The Role of Evolutionary and Social Factors in the Same-sex and Partner Aggression

by

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Abstract

Many theories have attempted to explain aggressive behaviour, ranging from social theories (Bandura, 1973) to evolutionary theories (Buss, 1999). This report uses evolutionary theory to derive predictors of aggressive behaviour, in particular whether there are sex differences in predicting aggression. Four evolutionary-derived predictors (impulsivity, dominance, competitiveness and sexual jealousy), and three aggression measures, were used: these were the aggressive questionnaire, specific acts of partner and same-sex aggression (both aggressor and victimization measures). The measures were presented to the participants via an online questionnaire, in which 322 participants (96 males and 226 females) took part in the study. The findings are described in three chapters: (1) sex differences in aggression measures; (2) the relationship between proneness to aggression (the aggressive questionnaire), specific forms of aggression and evolutionary-derived predictors; and (3) whether there were sex differences in the relationship between evolutionary derived predictors and specific forms of aggression. The main findings were: (1) no sex differences in the means of partner direct and indirect aggression whilst higher levels of same-sex direct and indirect aggression were reported by males than females; (2) a strong relationship between proneness to physical aggression and partner direct aggression; (3) impulsivity was more strongly related to same-sex aggression than to partner aggression; (4) dominance was a significant predictor of partner direct and indirect aggression for both sexes, a significant predictor of same-sex direct aggression for males only, and a significant predictor of same-sex indirect aggression for females only; (5) sexual jealousy was a particularly strong predictor of partner direct aggression in males but not females, and overall a weak predictor of same-sex aggression. Overall there was some support for evolutionarily-based hypotheses the

relationships between these variables. However, evolutionary theory is better at explaining aggressive behaviour in males than females.

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Chapter 1- Introduction

1.1 Introduction to study

Two main theories have been put forward to explain sex differences in aggressive behaviour, evolutionary theory (Archer, 1996; Buss, 1999) and social role theory (SRT: Bandura, 1973; Eagly, 1995). The two theories differ fundamentally in terms of the ultimate determinants of men's and women's aggressive behaviour; evolutionary theory explains sex differences in aggression through sexual selection pressures whilst SRT explains these sex differences (and others) through the division of labour in society (see Archer, 1996; Buss, 1995; Eagly, 1995). This thesis does not compare these competing theories of aggression. Instead it focuses on testing theoretical predictions derived from sexual selection. Therefore, this thesis will test whether any complete theory of aggression needs to include sexual selection theory.

The thesis has three original elements to the research: (1) comparing mean sex differences in partner and same-sex direct and indirect aggression within the same sample (previous work focused on only same-sex and opposite-sex members: Richardson & Green, 1999); (2) providing external validity by examining the associations between trait-based measures (the Buss & Perry Aggressive Questionnaire) and self-reported acts of aggression, including direct and indirect aggression to a partner; (3) whether there are sex differences, as predicted by sexual

selection, in associations between evolutionary-derived predictors and self-reported acts of aggression.

The thesis will be divided into the following chapters: (1) a literature review; (2) the methodology used. The next three chapters focus on the results and discussion on the original aspects of this research: (3) involves mean sex differences in partner and same-sex direct and indirect aggression; (4) considers the relationship between trait aggression and self-reported acts of aggression; (5) describes sex differences in associations between evolutionary-derived predictors of aggression and self-reported acts of aggression.

The remainder of this chapter is divided into the following sections: Evolutionary theory in relation to sex differences (1.2), Evolutionary theory as related to aggression (1.3), impulsivity (1.4), dominance (1.5), competitiveness (1.6) and sexual jealousy (1.7). The remaining five sections examine aggression measures, the Aggression Questionnaire (1.8), Partner direct aggression (1.9), Partner indirect aggression (1.10), Same-sex direct aggression (1.11), Same-sex indirect aggression (1.12), and partner and same-sex aggression (1.13).

1.2 Evolutionary theory in relation to sex differences

The mechanism for evolutionary theory was proposed by Darwin (1859, 1879) in two books, On the origin of Species and the Decent of Man. Although, the basic essence of evolutionary theory is similar to Darwin's theory, updates have been made (Dawkins, 1989; Huxley,1974; Jones,1999), and simply stated, natural selection is the

process by which organisms best suited to the environment survives thereby passing on the advantageous genes.

Evolutionary psychology is derived from explaining animal aggression via cost/benefit analyses. A number of articles and books have been written using evolutionary psychology to explain human behaviour (Archer, 1996; Buss & Shackleford, 1997; Buss, 1999; Campbell 1999; Campbell, Muncer & Bibel, 2001; Daly & Wilson, 1994). A major focus of evolutionary psychologists is in predicting sex differences in human behaviour in mate selection and aggression (Archer, 1996; Buss, 1999).

Perhaps the most influential paper written in evolutionary psychology to explain sex differences is Trivers' (1972) modification of Darwin's sexual selection hypothesis. The major principle behind sex differences in human behaviour is parental investment theory (Trivers, 1972; Brjorklund & Kipp, 1996). Parental investment theory can be defined as 'anything done for an offspring that increases its chances of survival and which decreases the parent's ability to produce additional offspring (Trivers, 1985, p 207). This ranges from the production of reproductive cells to the time and effort spent on rearing the offspring, and the cost of parental care. Therefore, there is generally higher parental investment in females than males, and this is likely to manifest itself in differences in social behaviour (Brjorklund & Kipp, 1996; Buss, 1999).

It follows from the sex differences in parental investment that there are different strategies for attracting members of the opposite sex. Males will seek to have a large

number of sexual encounters with females whilst females have more selective strategy because of the higher costs of mating. Therefore, males and females seek different traits in a member of the opposite sex. Males seek to find females with a high reproductive values (ability to produce offspring) whilst females seek males who have peer status and resources (Archer, 1996). The sex difference in paternal investment implies that there are different costs and benefits in social behaviour for males and females.

An important principle of theoretical evolutionary theory is the cost/benefit analysis. Applied to aggression, this holds that there are benefits (i.e., controlling a resource or individual) and costs (i.e., physical retaliation, time) of aggression. Sex differences emerge in the potential costs that are likely to be risked, with higher risk-taking in males than females due to the males' lower parental investment. Therefore, in male peer groups the benefits of controlling the group outweigh the possible costs of physical retaliation in terms of being a successful strategy of reproductive success. Compared to females, for males the benefits of gaining control over the group's resources outweigh the costs of committing aggression (such as being excluded from the peer group). There is empirical support for a sex differences in risk-taking. A study that examined attitudes towards taking risks found more positive attitude towards risks in males than females (Fetchenhauer & Rohde, 2002). Males have greater reproductive potential (in terms of the offspring they are able to produce) and hence will adopt a more risky strategy: males are more likely to risk the potential costs of being directly aggressive, whilst lower cost forms of aggression (i.e., indirect aggression) are likely to produce no sex differences in aggression . However, this does not imply that the individual has self-awareness of this cost/benefit analyses: it

may be a subconscious process (Bjorklund & Kipp, 1996). From the theoretical basis of the cost/benefit analysis system it is proposed that there will be greater inhibition in females than males (Bjorklund & Kipp, 1996).

1.3 Evolutionary theory and aggression

This section examines the theoretical link between evolutionary theory and aggression. Buss and Shackleford (1997) proposed that there are seven adaptive problems where aggression may have evolved as a solution in certain contexts: (1) co-opting the resources of others, (2) defending against attack, (3) inflicting costs on same-sex rival, (4) negotiating status and power hierarchies, (5) deterring rivals from future aggression, (6) deterring mates from sexual infidelity and, (7) reducing resources expended upon genetically unrelated children.

Specific acts of aggression are usually studied in two contexts, towards a partner or a member of the same-sex. Evolutionary analyses of aggression involve different principles for a partner and to a member of the same sex. A member of the opposite sex is usually a potential/actual collaborator for raising offspring whilst a same sex member is usually a competitor or rival for a mate (Archer, 1996). Most studies have examined aggression either to the same-sex or to opposite-sex members. The one study that did involve both of these did not specifically ask about partner aggression, i.e., an opposite sex member could be any one from the opposite sex (Richardson & Green, 1999). The present study specifically asked abut a partner in a intimate relationship, and therefore provides the first study in which aggression to both these types of opponent can be compared.

Evolutionary analyses suggest that there sex differences in strategies for dealing with a partner and same-sex members (Buss, 2002). In a long-term relationship, both sexes have a common interest in maintaining the relationship in order to produce successful offspring, although their interests may diverge in several ways. Firstly, it is to the advantage of both partners to exploit the other so as to be the net beneficiary in terms of investment in the relationship. Both should therefore seek to dominate the other's behaviour. Secondly, each sex has different reasons for exerting such control. For males, control of exclusive sexual access to a female would eliminate the chances that time and resources were being wasted on genetically unrelated children (Wilson & Daly, 1993). For females, control of the males' behaviour would reduce the chances of his spending resources on other females. Therefore clues of emotional or/and sexual infidelity may be a trigger for aggression.

Evolutionary analyses (sexual selection) propose that there are sex differences in reproductive strategies for dealing with same-sex members. Both sexes have a need to establish peer ordering but strategies diverge in their intensity. In terms of reproductive strategy, males are more likely to attempt to directly dominate their peer group members to gain peer status, compete for resources, and to seek to deter rivals from their sexual partners (Archer, 1996; Campbell, 1999; Pellegrini, 2002). Gaining resources and peer status would improve the likelihood of finding a high reproductive value mate. Females have a need for peer ordering in order to establish sexual reputations and to protect heterosexual relationships from a rival (Campbell, 1999), but as indicated above are less likely to adopt high-cost strategies in their peer relations than are men. Therefore, males and females have different types of social

networks for dealing with same-sex peers, so the aggressive strategy used will be dependent upon the sex of the person.

In the case of direct aggression, sexual selection theory predicts higher levels of reported acts of aggression in the male direction. This sex difference in physical aggression derives from the greater cost males are typically prepared to incur when aggressing (Trivers, 1972). Since indirect aggression involves a lower risk of direct retaliation there are no predicted sex differences for this form of aggression in adults (Archer & Coyne, 2005; Bjorkqvist, 1994; Campbell, 1999). Without specifically examining the context of aggression there is some empirical evidence supporting the sexual selection hypothesis, with higher levels of physical and verbal aggression being reported in the male direction (Archer, 2004; Buss & Perry, 1992; Toldos, 2005). In contrast, no sex differences have been consistently found using indirect aggression measures (Archer, 2004; Forrest et al, 2005; Richardson & Green, 1999; Toldos, 2005). Other researchers have found in a sample of adolescents reports of direct and indirect aggression to be higher in males than females (Salmivalli & Kaukiainen, 2004). It is particular interesting to compare sex differences in both indirect aggression and proneness to verbal aggression in the same sample as both are non-physical aggression measures and have rarely been studied together. Generally, no sex differences are found in indirect aggression, while proneness to verbal aggression is higher in males than females.

From this brief outline of general principles in evolutionary theory, we can make more specific predictions for the four evolutionary-derived predictor variables used in the thesis, impulsivity, dominance, competitiveness, and sexual jealousy. The study

addresses whether there is a sex difference in evolutionary-derived predictors as predicted by sexual selection theory (Archer, 1996; Trivers, 1972). This will be done in two ways: (1) sex differences in mean frequency and (2) sex differences in predictors of aggression measures.

1.4 Impulsivity

Impulsivity is a general characteristic referring to the tendency to act in an unplanned manner, without any conscious thought. A typical example of an impulsivity scale is that of Barrett (Barrett, 1994). An example of an item is 'I get easily bored when solving thought problems'. However, some of the questions appear on an impulsivity measure are also found on the AQ, e.g., 'some of my friends think I'm a hothead.' Caution is therefore needed when interpreting the results with the AQ and impulsiveness measures together.

The Barrett impulsivity scale has been used in many samples and as expected scores are higher in prison inmates than undergraduates (Patton, Stanford, Barratt, 1995). There is some evidence of higher levels in males than females (Vierikko, Pullkinen, Kaprio & Rose, 2005). However, other researchers have found no mean sex differences in impulsivity (Rammsayer, & Rammstedt 2000). But impulsivity has been consistently found to be associated with proneness to direct aggression (e.g., Barratt, Stanford, Dowdy, Liebman & Kent, 1999; Harmon-Jones, Barratt & Wigg, 1997; O'Connor et al., 2001; Stanford, Houston, Villemarette-Pittman & Greve, 2003; Krueger et al 1996). However, the relationship with indirect aggression has rarely been examined.

Rarely have sex differences in associations between impulsivity and partner and same-sex aggression been studied. In this M.Phil report we set up two hypothesis about the possible relationship between impulsivity and aggression. The first hypothesis is the traditional assumption of impulsivity being a trait measure (Stanford, Greve, & Dickens, 1995). This theory implies that impulsivity is related to aggression irrespective of the sex of the perpetrator and the sex of the opponent. Therefore, from this theory the relationship between impulsivity and specific acts of aggression would be significantly associated to a similar extent for both males and females.

The second hypothesis of the relationship between impulsivity and specific forms of aggression is derived from the parental investment model and this has not been empirically tested. A characteristic that is conceptually the opposite of impulsivity is inhibition, which involves suppressing urges. Bjorklund and Kipp (1996) have argued that higher parental investment in females manifests itself in various situations where females show greater inhibition in circumstances that are relevant to aggression, i.e., inhibition in social tasks. Therefore, males are more likely to risk engaging in aggressive behaviour in order to gain peer status and resources to improve the likelihood of producing successful offspring. We can hypothesise that there will be stronger associations between impulsivity and specific forms of aggression in males than females. Therefore according to this parental investment hypothesis, impulsivity would be able to account for more variance in aggression for males than females.

However, no research has directly tested whether the association between inhibition/impulsivity and specific forms of aggression varies between males and

females. To do this I examined impulsivity in relation to aggression in two contexts, to an intimate partner and to a member of the same sex. As indicated, from the evolutionary-analysis, we might expect stronger associations between impulsivity and measures of specific acts of aggression in males than females. It is also expected that the relationship between impulsivity and proneness to physical and verbal aggression will be higher in males than females. Research has found that inhibition is negatively associated with anger (Smits & Kuppens, 2005; Vigil-Colet & Codorniu-Raga, 2004). However, caution is needed in interpreting any impulsivity relationship with the AQ anger subscale, due to some anger items being similar to impulsivity measures, such as 'some people think I'm a hothead'.

1.5 Dominance

The concept of dominance describes the ordering of individuals in a group, according to their ability to gain access to resources (Archer, 1992; Buss & Shackleford, 1997), and in humans it describes an underlying trait involving seeking to dominate others. Dominance is closely related to control measures (Graham-Kevan & Archer, 2005; Wilkinson & Hamerschlag, 2005) but differs as it is a desire to dominate people rather than perceived control of a specific situation. Therefore, control measures are situation-specific whilst dominance can be used in relation to aggression across different contexts, i.e., partner and with same sex members. The measure of dominance used was created by the author and assesses the need for dominance rather than perceived or actual dominance, as this would be dependent upon the situation.

