersonal difficulties) than any other subgroup of maltreated children (Black & Oberlander, 2011).

Critically, in both the case of bullying and parental neglect, there are no obvious external signs that these acts are being carried out. That is, if one considers more overt forms of bullying such as physical violence; in these cases, the signs can be readily detected by a third party, whether they are bruises, cuts, or broken bones. The fact that ostracism is more detached from other, more overt forms of interpersonal violence may make it more of a *silent killer*. With the

signs being potentially harder for external parties to detect, this may lead to longer periods of suffering, and ultimately more harm to the victim.

Future Directions for Research

In the present set of experiments, the experience of ostracism was induced using the computer programme Cyberball (Williams et al., 2000). While Cyberball is a well-used research tool, and was the primary focus of this thesis, it is important to acknowledge that that there are several other manipulations commonly used to study the effects of ostracism and social rejection. For example, Twenge and Baumeister (Baumeister, Twenge, & Nuss, 2002; Twenge et al., 2001) have regularly employed a manipulation in which they provide bogus feedback from a personality questionnaire informing participants that they are likely to end up single and alone later on in their life. Nezlek, Kowalski, Leary, Blevins, and Holgate (1997) have developed a paradigm in which a group of participants are acquainted with one another during an introductory session, and then taken away separately and provided with bogus feedback that the other participants did not want to work with that individual in a subsequent group activity. Gardner, Pickett, and Brewer (2000) have used bogus internet chartrooms to make participants believe that they are being rejected. Geller, Goodstein, Silver, and Sternberg (1974) have manipulated rejection during face-to-face conversations, while Zadro and Williams (2006) have even incorporated a role-playing exercise to make individuals feel ostracised.

These paradigms have all proven to be valuable research tools, and researchers have used them to document a number of behavioural and cognitive outcomes associated with ostracism and rejection (Williams & Nida, 2011). Importantly, including Cyberball, all of these paradigms involve manipulating ostracism or rejection in a laboratory setting and over a short time period. However, if we look at real-world examples of ostracism, it appears that, generally speaking, ostracism is by no means an isolated event in the lives of most victims (Williams, 2007a).

The implications of experiencing long-term ostracism can be devastating. Williams (2007a) outlined that most people who experience ostracism over a long time period ultimately end up alienating themselves from the outside world and often become prone to depression, suicidal ideation, and suicide attempts (Williams & Nida, 2011). However, there is also evidence to suggest that in some extreme cases, ostracism can lead to some very severe cases of externalising behaviour. For example, theorists propose that ostracism may be a major factor in the vast majority of school shootings in the United States over the past two decades (Leary, Kowalski, Smith, & Phillips, 2003). Leary et al. (2003) reviewed the prevalence of ostracism in 15 cases of school shootings carried out between 1995 and 2001. They studied media reports of the 15 shootings, and each case was coded by three independent raters who estimated the extent of social exclusion that had occurred prior to each incident. Their analysis identified ostracism as a contributing factor in 87% of these cases, including the now infamous massacre at Columbine High School. Similarly, two more recent examples in the media reveal a similar trend. On April 16, 2007, 32 students at Virginia Tech were shot and killed by Cho Seung-Hui, a fellow student at the university. Post-event analysis of the deadliest school shooting in U.S. history found that Cho was a "loner" among his peers, a social introvert who was ostracised for his abnormal behaviour and fascination with macabre violence (CNN, 2007). In another relatively high-profile incident, on November 7, 2007, an 18-year-old Finnish adolescent - Pekka-Eric Auvinen shot and killed 8 people at his local high school in Jokela, Finland, before committing suicide. Like Cho, Pekka-Eric was described as a "loner" by his peers and had experienced ostracism for much of his adolescent life (CNN, 2008).

Ostracism and Longitudinal Research

While Cyberball and the other manipulations of social rejection have been shown to cause short-term psychological harm and lead to unwanted behavioural outcomes such as aggression (Twenge et al., 2001; Warburton et al., 2006), social compensation (Williams &

Sommer, 1997), anti-social behaviour (Chow et al., 2008), and non-conscious mimicry (Lakin et al., 2008), it is less clear how applicable these results are to the more extreme outcomes such as suicidality, or the extreme violent outbursts that are associated with ostracism in the real-world. The question therefore remains: Are these paradigms a good proxy measure of the real-world issue? In the case of Cyberball, there are several important points that support the validity of Cyberball as an effective laboratory-based manipulation of ostracism. First, the effects of ostracism, particularly on the four basic needs, have been shown to be extremely consistent across a number of different experiments (Gerber & Wheeler, 2009). Second, in all of these experiments, the *size* of the effect that ostracism has on the four basic needs is uniformly large, with effect sizes regularly ranging between 1.0 and 2.0 (Williams, 2007a). Third, as mentioned above, researchers have successfully documented a link between the experience of ostracism during Cyberball, and a number of negative behavioural outcomes. However, it is important to acknowledge that these are still laboratory experiments in which ostracism occurs over a relatively short time period. Future research needs to be conducted to investigate ways to examine ostracism as it occurs in the real world.

One obvious way to address this issue is to examine the effects of ostracism using a longitudinal design. However, to date, there has been surprisingly little research of this kind. In one notable exception Kuperschmidt et al. (1995) studied a group of school children over a three-year period to examine the link between ostracism and externalising behaviour problems. As described in Chapter 1, Kuperschmidt et al.'s study involved 880 school students from third to seventh grade. The participants were provided with a list of students from their grade, and were asked to nominate the three students that they liked the most, and the three students that they liked the least. This nomination procedure was repeated four times over a three-year period. The total number of nominations was summed and standardised for each student, and the "liked-least" scores were used as an indicator of ostracism. Kuperschmidt et al. also assessed

externalising behaviour using three methods. First, children were asked to nominate three grade mates who were the most verbally or physically aggressive. Second, delinquency was assessed using the delinquency sub-scale of the Youth Self-Report form. Third, delinquency was further assessed using a teacher report method, in which the teacher identified students who had been in negative contact with police. Like the assessment of peer rejection, these data were collected over a three-year period. The authors found that there was a significant relation between ostracism and externalising behaviour. Furthermore, they found that if the experience of ostracism increased over time, the risk of developing externalising behaviour problems increased as well.

Ostracism and Online Social Media – A New Frontier?

Longitudinal studies provide an interesting avenue for future researchers, but they are not the only way forward. While longitudinal studies provide an opportunity to study the long-term effects of social exclusion, they still rely largely on participants' self-reported perception of their social status, and are therefore prone to reporting biases (Paulhus, 1991). If we look at other ways to quantifiably study social interactions, and therefore social exclusion, a new technology poses as an interesting research tool – the internet.

The Internet and Psychological Well-being

The internet has been around since the early to mid 1990's (Ward, 2006). However, it is only in the past decade – since around 2003 – that the internet has become a major part of regular people's social lives (Notley, 2009). As a result, research regarding internet use is still very much in its infancy. Despite this, there are still several notable studies that have documented a link between internet use and psychological well-being. For example, in some very early pioneering research on internet use, Kraut et al. (1998) followed a sample of 169 adolescents and adults over a two-year period to examine the relation between the frequency of participants' internet use and their psychological well-being. They documented a significant

relation between increased internet use and greater feelings of depression, loneliness, and social anxiety. In a follow-up study, Kraut et al. (2002) found that their original effect could be explained by individual personality factors. They found that individuals who were higher on traits of extroversion actually *gained* social support through their internet use, whereas those who were introverted reported *lower* self-esteem, and greater feelings of loneliness and stress as a result of increased internet use. That is, for those who were most vulnerable, internet use was negatively associated with their psychological well-being.

Ybarra, Alexander, and Mitchell (2005) surveyed a sample of 1501 internet-using adolescents to investigate the relation between depressive symptomatology, internet use, and the use of online communication tools. Ybarra et al. found that, compared to psychologically healthy adolescents, depressed adolescents spent significantly more time online, were more likely use the internet to communicate with other people, and were more likely to use the internet for self-disclosure of personal details and secrets. Similarly, Hwang, Cheong, and Feeley (2009) investigated the relation between internet use and depressive symptoms in a sample of 6,341 Taiwanese adolescents. Hwang et al. found that those adolescents who reported higher levels of depressive symptoms were more likely to use the internet to communicate with others, establish online friendships, and express their inner thoughts and feelings. Furthermore, they found that these depressed adolescents were in turn less likely to interact with friends offline, which is in-line with the theory that depression leads an individual to disengage from their social life (Joiner, 2002).

Based on these findings it appears that the internet may be, at least in some part, contributing to depressive symptoms in some individuals. Interestingly, the World Health Organisation recently labelled depression as being the number one cause of disability in the world (Murray & Lopez, 1996). Researchers have also outlined that depression results in the greatest negative impact on individual's health above and beyond a number of chronic diseases

such as arthritis, asthma, diabetes, and angina (Moussavi et al., 2007). Furthermore, it is predicted that, by the year 2020, depression is likely to be the second major cause of disease burden behind heart disease (Murray & Lopez, 1996). As a result, the World Health Organisation has recently launched a global initiative to reduce the negative impacts of depression and improve treatment standards world-wide (World Health Organisation, 2011). Given that depression is such an obvious public health concern, and will continue to be a serious problem in the next decade, there is a clear need for researchers to focus on this disorder and all of the issues associated with it. Ostracism is one such issue, as it has been well-established that experiencing ostracism causes declines in the psychological well-being of victims (Williams & Nida, 2011).