Since the dominance measure used in this study investigates the desire to gain control other people independent of the context, it is expected that there will be no sex differences in the mean frequency of dominance because both sexes have a general need to be domineering in order to maximise their reproductive potential. In line with this, previous research has found no sex differences in the means for social dominance (Egan & Angus, 2004).

According to parental investment theory, it would benefit both sexes to be the dominant one in an intimate relationship, but for different reasons. For males, dominating their partner would reduce the chances of wasting resources and time on genetically unrelated children (Wilson & Daly, 1993), whilst females would benefit from reducing the chances of her mate investing time and resources in other females' offspring. A similar measure to dominance is control; when specifically examining control in an intimate relationship it has been found to be associated with partner aggression for both males and females (Graham-Kevan & Archer, 2005). Therefore, for partner direct aggression, we would expect both sexes to show an association between aggression and dominance.

Rarely has dominance been examined in relation to partner indirect aggression. Conceptually, indirect aggression has little to do with gaining control as it does not involve face to face engagement with the other person. Therefore, it is predicted that the relationship between dominance and partner indirect aggression has little to do with actual control of a relationship but the perceived control of the relationship, making the person feel in control of their life. By our predictions of no sex differences in dominance it is therefore predicted that there will be a significant association

between dominance and partner indirect aggression for both sexes because both sexes want to feel in control of their lives.

From an evolutionary perspective, the relationship between dominance and same-sex aggression will vary according to the sex of the participant. Both sexes seek to dominate peer relations and occasionally use aggressive tactics. Males have evolved a more risky strategy to dominate relations and therefore are more likely to use directly aggressive tactics. This enables a dominant male to control resources of the peer group and gain peer status, thus being able to attract a partner (Pellegrini, 2002; Pellegrini & Long, 2002). In contrast, females use a less risky strategy, usually opting to indirectly gain peer influence and improve their sexual reputations (Campbell, 1995; 1999).

The majority of research on social dominance in males has either focused on primates or children, and has rarely been extended to samples of human adults (Hawley, 1999). The desire for dominance is associated with aggression in adolescent boys (Pellegrini, 2002; Pellegrini & Long, 2002). In a new group there is an increase in aggression that declines when there is a dominant structure set (Pellegrini & Long, 2002). In animal studies it was found that hens are likely to attack a lower-ranking hen in order to maintain their dominant status (Archer, 1992; Forkman & Haskell, 2004). This can be applied to humans as it is expected that males seeking to dominate other males will target lower ranking males in order to improve their peer status (Archer, 1992). Therefore, participants with lower proneness to physical aggression are more likely to be targets of aggression because more aggressive males will target less aggressive males in order to maintain dominance over the less aggressive males (Archer, 1992).

The need for dominance is strongly associated with gaining peer group status (to be seen by the peer as the leader) and resources, and it has been linked to male on male violence (Buss, 1999). It has been widely researched that traditional masculine values are associated with aggression (Archer, Hollway & McLoughin, 1995; Cohen & Nisbitt, 1994). This helps to explain why trivial incidents, such as a conflict over a parking space, can lead to homicides (Archer & Lloyd, 2002). It is not the principles over the parking space that causes aggression but the need to dominate one another. It is expected that dominance would be strongly associated with same-sex direct aggression in males. However, due to the direct nature of males establishing peer hierarchical structures it is not expected that dominance will be significantly associated to same-sex indirect aggression.

Females have the same need for peer orderings in order to manage sexual reputations, competition for resource-rich males and to protect heterosexual relationships from a takeover (Campbell, 1995). But due to higher parental investment, females use a less risky strategy in terms of potential costs of committing aggression (See Campbell, 1999). Therefore they are less likely to use direct aggression but still use similar levels of indirect aggression to improve the chances of finding a resource-rich mate by manipulating the group using social networks (Campbell, 1999). Therefore female peer orderings involve inclusion and exclusion from friendship groups and more indirect forms of aggression compared to males (Archer & Coyne, 2005; Campbell, 1995, 1999). We can make predictions that dominance will be more strongly related to same-sex direct aggression in males than females, whilst it will be more strongly related to same-sex indirect aggression in females than males. It is also expected that

dominance would be significantly related to all of the four AQ subscales for both males and females as dominance has been linked to all forms of aggression (Campbell, 1999).

1.6 Competitiveness

Competitiveness is a desire for an individual (s) to gain resources from other individuals who want the same resource. It usually involves competition between members of the same sex (Wilson & Daly, 1993). The measure of competitiveness is similar to dominance but differs slightly because competitiveness is about achieving goals and materials whilst dominance is solely about the person's relationship with people. According to Trivers' (1972; 1985) parental investment theory, males are more competitive than females owing to their lower parental investment (also see Section 1.5). Therefore, in order for a male to attract a high reproductive value mate he needs to gain resources by directly competing against other males. Also males are more likely to show higher interest in sensational topics (such as interests in weapons and military) that have been associated with severe forms of intra-sexual competition (Weiss, Egan & Figueredo, 2004). It is expected that sex differences will occur in the mean frequency of competitiveness with higher levels being reported by males than females.

The association between competitiveness and specific forms of aggression is dependent upon the sex of the participant and the context of aggression (partner or same-sex aggression). In an intimate relationship, both sexes seek to gain a net benefit from the relationship but this does not include competing for resources and goals

against each other. Therefore, competitiveness has not been linked either empirically or theoretically to partner aggression

Males are likely to directly compete against each other to gain peer status and resources (Archer, 1996; Buss & Shackleford, 1997) whilst females are more likely to indirectly compete against other females to order establish sexual reputations (Campbell, 1999). However, competitiveness is a desire to gain resources rather than peer status: therefore, we do not expect associations for female partner or same-sex direct and indirect aggression. Thus, in the male analysis, we expect a significant association between competitiveness and same-sex direct aggression, but not same-sex indirect aggression.

However, the relationship between competitiveness and specific forms of aggression may not be straightforward, due to sex differences in the formation of peer groups. There are sex differences in the formation of groups. Males are more likely to form large groups whilst females prefer to stay in smaller groups: this is evident in children as young as five and when in competition with other same-sex members individuals displayed more assertiveness in groups than dyads (Benenson, Maiese, Dolenszky, Dolenszky, Sinclair & Simpson, 2002). In terms of sexual selection theory males will form a larger group and attempt to control the resources whilst females form smaller groups as they gain resources through mate selection. This position will be supported if higher levels of competitiveness are found in males than females.

We can make a number of predictions about competitiveness based on evolutionary analysis. Thus, competitiveness should only be associated with same-sex direct

aggression in males and not related to same-sex indirect aggression. It will not be related to partner aggression since partners typically share resources rather than competing for them. Also it is expected that the relationship between competitiveness and the four AQ subscales will yield higher associations in males than females.

1.7 Sexual jealousy

A fundamental principle of sexual selection is that both sexes have evolved strategies to maximise the chances of both producing and successfully rearing their offspring. A mechanism that has evolved to limit sexual access to a male's partner is sexual jealousy. Evolutionary psychologists have described different principles behind sexual jealousy for the two sexes (e.g., Buss, 2000). The function of male jealousy is to ensure his offspring are his own whilst the function of female jealousy is to ensure that vital resources are spent on her offspring (Widerman & Kendall, 1999; Sagaarin, Becker, Guadagno, Nicastle & Millevoi, 2003; Pietrzak, Laird, Stevens & Thompson, 2002). Therefore, the triggers for jealousy in males and females are held to differ, males being more upset by sexual infidelity and females by emotional infidelity, i.e. forming a new relationship. Sex differences in means of sexual jealousy are dependent upon the type of jealousy measure. The measure used in the study is mainly made up of emotional infidelity items. This was not a deliberate choice at the outset but was due to ceiling affects in sexual infidelity: therefore, in view of this, it is predicted that there will be a higher mean sex difference in the female direction.

Research into sex differences in sexual and emotional infidelity tend to be inconsistent with Buss' evolutionary theory of sexual jealousy (Harris, 2003). In real-

world situations it may be impossible to separate the two types of jealousy as acts of sexual infidelity will also contain acts of emotional infidelity. There is some support for the evolutionary perspective by findings that show males are more likely to remember acts of sexual infidelity whilst females were more likely to remember acts of emotional infidelity (Schuzwohl & Koch, 2004). Also Schutzwohl (2005) further expanded on the evolutionary hypothesis, by finding no sex differences in emotional or sexual infidelity in the first reaction to cues to infidelity, but when participants were asked about when the feelings of sexual jealousy became intolerable sex differences found. As predicted by evolutionary theory, males had a higher intolerance to sexual infidelity and females had a higher intolerance to emotional infidelity. However, these studies did not examine whether there are sex differences in the specific response to infidelity of either sort, i.e., whether emotional infidelity is more likely to lead to aggression in one sex or another.

Sexual jealousy is a major trigger to aggression (Buunk, 1997; Puente & Cohen, 2003; Wilson & Daly, 1993), and it has been argued that it is related to both partner and same-sex aggression to a greater extent in males than females (Buss, 2000; Daly, Wilson, Weghurst, 1982; Daly & Wilson, 1988). Also sexual jealousy has been a major motive underpinning partner homicide in a number of studies (Serran & Firestone, 2004) and partner violence (Marcus & Swett, 2003; Russell & Wells, 2000; Wilkinson & Hamerschlag, 2005). This is consistent with parental investment principles. A male's partner who commits sexual infidelity decreases the likelihood that any offspring she carries are from the original partner, whilst a male committing sexual infidelity does not affect the chances of the female producing offspring. Therefore, it is also expected that the relationship between sexual jealousy and the

four AQ subscales will be stronger in males than females. However, caution is needed in interpreting an association between sexual jealousy and hostility because some of the measures are very similar: for example 'I am sometimes eaten up with jealousy'.

1.8 Aggression

Aggression is defined in humans as behaviour intended to cause physical and/or or emotional distress towards another person who does not want to receive such actions. There is a broad range of aggressive actions ranging from the most serious, homicide, to relatively 'trivial' actions, such as spreading rumours about a person. Although there is a large difference in the intensity of such aggressive actions, both are underpinned by the aggressor's desire to cause the victim distress.

From the large variety of aggressive actions it is not surprising that researchers use different types of aggression measures. These measures can be divided into four main categories and in each case comparisons between partner and same-sex aggression can be made: homicide data (e.g., Daly & Wilson, 1988), criminal records reported to the police (e.g., Dobash & Dobash, 1977-78), criminal acts reported and unreported to the police, such as the British Crime Survey (e.g., Upson, Povey & Gray, 2004) and Self report measures (e.g., Richardson & Green, 1999). Each of the measures involves different types of aggressive actions that vary depending upon frequency and severity; therefore encompassing different strengths and weakness. The first two measures use officially recorded data (homicide and criminal records) and have the benefit of confirmation that the aggressive act has taken place by the police, or in the case of homicide, at a post-mortem. However, there are two major limitations: the first is the

focus on the extreme end of the aggression spectrum so that there is a difficulty in making generalizations to the general population. Secondly, the recorded police figures exclude a large amount of unreported aggression (Dobash & Dobash, 1977-78). However, the British Crime Survey and similar measures in other countries address the issue of unreported aggressive acts but still focus on the narrow legal definitions of aggression (Upson et al, 2004). The first three measures provide a useful ways of studying aggression but are not used in this study for the reasons discussed above.

The most common measure for studying aggressive acts that vary in intensity and frequency is via self-reported acts of aggression. Although self-report measures have been used in many different samples, a large number of these involve university populations (Archer, 2004). Self-report measures of acts of aggression have many advantages over the other three measures for the present purposes. The two most important are, first that they encompass the broad range of aggressive actions, whilst other measures only focus on the narrow legal definitions of physically aggressive behaviour; and second that self-report measures are more practical and flexible. Therefore, the inclusion of predictor variables can be incorporated into the design, whilst with the other aggression measures (homicide figures) this would not be possible. Yet there are also drawbacks to self-report measures that are addressed later in this section.

In order to examine the theoretical nature of self-report aggression measures we must understand the distinction between two types of measures. Firstly, there is a trait aggression measure that addresses proneness to aggression rather than specific acts of

aggression: an example of this is the Aggressive Questionnaire (AQ: Buss & Perry, 1992) The second type of measure represents aggressive acts (from serious assault too gossiping): an example is the Aggressive Acts Questionnaire (AQQ: Richardson & Green, 1999) that attempts to represent the full spectrum of aggressive acts (from serious assault too gossiping).

The AQ (Buss & Perry, 1992) has four subscales that can be divided into two categories, proneness to physical and verbal aggression and traits related to aggression, hostility and anger. Research into these scales have found sex differences in proneness to physical and verbal aggression with higher levels reported by males than females whilst no significant sex differences in hostility or anger (Archer, 2004; Buss & Perry, 1992).

The second type of self-report measure involves specific forms of aggression. In the aggression literature, two distinctions are made that are dependent upon the researcher's perspective; either, from the victim or perpetrator of aggression. Researchers who take the victim perspective focus on the consequences of aggression, i.e., physical and psychological abuse (Borjesson, Arons, & Dunn, 2003). Physical abuse is violence where the perpetrator uses their body or a weapon to inflict physical and emotional pain on the victim, whilst psychological abuse is confined to verbal or social manipulation that causes emotional distress. The second perspective is from the perpetrator viewpoint which focuses on direct or indirect aggression (e.g., Forrest, Eatough & Shelvin, 2005; Richardson & Green, 1999; Salmivalli & Kaukiainen, 2004). Direct aggression is an act of physical and/or verbal aggression where the target is present and can counterattack the aggressor, whilst indirect aggression is an

act of usually verbal aggression where the target is hidden and cannot counterattack the aggressor.

In this thesis, I used the distinction of direct and indirect aggression for two reasons. Firstly, there is no overlap in the definition of direct and indirect aggression (the target is present or not) whilst there is some overlap in the physical and psychological subscales because physical abuse will typically involve verbal aggression and anger as well. Secondly this research is primarily concerned with examining whether sex differences are found in evolutionary-derived predictors of aggression, so that it is appropriate to examine forms of aggression involving different cost/benefit contingencies (e.g., there are more risks associated with direct aggression than indirect aggression).

Two types of measures of aggressive acts are used in this study: perpetrator and victimization scales. The perpetrator measures involve participants' reports of committing aggressive acts whilst the victimization measures involve reports of aggression against the participant. By examining both perpetrator and victimization measures we can establish whether there are sex differences in the pattern of results, i.e., strengths of associations between the two measures. Although, this research does not examine whether there is agreement between partners's which has been dealt with in previous research (Archer, 1999). However, by examining whether there are sex differences in the strength of associations between perpetrator and victimization measures it can inform us whether there are sex differences in the pattern of reports of aggression. Both perpetrator and victimization measures are included for indirect aggression but more caution is needed when interpreting indirect aggression

victimization measure due to participants not being fully aware of all the indirect aggression directed at them.