Ostracism and The Internet

To date, several researchers have examined the effects of being ostracised through online technology. For example, Williams et al. (2002) had participants interact with two confederates (who they believed to be other participants) in an online chat room. Participants were asked to talk about a popular event topic – The Sydney Olympic Games – with their two counterparts. Unbeknown to the participants, the two confederates were following a pre-determined script to either ostracise or include the participant in the conversation. In the inclusion condition, the confederates had a 10-minute conversation between themselves and the participant in which they agreed with all of the participant's viewpoints and included them in the conversation. In the ostracism condition, the confederates disagreed with the participant's viewpoint, and then held a 10-minute conversation between themselves, ignoring all attempts by the participant to be included in the discussion. Essentially, the ostracised participant was forced to sit and view the two-way conversation for 10 minutes with no input into the proceedings. Following the chat-room paradigm, participants were asked to fill out a questionnaire, similar to those used in Cyberball research, to assess their well-being on the four

basic needs. Similar to research using Cyberball, Williams et al. (2002) found a strong effect of ostracism on participants' sense of control, belonging, self-esteem, and meaningful existence, with effect sizes ranging from 1.87 to 3.29.

In another example, Smith and Williams (2004) had participants communicate with two confederates (who they believed to be other participants) using cell phone SMS messages. Participants were introduced face-to-face with the confederates and then taken into a separate room and asked to communicate with them via a cellular phone. Participants were first asked to answer a test question "do you smoke?" designed to create an in-group, out-group situation. In the in-group condition, confederates replied back to the participant indicating that they had the same smoking habits as the participant, while in the out-group condition, the confederates indicated opposing habits. Participants were then instructed to begin an eight-minute free communication period in which they were either included or ostracised by the confederates. In the inclusion condition, the confederates replied to the participant's SMS messages and had a conversation with them for eight minutes. In contrast, in the ostracism condition, the confederates ignored the participant's questions, instead forcing the participant to sit alone for eight minutes. At the end of the eight-minute period, participants filled out a questionnaire assessing the four basic needs. Similar to prior research, Smith and Williams found that ostracism through SMS messages had a strong negative effect on participants' sense of belonging, control, self-esteem, and meaningful existence, regardless of whether the ostracism came from in-group or out-group members (effect sizes ranged from .96 to 1.61).

Ostracism and Online Social Networking

The experiments by Williams et al. (2002) and Smith and Williams (2004) represent two interesting ways in which internet technology can be used to examine the effects of ostracism. However, they are by no means the only way in which researchers could investigate ostracism over the internet. One recently new internet domain which could prove to be extremely useful in

terms of ostracism research is the development of online social networking websites. Since their inception in the mid-2000s, on-line social networking websites such as Facebook, MySpace, and Friendster have become a major source of interpersonal communication for both adolescents and adults (Correa, Hinsley, & de Zúñiga, 2010; Tapscott, 2008). For example, Madden and Zickuhr (2011) found that half of all adults in the US use a social networking site such as Facebook, MySpace, or LinkedIn, and that 65% access a social networking site on a daily basis (Madden & Zickuhr, 2011). Furthermore, social networking has been shown to be particularly popular among adolescents and emerging-adults (Barker, 2009). Sheldon, Abad, and Hinsch (2011) surveyed a sample of 1,002 university undergraduates, and found that over 95% of participants had a Facebook page, and 78% reported accessing the site at least twice daily. Similarly, Lenhart, Purcell, Smith, and Zickuhr (2010) found in a survey of 800 internet-using adolescents, that 82% of adolescents aged 14- to 17-years old used a social networking site on a daily basis. Given that online social networking websites are so widely used by the general public, they could potentially be an excellent opportunity to study human social interactions including the effects of ostracism.

So how prevalent is social exclusion on the internet? Simply put, nobody really knows the answer to this question, but, anecdotally speaking, a quick search of the internet reveals a number of people discussing the issue of online social exclusion and rejection through social networking sites such as Facebook. Sites like Facebook allow users to socialise with one another in a number of ways – users create a personal profile and invite other users to join their online network of "friends." Users can message one another both privately, as well as on a semi-pubic messaging system called a "wall" which can be viewed by other members of their "friends" list. Users can post content on their page such as photos, websites of interest, or their own opinions. They can create quizzes or surveys which their friends can choose to answer, they can play games with other Facebook users, they can create virtual invites for upcoming social events in

the real world, and they can create focus groups for people who hold similar interests to join and share their ideas (Facebook, 2011a). However, with all of these opportunities to interact with other people comes a number of ways in which an individual can experience social exclusion and rejection. For example, a user could post something about their personal life only to have their online friends ignore their comment, they could be left out of an invitation to a social event or to join a group, they could ask others to fill out a survey or quiz but have their request fall on deaf ears, or it could be as simple as inviting someone to join their friend list only to have their request ignored or even sometimes openly rejected ("Facebook rejection," 2009; Hare, 2009; Wrongplanet.net, 2009). Furthermore, it does appear that these experiences of online exclusion and rejection are hurtful for those who experience them ("Facebook rejection", 2009; Hare, 2009; Wrongplanet.net, 2009). Given the evidence to date, there is considerable scope for further research into the effects of social exclusion and rejection on online social networking sites.

To date, there have been a handful of experiments investigating the relation between online social networking sites and personal feelings of well-being and social connectedness (Barker, 2009; Ellison, Steinfield, & Lampe, 2007; Sheldon et al., 2011). For example, Ellison et al. (2007) surveyed a sample of 800 university undergraduate students on their Facebook usage and their feelings of self-esteem and inter-personal connection. They found a significant relation between low self-esteem and Facebook use; participants with low self-esteem who reported higher levels of Facebook use actually reported higher feelings of interpersonal connection compared to those with low self-esteem who had low Facebook use. Ellison et al. (2007) suggested that Facebook may be particularly beneficial for individuals with low self-esteem.

Barker (2009) surveyed a sample of 734 male and female university undergraduates on their motives for Facebook use, their self-esteem, and their frequency of Facebook use. They found that lower levels of collective self-esteem were correlated with higher levels of social

compensation. That is, those who felt negatively about their social status were more likely to use online social networks as a primary means of social interaction. Furthermore, this effect was more pronounced in males. Males were more likely than females to report negative collective self-esteem, and in turn, social networking use for social compensation.

Recently, Sheldon et al. (2011) published an experiment in which they investigated the relation between participants' use of Facebook and their feelings of inter-personal connection using a construct they termed "relatedness need." Based on self-determination theory (Deci & Ryan, 1985, 2000, 2008), relatedness was defined as the desire to experience closeness and interpersonal connection with others (Deci & Ryan, 2008; Sheldon et al., 2011). Relatedness shares a number of parallels with the basic-need construct of belongingness originally outlined by Baumeister and Leary (1995), and later adopted in Williams' (2001) model of ostracism. In a series of four experiments, Sheldon et al. (2011) asked participants to rate their feelings of interpersonal connection (items such as "I felt a sense of contact with people who care for me, and whom I care for") and interpersonal disconnection (items such as "I felt unappreciated by one or more important people") and then looked at the correlation between these scores and participants' self-reported weekly Facebook use. In their first experiment, they found a positive correlation between Facebook use and greater feelings of connection and disconnection. That is, greater Facebook use appeared to be related to both feelings of interpersonal connection and disconnection. Next, they investigated the mediating effects of participants' coping strategies by asking participants to rate the degree to which they used Facebook to cope with feelings of disconnection by rating their agreement with the statement "When I am feeling lonely or out of touch with others, I typically go on to Facebook." Interestingly, they found that coping through Facebook mediated the connection between Facebook use and disconnection; individuals who reported higher levels of disconnection reported higher levels of using Facebook to cope with their disconnection. In their third experiment, Sheldon et al. assessed the effect that Facebook

use had on participants' feelings of disconnection over a 92-hour time period. They assessed participants' feelings of connection and disconnection before asking them to undergo a 48-hour period of abstinence from Facebook. They then assessed their connection and disconnection again before giving participants a second 48-hour period in which they were free to use Facebook as much wanted. Finally, their feelings of connection and disconnection were measured a third time, as well as their amount of Facebook use during the free-use period. Sheldon et al. found that greater feelings of disconnection following the abstinence period predicted greater Facebook use during the free-use period. They reasoned that increased feelings of disconnection actually drove subsequent Facebook use. In their fourth experiment, Sheldon et al. asked participants to set themselves a goal to reduce their personal Facebook usage. They hypothesized that, given that disconnection drives Facebook use, participants who rated themselves higher on feelings of disconnection would in fact set themselves smaller reduction goals *and* perform worse in meeting those goals compared to connected participants. Their results supported this hypothesis, with disconnected participants not only setting smaller goals than connected participants, but also performing worse in meeting their goals compared to connected participants.

Overall, the experiments by Sheldon et al. (2011) suggest a strong link between feelings of disconnection and Facebook use. The authors concluded that participants appear to use Facebook as a means of coping with their general sense of disconnection in life. And in some ways, it appears that this coping strategy has some merit – the more that participants used Facebook, the more that they felt connection in their day-to-day lives. Importantly however, Facebook use did not decrease participants' feelings of disconnection. Therefore, Sheldon et al. tentatively concluded that, although Facebook use may provide individuals with a sense of connection and therefore may be viewed as a positive outlet for individuals who are lacking in

social connectedness, it does not appear to ameliorate the underlying problems of loneliness or disconnection which appear to drive an individual to use Facebook in the first place.