There are several practical problems associated with self-report measures of aggression. The first two are both underpinned by the same problem. Firstly, the self-report measures cannot determine who the initial aggressor is and who is defending against attack. Therefore, the motives may be different as the defender may have had no intention to injure a person but only to stop themselves from being injured, whilst the aggressor intends the person to be injured. Another problem is the failure to take the context into account, therefore losing a lot of important information about a specific situation, e.g., when somebody throws an object at a person, it may be intended to hit or miss the person. Both of these limitations are underpinned by the inability in determining whether there was intention to cause physical and/or emotional harm that is included in the operational definition of aggression. Also there are more specific limitations when examining partner aggression that are not applicable to same-sex aggression, for example, the agreement between partners about whether aggression has taken place (Archer, 1999). In same-sex aggression this is not applicable as those committing and receiving aggressive behaviour are not matched up.

1. 9 Partner Aggression

A controversial issue in aggression research is whether there are sex differences in partner aggression (Archer, 2000; Straus, 1979; Dobash, Dobash, Wilson & Daly, 1992). Two schools of thought currently exist in the partner aggression literature:

firstly, that there are no sex differences in partner aggression, whilst the second perspective claims there are sex differences with females most likely to be victims.

The first school of thought is that there are no sex differences in partner aggression, a view based on research coming from general population surveys. The majority of studies rely on self-report measures, such as the conflict tactics scale (CTS) developed by Straus (1979). Meta-analyses of these measures have found no sex differences in partner aggression (Archer, 2000, 2002) whilst reports of injuries have found to be slightly higher in females, an effect size of d = .05 (Archer, 2000). Also a recent British Crime Survey found 67% of victims of domestic violence are females (Upson et al., 2004) But it is also important to examine the distribution in self-report measures as research from the British Crime Survey suggests the majority of intimate relationships will not display any intimate aggression towards each other (Upson et al., 2004).

The second perspective, often termed the feminist perspective, is that females are more likely to be victims of partner violence with support from research into victim centres (see Graham-Kevan & Archer, 2005). Researchers who support these ideas generally suggest that a self-report measure is invalid and fails to take into account the context of aggression (Dobash et al., 1992; White, Smith, Koss & Figueredo, 2000). Two main criticisms have been levelled at the partner aggression measures. Firstly, the measure cannot determine who is the aggressor or the person defending against attack. Therefore, a person may consistently be the initial aggressor but if their partner defends themselves both are seen as equally as aggressive on the measure. But in such cases the defender is not initial aggressor because their motive is to protect him or her

self rather than inflicting physical and emotional pain upon the target. Therefore the intentions of the persons are different: the aggressor wants to inflict physical and emotional pain upon the target whilst the defender initial motive is to protecting himself/herself from harm.

The second issue surrounding the partner aggression measure is whether there is agreement between aggressive acts that have taken place between partners. Analyses of concordance between partner's aggressive acts have found low levels (Schafer, Caetano & Clark, 2002; Caetano, Schafer, Field & Nelson, 2002), with correlations between reports of partner aggression studies ranging in males from .36 to .46 and in females from .32 to .40 (Archer, 1999). Also there is evidence that there is a systematic underreporting in self-report measures by both sexes but more in males (Archer, 1999).

A minor problem of the Conflict Tactics Scale and similar aggression measures is the reliance of double-barrelled items, for example pushed, shoved and grabbed (Archer, 2000). From the analysis of Schafer et al (2002) this is where the most disagreement occurs between partners. Therefore, disagreement between partners might have been caused by a double-barrelled question (each partner thinking about different parts of the questions). This study addresses the issue of double-barrelled questions by using singular items, i.e., separate items for pushed, shoved and grabbed.

However, there are several problems with the alternative feminist perspective. The samples used in their studies focus on the extreme end of the aggression spectrum that does not represent the general population. Also there is a problem in the analysis of

sex differences as data are collected from samples from women's refuges and by definition there will be no males in the shelters.

One suggested way of reconciling these two approaches is that different patterns of aggression are found in different samples (Johnson, 1995). According to Johnson (1995) two distinct patterns emerge in partner aggression, common couple violence (equal amount of aggression between the sexes) and patriarchal terrorism (usually higher amounts in the male direction). The Conflict Tactics Scale and similar measures used in community samples focus on the common couple violence pattern whilst samples in refuges focus on patriarchal terrorism (Johnson, 1995). Graham-Kevan and Archer (2003) have to some extent supported the position of Johnson (1995) that different samples produce different results.

As indicated above, one of the main issues surrounding partner aggression is whether there is a sex difference (Archer, 2000; Dobash et al, 1992). The debate focuses on two issues: (1) whether there are sex differences in the means of partner aggression measures; and (2) whether there are sex differences in the motives for partner aggression. Both are investigated further in the studies reported in this thesis, Separate analyses are also conducted for males and females to examine whether sex differences occur in the relationship between aggressor and victimization measures. If sexual asymmetry exists in the pattern of the associations between perpetrator and victimization measures we would expect no sex differences in the strength of associations, whilst if there was no sexual asymmetry there should be a discrepancy between the two measures. No research has examined whether the AQ is related to partner aggression to test for the external validate for the measures. Interestingly,

there are discrepancies in the mean frequency of the measures; with no sex differences found in partner aggression whilst sex differences are found in the AQ subscales, physical and verbal aggression (See Archer, 2000; Buss & Perry, 1992). These findings are usually based in similar samples (university) but no research has examined partner aggression measure with the AQ.

It is also expected that there will be a strong associations in both sexes between partner direct aggression and proneness to physical and verbal aggression. Other research has found that anger and hostility have been associated with partner violence (Smith, Smith, Penn, Ward & Tritt, 2004; Marcus & Swett, 2003). Therefore, it is expected that the AQ anger and hostility measures will be related to both partner direct and indirect aggression. A largely ignored area is research into partner indirect aggression (Archer & Coyne, 2005). From previous research into indirect aggression it is expected there will be no significant sex differences in the mean frequency.

This M.Phil report assesses whether there is sexual asymmetry in the motives for aggressive acts by separately analysing males and females in relation to the associations between partner aggression and the four evolutionary-derived measures. From the evolutionary derived hypotheses in the previous sections we expect that impulsivity and sexual jealousy would account for more variance in partner aggression for males than females. It is expected that dominance would be equally associated with partner aggression in both sexes whilst competitiveness it is not expected to be related to partner aggression.

1.10 Same-sex aggression

There is less controversy surrounding sex differences in same-sex direct aggression. Sex differences are consistently found in same-sex direct aggression with more aggressive acts being committed by males than females. This has been demonstrated using a number of different measures. Research into homicide data found that males committed the majority of same-sex violence (Coleman, Hird & Povey, 2004/2005).

The results from the homicide findings show males committing more same-sex direct aggression; this has also been demonstrated in different samples including, police records and self-report measures. A study of police record findings in Scotland by Dobash and Dobash (1977-78) found that males committed more aggressive acts on males than females committed on other females. Also from the British Crime Survey males are more likely to be victims of same-sex direct aggression (Upson et al., 2004). The results are also found in self-report measures with males committing the majority of same-sex direct aggression (Archer, 2004). The results from same-sex direct aggression are inline with the AQ physical and verbal subscales that there are higher levels in males than females (See Archer, 2004; Buss & Perry, 1992).

Of particular importance to evolutionary psychologists is that aggression is more prevalent in young males, between the ages of 18-25, and that this cohort are also at greater risk of being victims of aggression (Upson et al., 2004). In terms of evolutionary theory, males are at the physical peak between the ages of 20 to their early 30s and are more likely to compete for resources and peer status (Buss, 1999; Campbell, 1999). Competition for mates is greater at these ages in order to attract a

high reproductive valued mate (Archer, 1996). Therefore, this study focuses on the age group that are more likely to produce aggressive behaviours, i.e., a young sample.

Evolutionary-analyses propose that sex differences in the frequency of aggression are due to males having a higher risk but potentially a more rewarding strategy (Archer, 1996, 2004). Therefore, males are more likely to risk the costs of retaliation from another same-sex member. However, the strategy would also involve reducing the risk of the other person within their peer group retaliating by choosing a person who is unlikely to fight back. We would predict there to be a medium sized negative correlation between proneness to physical aggression and victimization of same-sex direct aggression when controlling for aggressor measures. Therefore, male students would be more likely to target a weaker male student within their peer group to establish a position within the group. From the above analysis of evolutionary theory, hypotheses are derived that predict that sex differences will emerge in predictors of same-sex direct aggression. For males it is expected that all four measures will be associated to same-sex direct aggression whilst for females it is expected that only impulsivity will be associated to same-sex direct aggression.

The second type of same-sex aggression examined in this study is indirect aggression. Researchers have found no sex differences in the frequency of indirect aggressive acts (Richardson & Green, 1999). According to evolutionary theory this occurs because of the relativity lower costs of indirect retaliation; therefore both males and females commit equal amounts of indirect aggression (Archer & Coyne, 2005; Campbell, 1999). For verbal aggression, higher levels have been reported in males than females whilst, as stated before, there are no sex differences in acts of indirect aggression

(Archer, 2004). From the evolutionary-derived hypotheses it is predicted for males that impulsivity, sexual jealousy would be predictors of same-sex indirect aggression whilst it is expected that in females it will be predicted by impulsivity, dominance and sexual jealousy.

1.11 Partner and same-sex aggression

Few pieces of research have examined sex differences in both partner and same-sex aggression in the same sample. Those that have focus on samples of criminal records and self-report measures. Police reports demonstrate that males are more likely to be the offender against males and females (Dobash & Dobash, 1977-78). Also the few pieces of research examining sex differences in the self-report frequency of perpetrator and opponent in aggression do not specifically ask about partner aggression (Archer, 2004; Harris, 1992; Richardson & Green, 1999; Gergen, 1994). According to Graham and Wells (2002) who investigated reports of who was the opponent in the last physical fight, males reported the opponent being another male whilst females also reported the opponent being male. These support the predictions that sex differences will only occur in the male direction for same-sex direct aggression.

2.0 Methodology

Overview

2.1 Measures used in the study

2.2 Participants

All the measures used within this study are self-report measures because they are the most practical way to complete this research. Alternative methods were considered but rejected for the following reasons: (1) an longitudinal study was rejected because the time frame would be to long for this M.Phil thesis, (2) an retrospective (interview) was not used because participants might start to justification their actions, i.e., explaining why they were aggressive and (3) an experiment and observational research would not truly reflect aggressive behaviour in either partner or same-sex aggression and lacks ecological validate.

There are several advantages and disadvantages to using self-report measures. The main advantage of using self-report measures they are practical to use. Other measures were considered to do in other forms rather than self-reported measures but were rejected for several reasons: (1) lack of experience by me in conducting biological tests on participants, i.e., impulsivity and (2) is the purpose of the evolutionary-derived measures is an attempt to make independent of context as possible whilst a non-self report measure would be specific to the context of the laboratory. The participant does not have to met the person conducting the study therefore they are more likely to be honest about their answers, in particular those

about partner aggression. Also participants can complete the questionnaire when they have a few moments to spare whilst within interview/experiment settings they have to complete it when the person conducting the study is present. Self-report measures are less labour intensive. For example if I was to run a similar study in an interview setting (lasting 30 minutes) the amount of participants that were used within this study (288) it would take 144 hours to complete even without the time to get the participants to the interviews.

However, by using self-report items for all the measures it gives rise to common method variance problem. Therefore, some of the strengths of associations between the measures may have been exaggerated. This limits the overall conclusions that can be drawn from this study but the aim of this study is an exploratory analysis of evolutionary theory relates to aggression (correlation) and a validation exercise of the aggression measures. Other problems exist within self-report measures, such as a response bias that participants may just go down the list a click on the first response for all the items.

The delivery to the participants of the self-report aggression measures was via an online method rather than the typical paper and pencil method. The online method has the advantage of being able to give all the students with a university e-mail address (all students are given an e-mail address) the opportunity to take part in the study whilst the paper and pencil method involves selective sampling of certain parts of the university. Therefore, not all students would have an equal opportunity to take part in the study whilst the online method all students have an equal chance of taking part in the study. Secondly, the online method is more practical than the paper and pencil

method as it does not involve using a large amount of paper; this saves costs and is environmentally friendly. However, there are a couple of practical limitations to the online design. Firstly, it is unable to determine how many participants looked at the online questionnaire (i.e., response rate, how many times a student saw the advert but did not take part in the study) and secondly, the programme used does not have the ability to use counter-balancing techniques therefore creating order effects within this study.

2.1 Materials

The full online questionnaire can be found in appendix 1.

Aggression questionnaire (AQ: Buss & Perry, 1992). The scale contains four subscales, physical, verbal, anger and hostility (See table 2.1). A five-point scale was used: '(1) Never or hardly applies to me, (2) Usually does not apply to me, (3) Sometimes applies to me, (4) Often applies to me and (5) Very often applies to me'. There were strong Cronbach's alpha values ranging from .75 to .85 for the four subscales these are very similar to the original study .72 to 85 (Buss & Perry, 1992). Also the four subscales were normal distributed. The range of scores that participants could score on proneness to physical subscale is (9 to 45), proneness to verbal aggression (5 to 25), anger (7 to 35) and hostility (8 to 40).

Table 2.1. Items on the aggressive questionnaire, including the four subscales, physical aggression, verbal aggression, hostility and anger

Physical Aggression
Once in a while I can't control the urge to strike another person
Given enough provocation, I may hit a another person
If somebody hits me, I hit back
I get into fights a little more than the average person
If I have to resort to violence to protect my rights, I will
There are people who pushed me so far that we came to blows
I can think of no good reason for ever hitting a person (reverse)
I have threatened people I know
I have become so mad that I have broken things
Verbal Aggression
I tell my friends openly when I disagree with them
I often find myself disagreeing with people
When people annoy me, I may tell them what I think of them
I can't help getting into arguments when people disagree with me
My friends say that I'm somewhat argumentative

Anger
I flare up quickly but get over it quickly
When frustrated, I let my irritation show
I sometimes feel like a powder keg ready to explode
I am an even tempered person (reverse)
Some of my friends think I'm a hothead
Sometimes I fly off the handle for no good reason
I have trouble in controlling my temper

Hostility
I am sometimes eaten up with jealousy
At times I feel I have gotten a raw deal out of life
Other people always seem to get the breaks
I wonder why sometimes I feel so bitter about things
I know my 'friends' talk about me behind my back
I am suspicious of overly friendly strangers
I sometimes feel that people are laughing at me behind my back
When people are especially nice, I wonder what they want

Acts of Aggression Questionnaire (AAQ; acts of aggressive behaviour). This is a mean frequency scale consisting of 25 acts of direct and indirect aggression designed for this study, from various sources (Gergen, 1994; Harris, 1992; Richardson & Green, 1999), It is shown in 2.2. Participants were asked (on a 5-point scale) 'how many times they had used these acts during the last two years, to both a partner and members of the same sex' with the responses being (1) Never, (2) few times, (3) occasionally (4) some of the time and (5) all of the time. The chronbach alpha are has follows for the aggressor measure; partner direct aggression .93 (male .93 and female .93), partner indirect aggression .87 (male .90 and female .85), same-sex direct aggression .91 (male .93 and female .93) and same-sex indirect aggression .93 (male .93 and female .92). However, the distributions of all the measures are positively skewed. The range of scores that the participants could report on the direct scale is between 16 and 80 and on the indirect aggression scale is between 9 and 45.