In reviewing the literature on the internet and Facebook use, the findings to date suggest two main trends. First, it appears that vulnerable populations appear to be more likely to use the internet in general (Hwang et al., 2009; Kraut et al., 2002; Kraut et al., 1998; Ybarra et al., 2005), and they appear more likely to use online social networking sites to fulfil their need for interpersonal connection (Barker, 2009; Ellison et al., 2007; Sheldon et al., 2011). Second, the literature also indicates that while individuals may feel some increased sense of well-being (Ellison et al., 2007) and connection (Sheldon et al., 2011) as a result of their use of social networking sites, these feelings may not in fact translate to global improvements in their psychological well-being (Sheldon et al., 2011).

Studying Ostracism in Online Social Networks

Given that vulnerable populations do appear to be using online social networking sites (Barker, 2009; Ellison et al., 2007; Sheldon et al., 2011), and that there are a number of ways in which an individual can experience social exclusion while using these sites ("Facebook rejection," 2009; Hare, 2009; Wrongplanet.net, 2009), it appears that online social networking sites may be an excellent avenue to study the effects of ostracism in a naturalistic setting.

It is important to acknowledge that, while they are not a direct measure of cyber-ostracism, there are currently several measures being designed to assess the impact of cyberbullying. For example Topçu, Erduer-Baker, and Çapa-Aydin (2008) created the Cyberbullying Inventory (CBI) - a 34-item self-report questionnaire designed to assess participants' experiences of cyberbullying, both as a perpetrator and as a victim. Topçu et al. conceptualised cyberbullying as acts carried out over modern communication networks (such as cellular phone networks or the internet) between a perpetrator and a victim which were purposefully intended to be either aggressive (such as sending hurtful or threatening messages

via email or SMS) or humiliating (such as spreading malicious rumours or distributing embarrassing photos via email or SMS). Similarly, Menesini, Nocentini, and Calussi (2011) designed the Cyberbullying Scale (CS) - a 20-item self-report questionnaire with 10 items assessing perpetration of cyberbullying and 10 items assessing victimisation as a result of cyberbullying. Menesini et al. defined cyberbullying as three key types of behaviours occurring over modern communication networks: (1) written offences or insults (such as SMS messages, email, chatroom or web site comments), (2) verbal behaviours with mobile phones (such as prank calls), and (3) distributing violent or intimate photos via mobile phone or the internet. Importantly, in the case of both the CBI and CS, cyberbullying has been defined largely by overt acts of aggression or humiliation carried out between a perpetrator and a victim. However, recall that based on current definitions of bullying (Riebel et al., 2009), ostracism is also a valid form of bullying. Despite this, the definitions of cyberbullying used by Topçu et al. (2008) and Menesini et al. (2011) fail to account for the more insidious act of ostracism. Therefore, more work needs to be conducted to directly assess the impact of ostracism within modern communication networks.

One way that researchers could potentially address this issue would be to analyse the online behaviours of people who use social networking sites to directly assess the incidence and effects of online ostracism. For example, researchers could recruit participants who use Facebook and examine the extent to which they are included or ostracised in online social activities with users on their “friends” list. However, if researchers were to adopt this type of approach, they would have to overcome a number of significant hurdles. First, it would be very difficult to get an accurate and reliable measure of user activity on online social networking sites due to the complex nature of these online networks; take, for example, Facebook, the largest social networking site in the world with over 800 million active users. The average Facebook user has approximately 130 other users on their “friends” list, and is connected to approximately 80

community pages, groups, and events. Facebook receives more than 250 million photo uploads every day, and there are more than 900 million objects (such as pages, groups, events, and community pages) that users can interact with (Facebook, 2011c). Second, in addition to the difficulties that would be inherent in trying to analyse such a complicated network, researchers would also have to overcome a strict privacy policy that Facebook has regarding sharing of users' information with outside sources (Facebook, 2011b). In sum, although being able to access and analyse Facebook users' online activity could potentially provide a plethora of data on the incidence of online ostracism, it is quite possible that there are too many logistical hurdles for this to become a viable option in the foreseeable future.

Another possibility for future research would be for researchers to design a laboratory-based analogue of online-social networking which could be used to mimic some of the experiences of social exclusion that can occur over social networking websites. For example, participants could be asked to sign up to a bogus online social network in which (unbeknown to them) all of the other users are in fact confederates controlled by the experimenters. Participants could then be asked to carry out some sort of rudimentary task such as uploading a photo of themselves and have other users comment on it. Researchers could them manipulate the degree to which the participant receives comments on their photo relative to the other (bogus) users of the network, effectively either ostracising them from, or including them in, the social experience. The obvious advantage to conducting laboratory-based experiments is that it allows researchers to control for extraneous variables and to focus on a more uniform theory of cause and effect (Kantowitz, Roediger, & Elmes, 2009). However, clearly there would also be disadvantages to this approach. In the above example, it is unlikely that any observed results would be directly analogous to the real-life experiences of ostracism within online social media; participants would be interacting with strangers rather than with their friends and the degree to which they would be allowed to interact with one another would be limited. Therefore, much

like research using Cyberball, researchers would be restricted in the extent to which they could generalise their results to the real-life experiences of ostracism.

Currently, there is scope for more research to focus on the issues of online experiences of ostracism - this technology could lead to promising and exciting new ways to examine the effects of ostracism. However, as stated above, there are clearly several important issues that would need to be considered when designing research studies in this field.

Ostracism and Online Computer Gaming

The advent of online social networking sites provides an excellent opportunity for new ways to explore the effects of ostracism and social rejection. But it also important to acknowledge that there are a number of other ways in which people can socially interact through the internet. As mentioned previously, several researchers have investigated the effects of being ostracised through various forms of modern communication technology such as internet chat rooms (Williams et al., 2002), and cell phone SMS messaging (Smith & Williams, 2004). In addition to these current methods, another possibility to study online experiences of ostracism lies in the online computer-gaming community.

Since the inception of the internet, one of the other major factors contributing to the rise in online activity has been the growing popularity of online computer games (Griffiths, Davies, & Darren, 2003; Kim, Namkoong, Ku, & Kim, 2008). It is estimated that one in four global internet users engage in online gaming, which equates to over 400 million people worldwide (Baird, 2010). There are currently a whole host of ways in which people can play online games ranging from casual to very serious commitments (Griffiths et al., 2003). Recently, one of the most rapid rises in online gaming communities has been players of Massively Multiplayer Online Role-Playing Games (MMORPG) (Kim et al., 2008). MMORPGs are unique relative to many other online computer games in that they involve a richly detailed online world in which the player becomes fully immersed during their play time. Furthermore, the current popular MMORPGs

such as World of Warcraft and League of Legends often require quite serious time commitments from players; the average MMORPG player spends approximately 22 hours per week playing their chosen game (Daedalus Project, 2004). As a result, MMORPGs have featured heavily in research on online gaming because of a general concern that they may be significantly more likely to lead to internet addiction and therefore problems in people's real lives (Griffiths, 2010). However, to date, researchers have not yet examined the effects of ostracism and social rejection within these games.

The fact that MMORPGs are so deeply immersive makes them an interesting prospect from a social psychology perspective. MMORPG players spend a great deal of time interacting with other players online, engaging in very real and meaningful social interactions (Kim et al., 2008). For example, players may form long-term friendships with other online players (Daedalus Project, 2007), they may join online community groups known as "guilds" (Daedalus Project, 2008), or some may even get married in the virtual world (Daedalus Project, 2003). Furthermore, the level of immersion experienced by some players is so great that up to 20% of all MMORPG players will regularly forego important social duties in the real world such as friend or family commitments in order to play and interact online (Baird, 2010).

The amount of serious scientific research on this topic is currently sparse, but it does appear that players of online computer games, in particular MMORPGs, experience a highly immersive social experience when playing these games. Therefore, it may be that there are opportunities to study the impacts of ostracism and social rejection in general within online gaming communities. In the future, this is another area of online social-interaction which could be investigated by researchers looking at the effects of ostracism.

General Summary

Overall, the experiments described in this thesis provide further insight into the phenomenon of ostracism. We successful replicated and supported previous findings regarding

the negative psychological impact of ostracism on the four basic needs. Furthermore, we have extended the current literature base by providing new insight into some of the behavioural responses associated with ostracism, namely the relation between ostracism and introverted behaviour, and the relation between ostracism and risk-taking behaviour. Finally, there were several surprising findings in our research. First, in Experiment 1, we failed to find a change in participants' self-esteem levels after they experienced ostracism, and we also failed to replicate previously established age-related differences in participants' sensitivity to ostracism. Second, in Experiment 3, we failed to find an effect of ostracism on participants' aggression levels. Based on current information, we do not have clear explanations for these findings. In the case of the self-esteem change scores in Experiment 1, we are inclined to think that this may have been an anomaly in our sample due to the fact that we did find the desired effect in both Experiment 2 and Experiment 3. In regards to the expected age-related effect in Experiment 1, and the relation between ostracism and aggression in Experiment 3, we believe that these findings highlight the need for further research into these issues to more clearly identify the relation between ostracism and these effects.