Table 2.2. Items on the Acts of Aggression Questionnaire (AAQ) including direct and indirect aggression these are the same items for both aggressor and victimization measures

Direct Aggression	**Indirect Aggression:**
Punch	Spread rumours
Shove	Insulted person behind back
Threw an object at the person	Made up stories about the person
Hit the person with an object	Gossiped behind person's back
Slapped their body	Said bad things behind back
Slapped their face	Made up lies about person
Kicked them	Stole things from them
Threaten with weapon	Turned your friends against them
Scratched them	Told others not to associate with them
Screamed at the person	
Cursed at the person	
Pinched	
Made obscene gesture	
Called obscene name	
Beaten them up	
Grabbed the person	

Victimization measure (acts of aggressive behaviour) contained the same items as shown in table 2.2. Participants were asked (on a 5-point scale same as the aggressor

measure) 'how many times they had been victim of these acts during the last two years, from a partner and members of the same sex'. Caution is used throughout the study in the interpretation of the victimization measure of indirect aggression as participants may not be fully aware of all indirect aggression directed towards them. The chronbach alpha are has follows for the victimization measures; partner direct aggression .85 (male .87 and female .78), partner indirect aggression .81 (male .83 and female .81), same-sex direct aggression .91 (male .94 and female .84) and same-sex indirect aggression .92 (male .93 and female .91). Has with the aggressor measures, all the distributions of all the measures are positively skewed.

Impulsivity. A general measure of impulsivity (Barrett, 1985: Patton et al, 1995) was used that contained no subscales, with 29 items. Factor Analysis was preformed on the scale and it was found the best solution was one factor compared to other studies that have used more than one factor (Patton et al, 1995). Table 2.3 shows the items. Participants were asked to give their responses to the items below, on a 4-point scale; (1) Rarely/Never, (2) Occasionally, (3) Often and (4) almost/always. The Cronbach's alpha was alpha .79. The impulsivity scale was normally distributed. Some items were reversed were appropriate. The range on the impulsivity measure was between 29 and 116.

Table 2.3 Items from the Barrett Impulsivity Scale

Impulsivity	
I plan tasks carefully	I do things without thinking
I am happy-go lucky	I have racing thoughts
I plan trips well ahead of time	I am self controlled
I concentrate easily	I save regularly
I am a careful thinker	I plan for job security
I say things without thinking	I like to think about complex problems
I change jobs	I act 'on impulse'
I have regular medical/dental checkups	I act on the spur of the moment
I am a steady thinker	I change where I live
I buy things on impulse	I finish what I start
I walk and move fast	I solve problems by trail and error
I spend or charge more than I earn	I talk fast
I have outside thoughts when thinking	I am restless at lectures or talks
I find it had to sit still for long periods of time	I plan for the future
I find it had to sit still for long periods of time	I am more interested in the present than the future
I get easily bored when solving thought problems	

Dominance (measure created for this study due not unable to find a suitable questionnaire that could measure a need for dominance independent of context). Items for this measure were designed to measure a desire for dominance that would be independent of the situation rather than measuring participants perception of control. Participants rated their desire for dominance on a 9 item scale (see table 2.4) that used a 5-point measure; '(1) Strongly disagree, (2) disagrees, (3) neutral, (4) agree and (5) strongly agree'. Some items were reversed were appropriate. The Cronbach's alpha was at a moderate level of .64. Also the distribution was normally distributed. The range that could be achieved on the dominance measures was between 9 and 45.

Table 2.4. Items in the Dominance measure

Dominance	
I like to be in charge of a group of people	Dominating people makes me feel good,
I like dominating close relationships	I'm never in charge (reverse score).'
I hate to be in charge of a group of people (reversed score)	When I'm with my friends; I like to be the leader,
It is important in close relationships to have an equal say in decisions (reverse score),	When I'm with my friends, I never take the role as leader (reverse score),
When I work in groups, I'm always in charge,	

Competitiveness. The scale was a modified version of Tang's (1999) scale (see Table 2.5) by only using the competition scale and removing the cooperation part of the questionnaire. Participants asked to rate themselves on 11 items on how competitive they are using a five-point scale, '(1) Strongly disagree, (2) disagrees, (3) neutral, (4) agree and (5) strongly agree'. Cronbach's alpha was .74, this was lower then the orginal study of .85 (Tang, 1999). Also the distribution was normal distributed. The range on the competitiveness measures was between 11 and 55.

Table 2.5 items in the competitiveness measure

Competitiveness
It is important for me to do better than others,
Success is not very important to me (reverse score)
By achieving success I also get other things, which are important to me
To succeed, one must compete against others
People who succeed are more likely to have satisfying lives
Success is something I am willing to work hard for
I enjoy the challenge of competing against others to succeed
The rewards of success outweigh the costs
Success is my major goal in life
I am happier when I am not striving to succeed (reverse score)
I feel better about myself when I am working toward success'

Sexual Jealousy. This scale was a modified version of Nannini and Meyers (2000) scale by removing the different situations of the scale and using a general context and the wording of the questionnaire. Participants were given these instructions: "How would you feel should your partner interact with another individual who is of the same gender, age and unrelated to you, in the following situations?" Participants give their response to seven activities (see Table 2.6) using a 7-point scale, ranging from (1) being extremely pleased too (7) being extremely upset. There was a strong Cronbach's alpha level of .88. Also the distribution was normally distributed. Items that were removed are 'making love' and 'seeing them kissing' because they were positively skewed but the label sexual jealousy was maintained because the items on the scale represent cues to sexual infidelity. The range on the sexual jealousy measure was between 7 and 49.

Table 2.6 items in the sexual jealousy measure

Sexual Jealousy	
Laughing and talking	Working closely
Touching the person in conversation	Giving the person a present
Thinking a lot about that person;	Holding hands'
Partner-spending time with another person	

2.2 Procedure and Participants

Participants were recruited by an e-mail advert on the university e-mail system to take part in an online study. A response rate was not calculated because I did not know how many people opened and read the advert. The advert was the same as the opening page within the study (appendix 1a). In total there were 322 participants (96 males and 226 females), who were students at the University of Central Lancashire, Preston, UK and completed a series of questionnaires online (See appendix 1b for the questionnaire). There were 288 heterosexuals, 18 bisexuals and 15 homosexuals. 121 participants were single, 161 in a relationship and 25 were married. The mean age was 22.70 (SD 7.72) and there were no significant sex differences in ages. No additional efforts were made to recruit more people from the university has it would be possible that the same people could redo the study without myself finding out. No counterbalancing was used because of the nature of an online questionnaire. Within the questionnaire there were higher numbers for the aggression scales that were presented first, i.e., partner aggression than same-sex aggression. Therefore no attempts were made to transform the data because of the order effects. Data from homosexual participants were removed because the sexual jealousy scale assumes heterosexual relationships.

Chapter 3

Are the sex differences in aggression measures?

There are two main aims of this chapter; (1) examining whether mean sex differences occurred in the aggressive questionnaire (AQ), acts of partner and same-sex direct and indirect aggression (AAQ) and evolutionary derived measures, (2) whether there is sexual asymmetry in the relationship between aggressor and victimization measures.

This chapter is spilt into five sections: (1) Hypotheses of the predicted mean differences in the aggression questionnaires and how the analysis of the data was conducted; (2) sex differences in the mean frequency of the AQ and specific acts of partner and same-sex direct and indirect aggression (for both aggressor and victimization measures); (3) the relationship between four specific acts of aggressor and victimization measures; (4) whether significant differences are found in the context of aggression (partner versus same-sex direct and indirect aggression; (5) partial correlations in same-sex aggression between the AQ and victimization measures after controlling for the aggressor measure.

3.1 Hypotheses

The following hypotheses were predicted from previous research:

(1) Proneness to physical and verbal aggression will be higher in males than females, whilst no sex differences are predicted in hostility or anger.

(2) There will be no sex differences in partner direct or indirect aggression in both aggressor and victimization measures.

(3) For same-sex direct aggression, higher levels will be reported by males than females, with no sex differences in same-sex indirect aggression. The hypotheses is the same for both aggressor and victimization measures.

(4) There will be strong associations between aggressor and victimization measures in partner and same-sex aggression for both sexes.

(5) There will be no sex differences in the strength of associations between aggressor and victimization measures for partner and same-sex aggression.

(6) For males, there will be more reports of same-sex direct aggression than partner direct aggression whilst no differences are predicted between partner and same-sex indirect aggression.

(7) For females, there will be more reports of partner direct aggression than same-sex direct aggression and higher reports of same-sex indirect aggression than partner indirect aggression.

(8) For same-sex direct aggression, there will be a negative association between AQ physical and victimization measures after controlling for aggressor measures in males but not females. This is due to males targeting weaker males in order to improve their

own peer status. However, it is not expected there will be any other significant associations between same-sex victimization and AQ subscales after controlling for the aggressor measure. No analysis was performed on partner aggression due to the majority of intimate relationships involving both males and females, making it impossible to remove the influences of both sexes on one another.

The main analyses of this chapter involve investigating mean differences which were conducted by a combination of parametric (t-tests) and non-parametric (Mann-Whitney U test). To test the associations, Pearson's correlations were used; whilst for examinations of sex differences in associations, Fisher Z test was used.

Results

3.2 Frequency of aggression scales

Table 3.1 shows sex differences in the AQ subscales of proneness to physical and verbal aggression, and traits related to aggression, hostility and anger. The results confirmed previous research and our hypotheses that there are sex differences in proneness to physical and verbal aggression, with higher levels for males than females, whilst there are no sex differences in traits related to aggression (hostility and anger). In terms of the magnitude of the difference, the effect size of physical and verbal subscales showed a small-medium effect size in the male direction whilst the non-significant results were below the threshold for a small effect size, indicating the power of the study was at an appropriate level.

Table 3.1 sex differences in the aggression questionnaire, columns 2 and 3 showing mean and standard deviation (in brackets) for males and females. 1= one-tailed hypothesis; 2 = two-tailed hypothesis

	Male	Female	t-value	d
Physical (1)	18.27 (7.40)	15.97 (5.39)	3.19*	.37
Verbal (1)	12.61 (4.51)	11.55 (3.71)	2.14*	.26
Hostility (2)	14.05 (5.75)	14.42 (4.97)	1.54	-.19
Anger (2)	14.02 (5.74)	14.40 (4.97)	-.59	-.07

*= .05

Table 3.2 shows sex differences in partner and same-sex direct/indirect aggression using non-parametric tests (Mann Whitney). In partner direct aggression there was a significant difference with higher levels found in females than males whilst in partner indirect aggression there was no significant sex difference. However in partner direct aggression, the size of the magnitude (d= .07) suggests the results is not of any great meaning. Sex differences were found in same-sex direct and indirect aggression with males committing significantly more aggressive acts than females. The magnitude of the difference demonstrates that same-sex direct aggression shows a large effect size in the male direction whilst same-sex indirect aggression indicates a small-medium affect, again in the male direction.

Table 3.2, sex differences in the aggressor measure of partner and same-sex direct and indirect aggression columns 2 and 3 showing mean and standard deviation (in brackets) for males and females; DA= Direct aggression, ID= Indirect aggression, 1= one tailed hypothesis, 2= two-tailed

	Male	Female	non-parametric (z)	d
Partner DA	21.38 (8.09)	22.87 (8.65)	-2.30*	-.07
Partner ID	12.91 (6.24)	12.32 (4.53)	.70	.11
Same-sex DA	23.92 (7.60)	19.74 (4.11)	4.83**	.73
Same-sex ID	13.47 (4.92)	11.87 (3.85)	2.70**	.37

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

Table 3.3 shows sex differences in the victimization measures of partner and same-sex direct/indirect aggression, again using non-parametric tests (Mann Whitney). No significant sex differences were found in partner direct and indirect aggression. However, sex differences were found in same-sex direct aggression with significantly higher levels reported by males than females and an effect size of a large magnitude (d= .60) confirming a meaningful difference. There was no significant sex difference in reports of being the victim of same-sex indirect aggression. Again, the magnitude of the non-significant results suggests there is no meaningful difference between the groups.

Table 3.3 Sex differences in the victimization scales of partner and same-sex direct and indirect aggression; columns 2 and 3 showing mean and standard deviation (in brackets) for males and females. DA= Direct aggression, ID= Indirect aggression, 1= one tailed hypothesis, 2= two-tailed

	Male	Female	Non-parametric (z)	d
Partner DA	20.91 (6.78)	19.67 (6.64)	1.52	.18
Partner ID	11.81 (6.11)	11.30 (4.64)	.78	.10
Same-sex DA	22.35 (9.35)	18.17 (5.14)	4.46**	.60
Same-sex ID	14.76 (6.93)	13.80 (5.68)	3.56	.16

*= .05, **=.01

3.3 The relationship between aggressor and victimization measures

Separate analysis was conducted for males and females to examine whether mean differences emerge between aggressor and victimization measures by using non-parametric tests (Wilcoxon test). For males, only one significant difference was found between aggressor and victimization measure that was in same-sex direct aggression with higher levels in the aggressor measure direction (Table 3.4). For females, there was a significant difference in all four analyses: the majority of results showed higher levels in the aggressor measure than the victimization measures (Table 3.5). The only exception was same-sex indirect aggression, with higher levels in the victimization measure.

Sex differences in the strength of the relationships between aggressor and victimization measures were also examined. For partner direct and indirect aggression stronger associations between aggressor and victimization measures were found in females than males ($Z= 2.31$, $p<.01$ for direct aggression and $Z= 2.46$, $p<.01$ for indirect aggression). In same-sex direct aggression there were no sex differences in the strength of associations between same-sex direct ($Z= .45$ direct aggression and $Z= .54$).

Table 3.4 Differences between aggressor and victimization for partner and same-sex direct and indirect aggression for males.

Male	Aggressor	Victimization	Wilcoxen	Correlation (r)
Partner direct	21.38	20.91	.73	.37*
Partner indirect	12.91	11.81	1.96*	.49**
Same-sex direct	23.92	22.35	4.52**	.68**
Same-sex indirect	13.47	14.76	1.19	.57**

*= $p<.05$ and **= $p<.01$

Table 3.5 Differences between aggressor and victimization for aggressor and victimization in females

Female	Aggressor	Victimization	Wilcoxen	Correlation (r)
Partner direct	22.87	19.67	7.47**	.63**
Partner indirect	12.32	11.30	4.89**	.71**
Same-sex direct	19.74	18.17	6.78**	.64**
Same-sex indirect	11.87	13.80	5.53**	.69**

*= $p<.05$ and **= $p<.01$

3.4 Context of aggression

This section examines the influence of context (partner or same-sex other) on the aggressor scale using non-parametric tests (Wilcoxen test). As predicted, males reported committing significantly more same-sex direct aggression than partner direct aggression ($Z= 3.84$, $p<.01$) and there was a small but significant association between the two measures ($r= .35$). As expected, females committed significantly more partner direct aggression than same-sex direct aggression ($Z= 5.41$, $p<.01$) and these measures were significantly correlated ($r= .45$).

For male indirect aggression there was a significant difference with higher levels in same-sex than partner indirect aggression ($Z= 2.03$, $p<.05$) and these measures were significantly associated with one another ($r= .61$). Also as predicted, females reported committing more same-sex indirect aggression than partner indirect aggression ($Z= 3.17$, $p<.01$) and these measures were strongly significantly associated ($r= .74$).

3.5 Partial correlation

This section examines the hypothesis that males will target weaker males (in terms of lower proneness to physical aggression) in order improve their peer status. Partial correlations were carried out between the AQ and victimization measures after controlling for the aggressor measure only for same-sex aggression. The results are shown in Table 3.6 with the majority of correlations being lower and non-significant. There were no significant partial correlations for females whilst, as expected in males, one significant association was found between AQ physical and same-sex direct victimization measure after controlling for same-sex direct aggressor measure. Therefore, the lower the cost of retaliation the more likely they are to be victims of aggression.

Table 3.6 partial correlations between the aggressive questionnaire (AQ) and victimization measures of same-sex direct aggression after controlling for the aggressor measures.

	Same-sex direct aggression	
	Male	female
AQ physical	-.29*	-.06
AQ Verbal	-.16	.06
AQ Anger	-.14	-.15
AQ hostility	.16	.09

*= p< .05, **= p< .01

Discussion

The results for the mean sex differences largely confirmed previous research that sex differences are found in AQ physical and verbal subscales and same-sex direct and indirect aggression in the male direction; and that there are no sex differences in anger and hostility and partner direct and indirect aggression. However, for partner direct aggression there was significant differences emerged in the female direction but the strength of the magnitude was below .2, which does not indicate a strong difference. In the analysis of partner direct aggression the relationship between aggressor and victimization measures was stronger in females than males. Sex differences were found in same-sex direct and indirect aggression with higher levels being reported by males than females. There was a strong relationship between same-sex direct/indirect aggressor and victimization measures in both sexes. For males, higher levels of aggression were reported in same-sex direct aggression than partner direct aggression whilst for females, higher reports of partner direct aggression than same-sex direct aggression.

The rest of this chapter discusses the results in order of aggression measures; sex differences in the AQ (3.6), followed by partner direct aggression (3.7), partner indirect aggression (3.8), same-sex direct aggression (3.9), same-sex indirect aggression (3.10), and a comparison between partner and same-sex aggression.

3.6 Aggressive Questionnaire

As predicted from previous studies sex differences were found in the two AQ subscales and the findings were as predicted (Archer, 2004; Buss & Perry, 1992). In

the proneness to physical (d= .37) and verbal (d= .26) subscales higher levels were reported for males than females whilst no sex differences are found in traits related to aggression, anger and hostility (Archer, 2004; Buss and Perry, 1992). The results of proneness to aggression are in line with evolutionary analyses that males are more prepared to take risks in order to gain potential benefits due to parental investment theory (Archer, 1996, 2004; Trivers, 1972; Fetchenhauer & Rohde, 2002). Also all the four subscales were normally distributed, which is in contrast with specific forms of aggression that were positively skewed. Therefore, there are fundamental differences in the pattern of aggression measures thus affecting the interpretation.

3.7 Partner Direct Aggression

In contrast to the AQ subscales, no meaningful sex differences are found in either partner direct (d= .07) or indirect aggression (d= .11). However, the distribution of the results was positively skewed with a high number of non-aggressive participants demonstrating in the majority of intimate relationships there is no partner aggression. Therefore, non-parametric tests were carried out. The results generally support previous research into community samples that generally find no sex differences in partner direct aggression (Archer, 2000; 2002; Straus, 1979). These results are inconsistent with the AQ that shows higher proneness to physical aggression in males than females. Therefore, an important question that needs addressing is: why there is a discrepancy between the two measures?

We have seen that the proneness to physical and verbal aggression subscales formed a normal distribution pattern whilst, in contrast, partner direct aggression formed a

positively skewed pattern. Therefore, the inferences about mean differences are different. For it is valid to make the inference, on proneness to physical and verbal aggression that significant sex differences were found in the male direction because there is a norm mean score, i.e., equal amounts of low and high rates of proneness to aggression. But in partner direct aggression we cannot make such an inference because the distribution is positively skewed, i.e., in the majority of cases there is no aggression in relationships. We can make the inference there are no mean sex differences in partner aggression but in the majority of cases there is no partner violence. Therefore, the pattern of the result is different so comparisons should only be made with caution.

However, the measure of partner aggression is not invalid because the British Crime Survey (Upson, et al, 2004) also suggests that in the majority of intimate relationships there is no aggression between partners. Therefore, a similar distribution to the one found in the study is also found in the general population. Also in the next chapter we show there is a strong relationship between proneness to physical aggression and partner direct aggression in both sexes. This demonstrates external validity for the partner direct aggression measure. So statistical testing for mean sex differences can be misleading due to the distribution of results.

One of the hypotheses of partner direct and indirect aggression was whether there would be sex differences in the relationship between aggressor and victimization measures. It was found that the mean differences between aggressor and victimization measures of partner direct aggression were non-significant in males whilst in the female analyses higher reports were found in the aggressor measure than the

victimization measure. This was also demonstrated in the strength of associations between aggressor and victimization measures are slightly stronger for females (r= .59) than males (r= .37). These two findings suggest that female's partner aggression is more likely to be either, retaliation or puts them at risk of retaliation compared to the male counterparts.

3.8 Partner indirect aggression

The results of partner indirect aggression confirmed our hypothesis that there are no sex differences in partner indirect aggression with no significant differences in the non-parametric tests and low effect size. This confirmed previous research that supported no sex differences in partner indirect aggression (Archer and Coyne, 2005; Buss, 1999). It is also important to note that the distribution was similar to partner direct aggression measure, being positively skewed, with a high number not committing any indirect aggression. Therefore, the number of participants committing partner indirect aggression is also low. There are two possible explanations for the result. Firstly, items on the partner indirect aggression are mixed within partner direct aggression measure therefore participants may feel uncomfortable in acknowledging their aggressive towards their partner. Therefore the context in which indirect aggression measure is used may have affected the results. Secondly, partner indirect aggression is a type of hostility and/or anger towards their partner (the relationship between partner indirect aggression and anger and hostility is further examined in chapter 4).

Also examined was the relationship between aggressor and victimization measures in partner indirect aggression. Caution is needed in the interpretation of the results because some participants may not be fully aware of all indirect aggression targeted at them. As with partner direct aggression, sex differences were found in the relationship between aggressor and victimization measures of partner indirect aggression. For males, there were no significant differences in reports of aggressor and victimization measures whilst for females higher levels were reported in the aggressor than victimization measures. The same pattern was also found in partner direct aggression with no significant difference in the male analysis whilst females reported higher levels in the aggressor than victimization measures. Therefore, this study has found sex differences in reporting of partner direct and indirect aggression. In same-sex direct aggression both sexes report higher levels in the aggressor than victimization measure. A possible explanation is that females are more willing to accept they commit partner aggression compared to males therefore explaining why reports of male partner aggression does not fit into the overall pattern of reporting higher levels in the aggressor than victimization measures.

However, there are some limitations to the partner aggression measure that needs to be acknowledged when drawing conclusions. One limitation was we did not specifically ask respondents to bear in mind the same partner, for example a person could be a victim of relationship aggression in one relationship then leaves that partner to find a new partner and it is they who are the abusive partner. Also there are other limitations that were mentioned in the introduction, such as determining aggressor or defender.

One of the key questions regarding partner aggression is whether there is sexual asymmetry in the measures and motives of partner aggression (See Dobash et al, 1977-78). We have demonstrated that there is not perfect asymmetry in the pattern of partner direct and indirect aggression with females reporting higher levels in the aggressor than victimization measures whilst no differences are found in males. There were stronger relationships between aggressor and victimization measures for females than males. Therefore, there is evidence of both similarities and differences in the pattern of reporting results in partner aggression for males and females.

3.9 Same-sex direct aggression

As expected, sex differences were found in the same-sex direct aggression measure with higher levels reported by males than females. This was demonstrated in the non-parametric tests and the magnitude of the effect size was medium to large. This confirms previous research into self-report measures of same-sex direct aggression that higher levels are reported by males than females (Archer, 2004; Richardson and Green, 1999; Gergen, 1994). Also in contrast to partner aggression, the results have been replicated in studies using differing levels of seriousness including homicide data (Coleman, Hird & Povey, 2004/05) and criminal records (Dobash & Dobash, 1977-78; Upson et al, 2004). This is in line with findings for proneness physical and verbal aggression that higher levels were reported by males than females. Also the results of same-sex direct aggression are in line with evolutionary theory that proposes that males are more aggressive than females due to parental investment theory (Archer, 2004; Campbell, 1999; Daly & Wilson, 1988). Males show lower parental investment so are more willing to take risks (in terms of the consequences of

aggression) in order to gain resources and peer-status (Trivers, 1972). Therefore, they are more likely to risk the costs of aggression (Campbell, 1999). On the other hand, females have higher parental investment and are less willing to take risks, therefore using more subtle forms of aggression, such as manipulating friendship groups (Campbell, 1999).

A key question asked of the data is the relationship between aggressor and victimization measures. Firstly, no sex differences were found in the strength of the associations between aggressor and victimization for same-sex direct aggression. However, both males and females reported being the aggressor of same-sex direct aggression more than being the victim. Similar findings were found in the analysis of female partner aggression with higher reports in the aggressor measure than the victimization measures, suggesting an overall pattern in reporting results rather than a context specific problem. There are several explanations for this. Firstly, participants are fully aware of their intent whilst the victim does not have this insight, i.e., if somebody bumps into a person at a bar the 'aggressor' knows whether there is intention whilst the victim is open to interpret the situation in two ways, either aggressive behaviour by the target or by accident. Secondly, participants are more likely to remember being the initiator of acts of aggression rather than seeing themselves as victims of aggression.

Another type of analyses carried out on same-sex direct aggression was the association between the AQ subscales and victimization measures after controlling the aggressor measure. As expected there was only a significant relationship between proneness to physical aggression and same-sex direct aggression victimization after

controlling for same-sex direct aggressor measure. Therefore, males with a higher proneness to aggression generally attack males with a lower proneness to physical aggression in order to improve their peer status whilst reducing the risk retaliation (See Archer, 1992).

3.10 Same-sex indirect aggression

Surprisingly, in same-sex indirect aggression higher levels were reported by males than females (using a non-parametric test). Also the magnitude of the sex difference was small to medium (d= .37). Previous research had shown there are no sex differences in same-sex indirect aggression among adult samples (Archer & Coyne, 2005, Richardson & Green, 1999). According to parental investment theory no sex differences were expected in same-sex indirect aggression due to the relativity low costs of committing such aggression (Buss, 1999; Campbell, 1999). The pattern of indirect aggression results are more complicated than the hypotheses suggested; with no sex differences in partner indirect aggression whilst sex differences in same-sex indirect aggression. Therefore, there is mixed evidence for the evolutionary hypothesis of indirect aggression; with evidence supporting the evolutionary hypothesis with no sex differences in partner indirect aggression and evidence against the evolutionary hypothesis with higher levels in males than females in both proneness to verbal aggression and same-sex indirect aggression.

The relationship between same-sex indirect aggressor and victimization measures was also examined separately for males and females. For males, no mean differences were found between aggressor and victimization measures whilst females reported higher

levels on the victimization measures than aggressor measure. A possible explanation for this is that females are more aware of indirect aggression directed at them is because of the higher social skills in females than males (See Campbell, 1995). The strength of the associations between aggressor and victimization measures in same-sex indirect aggression was equally strong for both males and females.

3.11 Comparison between partner and same-sex aggression

Few researchers have examined the context of aggression (partner and same-sex) has on the frequency of aggression, with previous research only focusing on examining sex differences in perpetrator and opponent (Harris, 1992; Richardson & Green, 1999). Males committed significantly more same-sex direct aggression than partner direct aggression whilst females committed significantly more partner direct aggression than same-sex direct aggression. This supports Graham and Wells' (2002) findings that males are most likely to be the opponents in a fight for both males and females. Therefore, the evaluation of sex differences in direct aggression is not straightforward because the sex of the opponent has a large bearing on the frequency of aggression (Archer, 2004).

Also examined was the influence of the sex of the opponent as on indirect aggression. For males, there was no significant difference between partner and same-sex indirect aggression whilst females reported higher levels of same-sex indirect aggression than partner indirect aggression. The results can be explained by same-sex indirect aggression is used by females as a mechanism to manage peer relations whilst for

males it only damages their rivals' reputation which is of less importance than gaining resources directly (Campbell, 1999).

In this chapter, the results confirmed previous research with the discrepancy in the analyses of sex differences between different measures of aggression. Sex differences were found in proneness to physical and verbal aggression and same-sex direct and indirect aggression sex differences were found in the male direction whilst no sex differences were found in partner aggression. Males committed significantly more same-sex direct aggression than partner direct aggression whilst it was the reverse for females. More caution is needed in the interpretation of partner direct aggression as both sexes are involved in partner aggression and the distribution of data suggests the majority of participants do not commit aggression, which is also the same in same-sex direct and indirect aggression. In Chapter 5 the motives behind aggression are explored in particular whether sex differences emerge in predictors of aggression.

4.0. The aggressive questionnaire: relationship with evolutionary-derived measures and specific acts of partner and same-sex direct/indirect aggression.

This section is in press at Aggressive Behavior (see appendix 2)

The aim of this chapter is to examine the relationship between the aggressive questionnaire (AQ) with the acts of aggression questionnaire (AAQ) therefore assessing whether there is external validatity for the measure. Also examined is the relationship between the AQ and the four evolutionary-derived measures, to determine whether these are related to a general aggression measure (AQ). This chapter uses correlation-based techniques, including Pearson's correlations, Fisher Z Test to test for whether there are significant sex differences between associations and multiple regression analyses.