The field of ostracism has expanded significantly in the past 15 years (Williams & Nida, 2011), however there is still a lot more to be learned. We have outlined potential areas for future researchers to focus their attention on the effects of ostracism within the online communities. Furthermore, there currently is a substantial body of literature on the effects of ostracism, but the evidence is less clear on effective ways to deal with these effects. An important area for future researchers to focus on is the development of strategies to treat people who experience ostracism in the real world. Ultimately, it is important for researchers to remember that ostracism is a real and hurtful experience with potentially devastating consequences for some victims. Understanding these consequences and finding new ways to

deal with them has important practical implications for the health and well-being of adolescents and emerging-adults.

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Appendix A

A review of the four basic needs.

Belonging

The term belonging describes the feeling of inclusion in, or acceptance by, a group (Reber & Reber, 2001). Research has shown that a sense of belonging leads to positive changes in an individual's emotional state, such as the feelings of bliss associated with falling in love (Sternberg, 1986). Furthermore, this positive affect may, in turn, increase the likelihood of forming additional social bonds, and thereby the likelihood of experiencing belongingness in the future (Baumeister & Leary, 1995).

Baumeister and Leary (1995) identified belonging as one of the fundamental human needs and on the basis of their literature review, they concluded that two conditions must be met in order for an individual to feel that they belong. First, the individual must experience regular, pleasant interaction with other people. Second, these interactions must be stable and ongoing, and among group members, there needs to be a clear concern for each other's wellbeing. Individuals who experience only one of these components usually display some degree of benefit, but to a lesser extent than those individuals who experience both components. Baumeister and Leary (1995) proposed that belongingness can be classified as a primary need because it meets two criteria. First, humans display an innate desire to form social bonds and regularly engage in goal-oriented behaviour to increase social contact. Second, individuals are extremely reluctant to lose attachments, even in the case of negative or destructive relationships (Strube, 1988). Individuals who do not experience feelings of belongingness are prone to develop a number of physical and psychological problems including depression, anxiety, stress, eating disorders, and other mental illnesses (Baumeister & Leary, 1995). While Baumeister and Leary cite a number of social experiences that can impact

negatively on an individual's sense of belongingness, Williams (2001) has suggested that ostracism is one of the most direct ways to undermine an individual's sense of belonging.

Self-Esteem

The term self-esteem refers to an individual's perception of his or her own self-worth (Reber & Reber, 2001). Specifically, self-esteem has both cognitive (personal beliefs about oneself) and affective (feeling good or bad about oneself) components (Leary et al., 1995). Although self-esteem has been a cornerstone of psychology for over 100 years (Murk, 1999; Owens & Stryker, 2001), it is difficult to establish a consensus definition of this multifaceted concept. While a complete literature review of the various theories of self-esteem is beyond the scope of this thesis, it is important to outline some basic self-esteem concepts in order to understand the interrelation between ostracism and self-esteem.

Self-esteem is viewed by many psychologists to be an essential determinant of perceived competence and general mental well-being (Leary et al., 1995; Sommer, 2001; Williams, 2001). In fact, the goal of many psychological treatments is to increase an individual's general sense of wellbeing (Leary et al., 1995; Murk, 1999), or, in other words, increase their self-esteem. Self-esteem is believed to contribute to positive outcomes for an individual because high self-esteem leads to an increase in goal-seeking behaviour, which in turn enhances productivity (Leary et al., 1995). The benefits of increased productivity are believed to be two-fold: First, productive individuals are more likely to strive towards and achieve their desired goals. This increased level of achievement leads to a sense of mastery and, subsequently, a further increase in self-esteem (Bandura, 1977; Leary et al., 1995). Furthermore, individuals with high self-esteem are more likely to persevere through initial failure (Shrauger & Sorman, 1977), and high self-esteem has been positively linked to achievement in a number of school-based studies (Brouillard & Hartlaub, 2005; El-Anzi, 2005; Raj & Agarwal, 2005). In contrast, degradation of an individual's self-esteem can lead to negative expectations of one's self-worth, and ultimately, undesirable

behavioural or cognitive consequences (Williams, 2001). In their work on social identity theory, Hunter and his colleagues (Hunter et al., 2005; Hunter et al., 2004; Hunter, Platow, Howard, & Stringer, 1996) have found that individuals who experience declines in their self-esteem are more likely to exhibit intergroup discrimination. A number of other researchers have found that decreased self-esteem can lead to a number of negative behaviour outcomes including suicide (Grøholt, Ekeberg, Wichstrøm, & Haldorsen, 2005; Metha, Chen, Mulvenon, & Dode, 1998; Wilburn & Smith, 2005), delinquency (Boden, Fergusson, & Horwood, 2007), and aggression (Boden et al., 2007; Sandstrom & Jordan, 2008).