Firstly, mean differences in evolutionary-derived measures are presented (4.1). The main part examines AQ correlations with firstly, specific forms of aggression and secondly, evolutionary-derived measures (4.2). The next section involves using a hierarchical multiple regressions to evaluate the four AQ subscales in associations with AAQ and evolutionary-derived measures. Due to the expected stronger associations with AAQ than evolutionary-derived measures a hierarchical multiple regressions was used: in block one the AAQ (partner and same-sex direct and indirect aggression) was entered and in block two impulsivity, dominance, competitiveness and sexual jealousy were entered. These hierarchical multiple regressions are examined in turn as follows: proneness to physical (4.3) and verbal aggression (4.4)

and traits related to aggression, anger (4.5) and hostility (4.6). Entered first was AAQ and secondly the evolutionary-derived measures.

Hypotheses

It was predicted from previous research that there will be sex differences with higher levels in impulsivity and competitiveness in males than females, with no sex differences in dominance and higher levels of sexual jealousy in females than males because the sexual jealousy is made up of emotional infidelity items.

It is predicted that all the AQ scales will be significantly positively associated with both AAQ and evolutionary-derived measures. However the strength of the associations will be stronger between the AAQ than evolutionary-derived measures.

Results

4.1 Sex differences in means for the four evolutionary-derived measures

Table 4.1 shows mean sex differences for the four evolutionary-derived measures. There was no sex difference in impulsivity, which was not as predicted. Also no sex differences were found in dominance. The strength of the effect sizes (both values d= .14) demonstrates that neither were of a particular strong magnitude. As expected, sex differences were found in competitiveness with higher levels in males than females whilst in sexual jealousy higher levels were found in females than males

Table 4.1 Sex differences in the frequency of the four evolutionary-derived measures, impulsivity, dominance, competitiveness and sexual jealousy.

	Male	Female	t-value	Cohen-d
Impulsivity	85.10 (10.22)	83.70 (10.27)	1.03	.14
Dominance	30.84 (4.19)	30.16 (4.84)	1.13	.14
Competitiveness	32.15 (5.47)	30.94 (5.41)	1.75*	.22
Sexual Jealousy	32. 85 (6.77)	34. 60 (5.32)	-2.40*	-.30

*= $p < .05$

4.2 Correlations between AQ and specific acts of aggression (AAQ) and evolutionary-derived measures (EDM).

Table 4.2 shows Pearson's correlations for the relationship between the four AQ subscales and specific forms of partner and same-sex direct/indirect aggression. As expected, there were strong associations between the four AQ subscales and specific forms of partner and same-sex direct and indirect aggression. Importantly, proneness to physical aggression was significantly related to partner and same-sex direct aggression. However, proneness to physical aggression was slightly more strongly associated with same-sex than partner aggression.

Separate analyses of the associations between AQ subscales and specific forms of aggression in males and females found a slightly stronger association between proneness to physical aggression and partner direct aggression in females than males. Proneness to verbal aggression was significantly related to all specific forms of

aggression. Again, there were slightly stronger associations with same-sex aggression than partner aggression. Anger was significantly associated with all four specific forms of aggression. Finally, hostility was significantly more strongly related to indirect aggression than direct aggression.

Table 4.2. Pearson's correlations between the aggressive questionnaire (AQ) and acts of aggression to partners and to same-sex members for direct and indirect aggression (AAQ), and in parenthesis correlations for first males and second females

	Partner aggression		Same-sex aggression	
AQ	Direct	Indirect	Direct	Indirect
Physical	.48 (.38/.59)	.44 (.51/.39)	.60 (.58/54)	.53 (.53/.50)
Verbal	.37 (.32/.41)	.35 (.45/.26)	.52 (.53/.52)	.43 (.45/.39)
Anger	.45 (.33/.50)	.37 (.44/.32)	.44 (.58/.42)	.42 (.52/.41)
Hostility	.37 (.29*/.41)	.47 (.55/.40)	.37 (.47/.33)	.53 (.59/.50)

All correlations significant at $P < .01$, except for * ($P = .013$); overall N = 222 to 270; male N = 61 to 77; female N = 157 to 195.

Table 4.3 shows Pearson's correlations between the four AQ subscales and four evolutionary-derived predictor variables. Proneness to physical aggression was significantly related to three out of the four predictor variables with the only exception being sexual jealousy. Also sex differences were found in the strength of

the associations between proneness to physical aggression and both impulsivity and sexual jealousy was stronger in the male direction. Proneness to verbal aggression is significantly associated with three out of four evolutionary-derived measures, again the exception being sexual jealousy. Only one significant sex difference was found in the association between proneness to verbal aggression and four evolutionary-derived measures: there was a stronger association between verbal aggression and sexual jealousy in males than females. However, the strength of the associations were low and non-significant.

Anger was significantly correlated with all four evolutionary-derived predictor variables. Two significant sex differences were found: the relationship between anger and dominance was significantly stronger in females than males, whilst the relationship between anger and sexual jealousy was significantly stronger in males than females.

Hostility was significantly related to all four evolutionary-derived measures. Two significant sex differences are found: the associations between hostility and both impulsivity and sexual jealousy were more strongly associated in males than females.

Table 4.3. Pearson's correlations between the aggressive questionnaire (AQ) and predictors of aggression derived from evolutionary theory, and in parenthesis correlations for first males and second females.

	Impulsiveness	Dominance	Sexual jealousy	Competitiveness
Physical	26**(.48**/.14)[b]	35**(.24/.39**)	.14 (.46**/-.004)[b]	.22**(.26/.18)
Verbal	.31**(.39**/.26**)	.37**(.27/.41**)	.03 (.26/-.08)[a]	.28**(.20/.31**)
Anger	.34**(.46**/.28**)	.34**(.14/.43**)[a]	.18**(.45**/.02)[b]	.25**(.22/.27**)
Hostility	.30**(.48**/.21**)[a]	.21** (26*/.19**)	.17**(.35**/.09)[a]	.19**(.12 /.21**)

** P < .01; overall N = 254 to 281; male N = 72 to 80; female N = 179 to 206

[a] and [b] indicate that Fisher's Z test showed significant differences between the correlations for men and women at the P < .05 ([a]) and the P <. 01 levels ([b]) respectively.

4.3 AQ physical subscale: hierarchical multiple regressions with specific acts of aggression (AAQ) and Evolutionary-derived measures (EDM)

Table 4.4 shows the results of a hierarchical multiple regression of the predictor variables on to proneness to physical aggression. Overall, a high proportion of the variance was accounted for (R^2= .45), and there were four significant predictors, in block 1 same-sex direct aggression, and partner direct aggression, and in block 2 sexual jealousy and dominance. Of these, same-sex direct aggression was the

strongest predictor, and accounted for more of the variance than partner direct aggression. Although sexual jealousy showed a low zero-order correlation it did significantly predict proneness to physical aggression.

Table 4.4. Hierarchical multiple regression of predictor variables on to AQ physical subscale, aggression variables entered in block 1 and evolutionary variables in block 2.

	B	SE B	ß	t-value
Block 1:				
Same-sex direct aggression	.54	.06	.52	8.52**
Partner direct aggression	.14	.06	.15	2.34*
Block 2:				
Sexual Jealousy	.17	.06	.17	3.02*
Dominance	.19	.08	.15	2.49*

$R^2 = .45$, $F = 36.77$, $P < .001$

*$P < .05$, ** $P < .01$

4.4 AQ verbal subscale: hierarchical multiple regressions with specific acts of aggression (AAQ) and Evolutionary-derived measures (EDM)

Only two significant evolutionary-derived measures were associated with proneness to verbal aggression. In contrast to proneness to physical aggression, proneness to

verbal aggression accounted for a lower amount of variance (r^2= .35). In block 1 there was one significant predictor of verbal aggression, which was same-sex direct aggression (B = .26; ß = .39; t = 5.89; P < .001), whilst in block two, dominance was a significant predictor (B = .23; ß = .29; t = 4.45; P< .001). Again, we find same-sex direct aggression to show the strongest association of the four specific forms of aggression. However, partner direct aggression was not a significant predictor of proneness to verbal aggression, although it approached significance (B = .07; ß = .11; t = 1.76; P = .08).

4.5 AQ anger subscale: hierarchical multiple regressions with specific acts of aggression (SAOA) and Evolutionary-derived measures (EDM)

Five measures were significant predictors of anger (Table 4.5), two were in block 1 whilst block 2 contained three significant predictors. Overall, 31 percent of variance was explained. In block 1, both partner and same-sex direct aggression were significant predictors of anger. However, more variance was again accounted by same-sex direct aggression. Although, anger was significantly associated with the two measures of indirect aggression (Table 4.1), these were non-significant in the hierarchical multiple regression. In block 2, three out of the four evolutionary-derived measures were significant predictors (impulsivity, dominance and sexual jealousy).

Table 4.5 Hierarchical Multiple Regression of Predictor Variables on to AQ Anger Subscale, aggression variables entered in block 1 and evolutionary variables in block 2.

	B	SE B	ß	t-value
Block 1:				
Same-sex direct aggression	.24	.06	.27	3.87**
Partner direct aggression	.12	.06	.15	2.19*
Block 2:				
Impulsiveness	.09	.03	.18	2.79**
Sexual Jealousy	.16	.05	.19	2.99**
Dominance	.20	.07	.18	2.76**

Overall $R^2 = .31$; $F = 16.67$; $P < .001$

* $P < .05$, ** $P < .01$

4.6 AQ hostility subscale: hierarchical multiple regressions with specific acts of aggression (SAOA) and Evolutionary-derived measures (EDM)

Only two significant predictors of hostility were found, one in each of the two blocks accounting for lowest proportion of variance (25%) of the four AQ subscales. In block 1, hostility was significantly predicted by same-sex indirect aggression ($B = .81$; $ß = .47$; $t = 7.10$; $P < .001$). In the zero-order correlations partner indirect aggression was significantly associated with hostility but not found to be significant in the multiple

regressions, possibly due to accounting for similar variance to same-sex indirect aggression. The relationship between hostility and same-sex indirect aggression is of particular importance as they have not been previously linked, either theoretically or empirically. In block 2, hostility was significantly predicted by sexual jealousy (B = .15; ß = .16; t = 2.43; P = .016).

Discussion

This analysis supports the AQ as a trait measure of aggression, with it being significantly related to both specific forms of aggression and evolutionary-derived measures. However, none of the associations are high enough to indicate that they are representing the same concept, either as specific forms of aggression or as evolutionary-derived predictors. However, AQ physical and verbal subscales are related more strongly to same-sex than partner aggression. Although, evolutionary-derived measures were related to aggression they were not as strongly associated as specific forms of aggression.

The reminder of this discussion is spilt into two parts: (1) AQ subscales relation to specific forms of aggression and (2) AQ subscales relation to evolutionary-derived measures. Each section is structured differently in order to gain the most meaning out of the results. Therefore part (1) discusses AQ in relation to specific forms of aggression: (4.6) the relationship between proneness to physical aggression and AAQ: (4.7) proneness to verbal aggression and AAQ: (4.8) anger and AAQ and: (4.9) hostility and AAQ. The second part examines evolutionary-derived measures in relation to the AQ. Therefore this section is divided into four sections: (4.10) the

relationship between impulsivity and the AQ, (4.11) the relationship between dominance and the AQ, (4.12) the relationship between competitiveness and the AQ, (4.13) the relationship between sexual jealousy and the AQ.

4.6 The relationship between Proneness to physical aggression and specific forms of aggression (AAQ)

Proneness to physical aggression was significantly related to all of the four specific forms of aggression. The relationship between proneness to physical aggression and partner direct aggression is slightly stronger for females (r= .59) than males (r= .38) but not significant to the standard level of .05. It would have been expected that proneness to physical aggression should more strongly associated with partner direct aggression in males than females if female aggression is about defending against attack, which the feminist research perspective would suggest (See White et al, 2000). Also evidence from the results show that the AQ is more strongly associated with same-sex direct aggression than partner direct aggression. For males, the relationship between proneness to physical aggression and direct aggression was more strongly associated with same-sex members (r=.58) than an intimate partner (r= .38). Although the original study was not designed with partner aggression in mind this study found a small significant relationship but not has strong as same-sex aggression (Buss & Perry, 1992). Therefore, a limitation of the AQ that it is not equally related to all contexts of aggression.

An important theoretical finding concerning the AQ is that there are no significant differences in the strength of associations between proneness to physical aggression

and direct or indirect aggression. In the definition of direct aggression there are both physical and verbal aggressive actions whilst indirect aggression only involves verbal aggression. Therefore, the AQ physical subscale should have been more strongly related to direct aggression than indirect aggression. This is consistent with the view that the AQ physical aggression is a general measure of aggression rather than being able to discriminate between direct and indirect aggression. There were three major findings in the relationship between proneness to physical aggression and forms of aggression measures; (1) significant relationship between proneness to physical aggression and direct aggression but there was a stronger association in same-sex direct than partner direct aggression; (2) the AQ can not distinguish between direct and indirect aggression; (3) the relationship between proneness to physical aggression and partner direct aggression was stronger in females than males.

4.7 The relationship between proneness to verbal aggression and specific forms of aggression (AAQ)

The next AQ subscale examined is proneness to verbal aggression. Only one significant predictor in the multiple regressions was found in the relationships between proneness to verbal aggression and forms of aggression, which was same-sex direct aggression. A plausible explanation is that because all of the four forms of aggression contain verbal aggressive items (direct and indirect aggression) similar amount of variance was accounted for in the four forms of aggression therefore leaving only one significant predictor. As with proneness to physical aggression, the strength of the associations between proneness to verbal aggression and AAQ tends to indicate a stronger association with same-sex than partner aggression. This

demonstrates that the both proneness to physical and verbal aggression have similar relationships with the four forms of aggression. Also as expected, there was an equally strong association between proneness to verbal aggression and direct and indirect aggression. Both direct and indirect aggression subscales contain items of verbal aggression. Therefore this provides external validity for AQ verbal subscale and indirect aggression.

4.8 The relationship between proneness to anger and specific forms of aggression (AAQ)

In the multiple regressions, two significant predictors were found between anger and the forms of aggression, which were partner and same-sex direct aggression. Therefore, anger has a stronger link to direct aggression than partner aggression. The overall associations between anger and specific acts of partner and same-sex aggression are of a similar range (r=. 37 to r= .45) but some important sex differences emerged in the associations. The relation between anger and partner direct aggression is more strongly associated in females (r=. 50) than in males (r= .33). In this study there is a consistent theme for partner direct aggression to be more strongly associated with the AQ in females than males indicating sex differences in the pattern of partner direct aggression results.

4.9 The relationship between hostility and specific forms of aggression (AAQ)

In the multiple regressions hostility was only predicted by one form of aggression, which was same-sex indirect aggression. Both partner and same-sex indirect

aggression showed similar zero-order correlations to one another (r= .47 and r= .53) and would account for similar variance in the indirect aggression measures Also there were no differences in the associations between hostility and partner or same-sex aggression measures. Importantly, hostility was more strongly linked to indirect aggression than to direct aggression. Hostility has not previously been either empirically or theoretically linked to indirect aggression. It is plausible that a person will use indirect aggression to release their hostility instead of using direct aggression.

In partner direct aggression there are higher costs of aggression in terms of retaliation and the possibility of their partner leaving, whereas indirect aggression due to its nature does not carry such consequences. Therefore, hostility towards a partner could be shown in the form of indirect rather than direct aggression. The same is also found in same-sex indirect aggression suggesting that displaced hostility is also responsible in this case, in order to reduce the costs of aggression. However, using indirect aggression against people too much may also damage the person's reputation and he or she may be labelled a 'gossip.'

Evolutionary-derived measures

This section examines the relationship between the AQ subscales and the four evolutionary-derived measures. In contrast to the last section, the order examines the four evolutionary-derived measures (impulsivity, dominance, competitiveness and sexual jealousy) as we gain more understanding from examining them in this order, so as to discuss their separate theoretical implications.

4.10 Impulsivity relationship with the AQ

No significant sex differences were found in the mean frequency of impulsivity and the magnitude of the effect size was below the Cohen d value of .20, suggesting that there are no trait differences in impulsivity between males and females. But the results were in the direction predicted by parental investment theory that impulsive would be higher in males than females whilst previous research had been inconsistent with research findings higher levels in boys than girls (Vierikko et al, 2005) and no sex differences (Rammsayer & Rammstedt, 2000). If there are any sex differences in the mean level of impulsivity it would only be a small effect. But of more importance to research into impulsivity is how it is related to aggression measures.

Overall, the relationship between impulsivity and the four AQ subscales showed consistently significant, but small associations. In the multiple regression analyses only one significant association was found, which was between impulsivity and anger. However, there are similar items in both impulsivity and anger measurements. The zero-order associations between impulsivity and AQ gave some support to previous research linking impulsivity with aggression (Seroczynski et al, 1999; Stanford et al, 2003). However, in chapter one there were two different hypotheses about the relationship between impulsivity and aggression: firstly, the view of impulsivity as a trait measure that is independent of sex and context; and, secondly, a link between inhibition and parental investment theory that is dependent upon the sex of the opponent and the context of aggression, i.e., partner and same-sex aggression (See Bjorklund & Kipp, 1996). Although, this chapter does not assess the context of

aggression, we can examine whether sex differences are found in associations between impulsivity and the AQ subscales. The association between impulsivity and proneness to physical aggression was stronger in males than females. This gives some support to the parental investment model that predicted stronger associations in males than females (Bjorklund & Kipp, 1996).

There were significant correlations between impulsivity and proneness to verbal aggression in the zero-order correlations although impulsivity was not a significant predictor in the multiple regressions. Also there were no sex differences in the strength of associations between AQ verbal subscale and impulsivity in the male direction. This further supports the parental investment theory of impulsivity. However, the AQ verbal subscale does not discriminate between direct and indirect verbal aggression therefore making it difficult to make comparisons with the parental investment theory of impulsivity.

Impulsivity was significantly associated with both anger and hostility in the zero-order correlations. In the multiple regressions, impulsivity was a significant predictor of anger but not hostility. However, caution is needed in the interpretation of the relationship between impulsivity and anger as some of the items are very similar, i.e., 'sometime I fly off the handle for no good reason' and 'I have trouble controlling my temper' (Buss & Perry, 1992). However, different measures have found that inhibition is negatively associated with anger indicating a real relationship rather than just been caused by error (Smits & Kuppens, 2005; Vigil-Colet & Codorniu-Raga, 2004). Also no sex differences were found in the association between impulsivity and anger, which was not predicted by parental investment theory of impulsivity. Therefore, the

most likely explanation for the significant association between impulsivity and anger is due to a number of similar items on each of the scale.

In contrast, the relationship between impulsivity and hostility was stronger in males than females. This would be consistent with the paternal investment hypothesis that there would be stronger associations between impulsivity and AQ. Although, no sex differences were found in mean levels there is some support for sex differences in associations between impulsivity and AQ with higher levels in the male direction.

4.11 Dominance relationship with the AQ.

As expected, there were no sex differences in the mean score of dominance, which is similar to previous research (Egan & Angus, 2004). Both males and females have a need for dominance but the differing reasons according to parental investment theory. In an intimate relationship both sexes need to dominate but for different reasons from an evolutionary theory perspective (Buss, 1999). For males, this involves increasing the chances that his partner's offspring are his own whilst for females it would involve making sure that resources are spent on their offspring. The same parental investment principles are also applied to same-sex aggression. Males need to directly dominate peers in order to gain status and resources whilst females need to gain peer status but use less intense actions (manipulating friendship groups) therefore is of a lower intensity.

Dominance was significantly correlated with the four AQ subscales. Dominance was the evolutionary-derived measure that was most closely related to the AQ with it

being a significant predictor in three out of the four multiple regressions, the only exception being hostility. This demonstrates that the desire to control/dominate people is strongly linked to proneness to physical and verbal aggression in a young adult sample with previous research focusing on either primates or children (Hawley, 2003; Pellegrini, 2002). Therefore, participants with a need to dominate people are more likely to use aggression to gain their goals.

Dominance was significantly correlated with proneness to physical and verbal aggression in the zero-order correlations. In the multiple regressions dominance was a significant predictor of these two variables. Also no sex differences are found in the zero-order correlations between dominance and proneness to physical and verbal aggression. Therefore, giving some support to the general hypotheses that participants with a strong need to dominate a group are more likely to have higher proneness to physical and verbal aggression.

A significant association was found in the correlations and multiple regression between dominance and anger. However, analysis of the zero-order correlations using fisher Z test was more strongly associated between dominance and anger in females than males. It is difficult to explain this result but it is plausible that being female with a similar desire to 'dominate their world' goes against the traditional stereotypical view of how a female should behave therefore producing more anger.

As expected there is a strong association between dominance and hostility but no significant sex difference was found in the associations. However, hostility was the only AQ subscale that was not predicted by dominance. On the hostility scale there

are items that relate to thinking that 'things are out of my control' and therefore unlikely to score high on a dominance scale, for example 'at times I feel I have gotten a raw deal out of life', (Buss & Perry, 1992).

4.12 Competitiveness relationship with the AQ.

Competitiveness was significantly higher for males than females. This confirmed our hypothesis and can be explained by evolutionary principles, in particular parental investment theory. Males have lower parental investment due to parental uncertainty and therefore have a more risky but potentially more awarding strategy (in terms of offspring produced; Buss, 1999). But in order to attract a mate, the male must compete for peer status and resources. If he does not, he would struggle to find a mate (Buss, 1999; Pellegrini, 2002). In contrast to males, females need resources in order to enable the survival of their offspring and additional resources can be gained via the male (Archer, 1996; Buss, 2002). However, in today's modern society this is not the case as the majority of females have the ability to support themselves and their offspring. Therefore, there is a conflict between our evolutionary-derived desires (nature) and the environment that we live in (nurture). This supports the best way to explain behaviour is through an interactive perspective rather than singularity theories of evolutionary and social influences.

Competitiveness was associated with all of the four AQ subscales in the zero-order correlations. Although, in this analysis there were significant associations in females (three out of the four measures), there were no significant associations in the male analysis. But the examination of the associations showed a similar range in males (r=

.12 too r= .26) and females (r= .18 too r= .31), therefore suggesting the size of the sample may have produced non-significant associations for the male analyses (since there were a higher number of females than males). Therefore this analysis does not support our hypothesis that the relationship between competitiveness and AQ subscales would be stronger in males than females. However, this chapter does not explore the relationship between competitiveness and specific forms of aggression, which shows some support for the evolutionary model (See Chapter 5).

Competitiveness was not significantly related to any of the AQ subscales in the multiple regressions. Our hypothesis suggested that competitiveness will only be significantly related to the AQ for males. This was not confirmed, with a non-significant sex difference being found in the association between competitiveness and the four AQ subscales. It had been proposed that the need for competition for resources and peer status is more likely to lead to conflict and/or aggression in males than females due sexual selection (Daly & Wilson, 1988).

4.13 Sexual jealousy relationship with the AQ.

In the analysis of sexual jealousy there were higher mean scores in females than males. From an evolutionary perspective this is not surprising considering that the majority of items in the measure contain emotional infidelity items (See Buss, 2002 & Harris, 2003). Males are more likely to be upset by sexual infidelity as it directly affects their chances of producing offspring with their partner whilst females are more likely to be upset by emotional infidelity (Buss, 2000; Pietrzak et al, 2002; Sagaarin et al, 2003; Schuzwohl & Koch, 2004). However, this distinction has been controversial

as doubts remain over the validatity of such a distinction (Harris, 2003). A problem with the distinction that is any sexual infidelity items will contain acts of emotional infidelity (but you cannot have sexual infidelity without emotional infidelity). However, of more importance in this study is how sexual jealousy is related to aggression measures.

Sexual jealousy was significantly associated to three out of the four AQ scales and sexual jealousy was a significant predictor in the multiple regressions for anger and hostility. Importantly, in the zero-order associations sex differences were found between sexual jealousy and the four AQ subscales with stronger associations in males than females. This supports previous evolutionary research that would predict stronger associations between sexual jealousy and aggression in males than females (Buss, 2000; Pietrzak et al, 2002; Sagaarin et al, 2003; Schuzwohl & Koch, 2004). Interestingly, the relationship between sexual jealousy and proneness to physical was significant whilst verbal aggression was not significant. This supports the view that sexual jealousy is a trigger to aggression (Buunk, 1997; Puente & Cohen, 2003; Wilson & Daly, 1993).

Sex differences were found in the associations between sexual jealousy and AQ in three out of four AQ subscales in the male direction, with the only exception being proneness to verbal aggression. Although, mean scores in the sexual jealousy measure was higher for females than males there were stronger associations in the male direction. Evolutionary analysis suggest two distinct types of jealousy, sexual and emotional infidelity. Males are more affected by sexual infidelity due to parental uncertainty principle in order to stop their partners having sexual relations with other

males and improve their chances of producing offspring. On the other hand, females are more likely to be affected by emotional infidelity in order to ensure resources are spent on her offspring. However, due to problems with the present sexual jealousy measure, all the items were emotional infidelity items. Importantly, sexual jealousy was more strongly associated with the AQ in males than females, demonstrating that although emotional infidelity is more upsetting for females than males, there are stronger associations to aggression in the male direction. Indicating that emotional infidelity may acts as a trigger for male aggression.

In conclusion, we found evidence for the AQ subscales being more strongly related to specific acts of aggression than evolutionary-derived measures. The most significant findings were the external validity given to both proneness to physical aggression and specific acts of aggression (partner and same-sex members). However, there is evidence that the AQ subscales are more strongly related to same-sex aggression than partner aggression. Also proneness to physical aggression could not distinguish direct and indirect aggression.

5.0 Are the sex differences in predictors of partner and same-sex direct/indirect aggression?

The main purpose of this report is to examine sex differences in evolutionary-derived measures in relation to the acts of aggression questionnaire (AAQ). In the previous chapters we have seen that discrepancies have occurred when examining sex differences in aggression measures, with males committing more same-sex direct aggression and scoring higher on the aggressive questionnaire subscales physical and verbal aggression whilst no sex differences are found in partner direct aggression. We have discussed the limitations of specific forms of aggression measures. Now, this section examines whether sex differences are found in evolutionary-derived predictors of partner and same-sex direct/indirect aggression. Firstly, the associations between evolutionary-derived measures and specific forms of aggression were examined using Pearson's correlations and secondly, whether sex differences are found in the zero-order correlations (tested using Fisher Z tests). The final stage involved entering the predictor variables into a standard multiple regressions separately for males and females. The overall structure of the chapter is shown below.

The overview of this chapter takes a similar form to chapter 3 and 4. The first section discusses the hypotheses in relation to the predictions from chapter 1. The hypothesis will be spilt into two sections: (1) hypothesis is concerned with evolutionary-derived measures relationship with the different forms of aggression (i.e., the relationship between impulsivity and partner and same-sex aggression etc); (2) hypothesis is concerned with the relationship between AAQ and evolutionary derived measures (i.e., which evolutionary-derived measures predicts partner direct aggression etc).

Although, the hypotheses in both sections are the same but for clarity are displayed in different forms. This is due to the results and discussion having different structures.

The results overall are spilt into four main sections; (1) examined the inter-correlations between the four-evolutionary-derived measures, including separate analyses for males and females (5.2); (2) the relationship between evolutionary-derived measures and forms of aggression measures separately for males and females using Pearson's correlations (5.3); (3) whether there are sex differences in predictors of forms of aggression in the zero-order correlations using Fisher Z test; (4) the final section involved putting the four predictors (impulsivity, dominance, competitiveness, sexual jealousy) into multiple regressions (separate for males and females) for the four forms of aggression ; partner direct aggression (5.5), partner indirect aggression (5.6), same-sex direct aggression (5.7) and same-sex indirect aggression (5.8).

5.1 Hypotheses

Due to the nature of the study, hypotheses testing is in two sections. Section 1 involves comparing the predictor variables with the four specific forms of aggression, i.e., the relationship between impulsivity and partner and same-sex direct/ indirect aggression. Section 2 involves comparing specific forms of aggression (i.e., partner direct aggression) with the four evolutionary-derived predictors (impulsivity, dominance, competitiveness and sexual jealousy) for each sex.

Section 1 hypotheses

Impulsivity is predicted to be strongly associated with partner and same-sex direct/indirect aggression in males than females due to lower parental investment in males than females.

Dominance (1) is predicted to be strongly associated with partner direct and indirect aggression for both males and females as both sexes desire to dominate an intimate relationship.

Dominance (2) is predicted to be significantly associated with same-sex direct aggression only in males because of sexual selection theory as males attempt to directly acquire peer status and resources. The reverse is predicted in same-sex indirect aggression with a significant association in females but not males. This is because of the higher parental investment in females, so that they are more likely to use less risky strategies to establish peer status that mainly involve indirect aggression.

Competitiveness for males is only expected to be significantly related to same-sex direct aggression but not same-sex indirect aggression whilst for females it is not expected to be significantly related to same-sex direct or indirect aggression. This is due to sexual selection that males need to gain resources in order to attract a high reproductive value male. Partner direct and indirect aggression has not been linked to competitiveness either theoretically or empirically.

Sexual jealousy is expected to be significantly more strongly associated with partner and same-sex direct/indirect aggression in males than females because males have paternal uncertainty so it is a mechanism that attempts to ensure that his offspring are his own.

Section 2 Hypotheses

Partner direct and indirect aggression: for males it is expected to be predicted by impulsivity, dominance and sexual jealousy whilst for females it is only expected that partner indirect aggression will be predicted by dominance.

Same-sex direct aggression: for males it is expected to be associated with all four variables, impulsivity, dominance, competitiveness and sexual jealousy whilst for females it is only expected impulsivity to be related to same-sex direct aggression.