Theorists commonly agree that an individual's self-esteem is largely influenced by their evaluation from others, with high self-esteem resulting from perceived social acceptance (Leary et al., 1995). From this perspective, it is argued that ostracism has a negative impact on an individual's self-esteem because it challenges their perception of acceptance, which in turn leads to a perception of inferiority relative to others (Leary et al., 1995). It is also argued that ostracism influences self-esteem because it is associated with punishment and therefore, there is an implicit suggestion that an individual has done something wrong (Williams, 2001).

Control

Like belonging and self-esteem, an individual's perception of control is a motivating factor in their behaviour (Friedland, Keinan, & Regev, 1992). Control is a positive influencing factor in our daily lives, leading to feelings of effectiveness and self-worth, which in turn promotes both individual health and social comfort (Fiske & Yamamoto, 2005). In addition, some have argued that the perception of control potentially buffers individuals from the effects of failure, and ultimately leads to an increased likelihood of success (Bandura, 1997; Williams, 2001). Without the perception of control, individuals typically exhibit learned helplessness and may become depressed (Williams, 2001).

Ostracism is thought to directly affect an individual's perception of control because it denies the target social feedback from the situation (Williams, 2001). For example, a verbal argument, although a potentially unpleasant event, involves a level of reciprocal communication (albeit a negative one) that allows an individual to maintain some degree of control or direction over the situation (Williams & Zadro, 2005). In contrast, ostracism denies the recipient any social exchange, and subsequently, any power over the situation. As a result, ostracised individuals can feel that they lack control, which is believed to contribute significantly to the negative consequences experienced following ostracism (Williams, 2001; Williams & Zadro, 2005). Individuals who experience ostracism exhibit an innate desire to re-gain a sense of control by increasing their pro-social behaviour toward those who ostracise them, or by asserting control in an alternative context (Friedland et al., 1992).

Meaningful Existence

The concept of meaningful existence encompasses an individual's perceived level of worth and purpose in life (Williams, 2001). The idea that humans have an innate need to experience a meaningful existence is primarily based on the principles of terror management theory. Terror management theory proposes that humans constantly strive to seek information which re-affirms their sense of worth, or meaningful existence (Greenberg et al., 1992). More specifically, terror management theory predicts that humans are continuously aiming to buffer against the terror that they feel when contemplating their own mortality and insignificance (Greenberg et al., 1990). Williams (2001) argues that ostracism can be metaphorically likened to death (or non-existence), in that an ostracised target may feel as if they have no self-worth, or existence. Ostracism therefore threatens an individual's sense of meaningful existence by acting as a reminder of mortality and our relatively inconsequential existence (Williams & Zadro, 2005).

Appendix B

The Post-ostracism Cyberball Questionnaire (Williams et al., 2002).

Cyberball Post-Experimental Questions

Question:	Not at all				*Very much*
I felt disconnected.	1	2	3	4	5
I felt rejected.	1	2	3	4	5
I felt like an outsider.	1	2	3	4	5
My feelings were hurt.	1	2	3	4	5
I felt good about myself.	1	2	3	4	5
My self-esteem was high.	1	2	3	4	5
I felt liked.	1	2	3	4	5
I felt invisible.	1	2	3	4	5
I felt meaningless.	1	2	3	4	5
I felt non-existent.	1	2	3	4	5
I felt powerful.	1	2	3	4	5
I felt I had control over the course of the interaction.	1	2	3	4	5
I felt superior.	1	2	3	4	5
I felt angry	1	2	3	4	5
My mood was….					
…good	1	2	3	4	5
…bad	1	2	3	4	5
…happy	1	2	3	4	5
…sad	1	2	3	4	5
…friendly	1	2	3	4	5
…unfriendly	1	2	3	4	5
…tense	1	2	3	4	5
…relaxed	1	2	3	4	5
I was ignored	1	2	3	4	5
I was excluded	1	2	3	4	5
Assuming 25% of the time you would receive the ball if everyone received it equally, what percent of the throws did you receive?	_____%				

Appendix C

The Cyberball introductory page; shown to participants before beginning the Cyberball game.

Welcome to Cyberball, the Interactive Ball-Tossing Game Used for Mental Visualisation!

In the upcoming experiment, we test the effects of practising mental visualisation on task performance. Thus, we need you to practice your mental visualisation skills. We have found that the best way to do this is to have you play an on-line ball tossing game with other participants who are logged on at the same time.

In a few moments, you will be playing a ball tossing game with other students over our network. The game is very simple. When the ball is tossed to you, simply click on the name of the player you want to throw it to. When the game is over, the experimenter will give you additional instructions.

What is important is not your ball tossing performance, but that you ***MENTALLY VISUALISE*** the entire experience. Imagine what the others look like. What sort of people are they? Where are you playing? Is it warm and sunny or cold and rainy? Create in your mind a complete mental picture of what might be going on if you were playing this game in real life.

Okay, ready to begin? Please click on the following link to begin: Start Playing Now