Same-sex indirect aggression: for males it is expected to be associated with impulsivity whilst for females it is expected impulsivity and dominance will be significantly related to same-sex indirect aggression.

Results

5.2 Inter-correlations

Table 5.1 shows inter-correlations between the four evolutionary-derived measures for males and females. For males, two out of six correlations were significant, which

are dominance-competitiveness and competitiveness-sexual jealousy. For females, two out of sex correlations were also significant, dominance-impulsivity and dominance-competitiveness. The dominance-impulsivity (male analysis) association was to small in magnitude to be considered meaningful (r= .15). The strength of the associations shows that none of the measures are strongly associated enough to represent the same concept but the strength of the associations between dominance and competitiveness show there is some overlap between the two measures.

Table 5.1 Pearson's correlations showing inter-associations for the four evolutionary derived measures for both males and females.

	Impulsivity		Competitiveness		Sexual jealousy	
	Male	Female	Male	Female	Male	Female
Dominance	.19	.15*	.53**	.32**	-.02	-.08
Sexual Jealousy	.17	.13	22*	.05		
Competitiveness	.18	.13				

*= p< .05, **= p< .01

5.3 Correlations between evolutionarily-derived variables and aggression measures

Table 5.2 shows the zero-order correlations between the four evolutionarily-derived measures and partner and same-sex direct/indirect aggression separately for males and females. The majority of these associations were significant. Impulsivity was not associated with partner direct aggression for both males and females whilst partner

indirect aggression was significantly associated in males but not females. In contrast, impulsivity was significantly related to same-sex direct and indirect aggression in both males and females.

Dominance was significantly correlated with seven out of the eight specific forms of aggression (table 5.2). For males, dominance was significantly correlated with three out of the four specific forms of aggression, the only expectation being same-sex indirect aggression. For females, dominance was significantly associated with all four of the specific forms of aggression in a similar range (r= .27 to r= . 36).

Competitiveness was significantly correlated with only three out of the eight specific forms of aggression measures (table 5.2). All of the three significant associations were found in the male analysis, with partner direct and indirect aggression and same-sex direct aggression.

For sexual jealousy there was only three significant correlations with specific forms of aggression (table 5.2). For males, sexual jealousy was significantly associated with both partner direct and indirect aggression but was not significantly associated with same-sex direct and indirect aggression. For females, sexual jealousy was significantly negatively associated with partner indirect aggression.

Table 5.2 Sex differences in zero-order correlations between evolutionarily-derived measures and same-sex and partner direct/indirect aggression. Male (M) and Female (F)

	Partner aggression				Same-sex aggression			
	Direct		Indirect		Direct		Indirect	
	M	F	M	F	M	F	M	F
Impulsivity	.14	.11	.41**	.08	.42**	.22**	.38**	.22**
Dominance	.29*	.36**	.31**	.27**	.36**	.20**	.15	.34**
Competitiveness	.24*	.08	.28*	-.01	.32**	.10	.20	.10
Sexual jealousy	.34**	-.13	.26*	-.21**	.12	-.09	.16	-.09

*= p< .05, **= p<.01, Male N= 62-79, female N= 168-192

No adjustments were made to the probability value because of the following reasons; (1) different type of hypotheses (type one and type two) within the same table, (2) the use of multiple regression analysis will to some extent take into account the impact of the predictor variable when calculating the results, (3) In some the hypotheses I make the predictions that there will be no significant association therefore by adjusting the alpha levels I would be supporting my own hypotheses when not true (type 2).

5.4 Differences between males' and females' correlations

This section examines sex differences in the strength of associations between forms of aggression and evolutionarily-derived measures. The test of significant differences in associations used in this study is the Fisher Z test. The significant alpha level used in

this study was p< .05 but alpha levels ranging from p<.05 to p< .10 are noteworthy as it indicates a stronger relationship that may be confirmed in the second analyses, and the Fisher Z test not being a particular strong test.

Table 5.3 shows an overview of the Fisher Z test results. The p value of less than p< .10 was included as a significant difference between associations.

	PDA	PIA	SDA	SIA
Impulsivity	X	M	M	X
Dominance	X	X	X	F
Competitiveness	X	M	M	X
Sexual jealousy	M*	M*	X	M*

- * indicates male associations were positive whilst female associations were negative.

Key; PDA = partner direct aggression, PIA = partner indirect aggression, SDA= Same-sex direct aggression, SIA= Same-sex indirect aggression, X= no difference in associations, M= significant difference in the male direction, F= significant difference in the female direction.

Partner direct aggression

There were no significant sex differences in the relationships between partner direct aggression and impulsivity (Z= .29, ns), dominance (Z= .56, ns) or competitiveness (Z= 1.19, ns). There was a significant sex difference in the relationships between sexual jealousy and partner direct aggression: for males it was a moderate positive associated whilst it was negatively associated for females (Z= 3.56, p< .01)

Partner indirect aggression

The association between impulsivity and partner indirect aggression was significantly stronger in males (r= .41) than females (r=.08): Z = 2.49, p< .01. There was no sex difference in the relationship between dominance and partner indirect aggression (Z = .31, ns). Sex differences occurred in the strength of associations with partner indirect aggression and competitiveness in the male direction (Z= 2.12, p<.05). There was also a significant sex difference in the relationship between sexual jealousy and partner indirect aggression: for males it was moderately positive correlated whilst it was negatively correlated in females (Z= 3.59, p<. 01).

Same-sex direct aggression

The association between same-sex direct aggression and impulsivity was stronger in males (r= .42) than females (r= .22; Z= 1.45, p= .07) and the same was found in competitiveness with higher associations in males (r= .32) than females (r= .10; Z= 1.55, p< .06). Neither of the probability values was significant at the standard alpha level of p< .05, but both were near. There were no significant sex differences in the associations between same-sex direct aggression in either dominance (Z= 1.15, ns) or sexual jealousy (Z= .58, ns).

Same-sex indirect aggression

The association between dominance and same-sex indirect aggression was significantly stronger in females (r= .34) than males (r= .15; Z= 1.71, p<.05). The

association between sexual jealousy and same-sex indirect aggression was difference with females being negatively associated (r= -.09) whilst males was positively associated (r= .16) but difference only approached significance (Z = 1.37, p< .08). There were no significant sex differences between same-sex indirect aggression showed no significant sex difference with impulsivity (Z = 1.16, ns), as competitiveness (Z= .69, ns).

Standard Multiple regressions

5.5 Partner direct aggression

Table 5.4 shows male and female standard multiple regressions of the predictor variables onto partner direct aggression. In the overall models, similar amounts of variance were accounted for in the male model (25%) and the female model (16%). Two significant predictors were found for the male SMR model of partner direct aggression: these were dominance and sexual jealousy. For the female SMR model of partner direct aggression, only dominance was a significant predictor. These were similar findings in the zero-order correlations, with no sex differences in dominance associations to partner direct aggression whilst the association between sexual jealousy and partner direct aggression was stronger in males than females.

Table 5.4 Partner direct aggression: Standard multiple regressions for males and females for the evolutionary-derived predictors

	B	SE B	β	t-value
Male				
Impulsivity	.09	.10	.10	.92
Dominance	.73	.28	.34	2.59*
Competitiveness	.01	.21	.01	.06
Sexual jealousy	.47	.14	.37	3.34*
Female				
Impulsivity	.04	.07	.04	.55
Dominance	.71	.15	.37	4.69**
Competitiveness	-.07	.14	-.04	-.51
Sexual jealousy	-.21	.12	-.13	-1.74

*= p< .05, **= p< .01

Male model: R^2= .25, F= 5.24, p< .001

Female model: R^2= .16, F= 7.64, p< .001

5.6 Partner indirect aggression

Table 5.5 shows male and female standard multiple regressions of the predictor variables onto partner indirect aggression. In contrast to partner direct aggression a lower proportion of variance was accounted by the female model (13%) whilst a

similar amount of variance was accounted for in the male analysis (28%). For males, partner indirect aggression was predicted by three measures, impulsivity, dominance and sexual jealousy. For females, dominance and sexual jealousy (negative) were significant predictors of partner indirect aggression. In comparison to the zero-order correlations, the only difference was that competitiveness was not a significant predictor in the male model.

Table 5.5 standard multiple regressions in males and females for the evolutionary predictors in partner indirect aggression

	B	SE B	β	t-value
Male				
Impulsivity	.21	.07	.32	2.95**
Dominance	..44	.21	.26	2.08*
Competitiveness	.03	.16	.02	.19
Sexual jealousy	.21	.10	.22	2.01*
Female				
Impulsivity	.03	.03	.06	.76
Dominance	.27	.07	.29	3.57**
Competitiveness	-.07	.07	-.09	-1.12
Sexual jealousy	-.17	.06	-.21	-2.78**

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

Male model: $R^2 = .28$, $F = 6.35$, $p < .001$

Female model: $R^2 = .13$, $F = 6.37$, $p < .001$

5.7 Same-sex direct aggression

Table 5.6 shows male and female standard multiple regressions of the predictor variables onto same-sex direct aggression. Overall, more variance was accounted in the male model (36%) than the female model (.09%). Two significant predictors were found in the male SMR model of same-sex direct aggression, which are impulsivity and dominance. In the female SMR model, only impulsivity was a significant predictor of same-sex direct aggression. In comparison to the zero-order correlations, there were stronger associations between same-sex direct aggression and impulsivity and dominance in males than females.

Table 5.6 standard multiple regressions in males and females for the evolutionary-derived measures for same-sex direct aggression

	B	SE B	β	t-value
Male				
Impulsivity	.32	.09	.40	3.59**
Dominance	.72	.24	.40	3.05**
Competitiveness	.04	.17	.03	.23
Sexual jealousy	.15	.13	.14	1.19
Female				
Impulsivity	.08	.03	.21	2.54*
Dominance	.14	.08	.16	1.82
Competitiveness	.07	.07	.09	1.07
Sexual jealousy	.02	.06	.03	.35

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

Male model: $R^2 = .36$, $F = 7.39$, $p < .001$

Female model: $R^2 = .09$, $F = 3.77$, $p < .01$

5.8 Same-sex indirect aggression

Table 5.7 shows male and female standard multiple regressions of the predictor variables onto same-sex indirect aggression. Overall, a similar amount of variance was explained in the male (19%) and female (15%) models. For males, impulsivity was the only significant predictor of same-sex indirect aggression in the SMR whilst in the female SMR model impulsivity and dominance were significant predictors of same-sex indirect aggression. The regression is consistent with the zero-order correlations.

Table 5.7 standard multiple regression in males and females for the evolutionary predictors for same-sex indirect aggression

	B	SE B	β	t-value
Male				
Impulsivity	.19	.06	.36	2.94*
Dominance	.18	.17	.15	1.06
Competitiveness	.04	.13	.04	.29
Sexual jealousy	.07	.09	.10	.82
Female				
Impulsivity	.08	.03	.19	2.43*
Dominance	.24	.06	.30	3.56**
Competitiveness	.05	.06	.008	.09
Sexual jealousy	.08	.05	-.12	-1.54

*= p< .05, **= p< .01

Male same-sex indirect aggression: R^2= .19, f= .3.44, p< .05

Female same-sex indirect aggression: R^2= .15, f= 6.48, p< .001

Discussion

The results showed some support for our hypotheses concerning the relationship between evolutionary-derived measures relationship and aggression. Although there was a considerable range in the proportion of variance accounted for by the four predictor variables relationship with the different forms of aggression (from 9 to 36 per cent), this was largely due to entering variables that did not have either empirical or theoretical support in relation to aggression. For example in the female analysis of same-sex direct aggression it was only expected that impulsivity would be a significant predictor For males, partner direct aggression was predicted by dominance and sexual jealousy; partner indirect aggression was predicted by impulsivity, dominance and sexual jealousy; same-sex direct aggression was predicted by impulsivity and dominance; and same-sex indirect aggression was predicted by only impulsivity. For females, partner direct aggression was only predicted by dominance; partner indirect aggression was predicted by dominance and sexual jealousy (negative); same-sex direct aggression was predicted by impulsivity; and same-sex indirect aggression was predicted by impulsivity and dominance. The rest of the chapter will examine the four evolutionary derived measures with specific acts of aggression, firstly with impulsivity.

5.10 Impulsivity

The zero-order correlations and multiple regressions demonstrated that the relationship between impulsivity and AAQ was stronger for same-sex aggression than partner aggression. This is similar to the findings in chapter 4 in relation to the AQ

subscales being more strongly associated to same-sex than partner aggression. Impulsivity was a significant predictor in the multiple regressions in five out of the eight multiple regression supporting previous research linking impulsivity/inhibition to aggression, (Barratt et al, 1999; Harmon-Jones et al, 1997; O'Connor et al, 2001; Stanford et al, 2003; Krueger et al, 1996). The pattern of results was more complex than originally thought. For males, impulsivity was significantly associated with partner indirect aggression, same-sex direct and indirect aggression whilst for females impulsivity predicted same-sex direct and indirect aggression.

For both sexes impulsivity was not significantly related to partner aggression in the standard multiple regressions. There are two explanations for this. Firstly, intimate partners do not compete for resources but attempt to gain a net benefit from the relationship (Archer, 2002). Therefore, if a person's partner becomes seriously injured or died it directly affects their offspring surviving: thus the person is unable to gain a net benefit from the relationship. This explanation suggests that impulsive behaviour may be dependent upon an unconscious cost/benefit system that has been studied in animal behaviour (Trivers, 1972) but rarely as been applied to human behaviour. Therefore, impulsive aggressive behaviour could be actions without conscious thought but this does not necessarily mean that there has not been a sub-conscious thought. Secondly, it is a limitation of the study that it did not examine where the aggressive behaviour took place,

In contrast to partner direct aggression, the relationship between impulsivity and partner indirect aggression was significant in males but not females in both the zero-order correlations and multiple regressions. This gives some support to the parental

investment theory that sex differences would be found in the associations between impulsivity and specific acts of aggression in the male direction. From an evolutionary perspective partner indirect aggression has relativity low costs compared to direct aggression. Therefore, the relationship between impulsivity and partner indirect aggression could represent a displaced hostility without the potential costs of committing partner direct aggression, such as direct retaliation or their partner leaving them. In cases where it does not directly affect the male's ability to produce offspring the relationship between impulsivity and specific acts of aggression will be higher in males than females.

The relationship in the zero-order correlates and multiple regressions between impulsivity and same-sex direct aggression was significant in males and females. However, there was a stronger association between impulsivity and same-sex direct aggression in males than females. This gives support to our two hypotheses. Firstly impulsivity is a good predictor of same-sex direct aggression in both males and females (trait aggression hypothesis) and secondly, the parental investment theory of impulsivity that sex differences in associations occurs in the male direction (Bjorlund & Kipp, 1996). Therefore, this demonstrates that the relationship between impulsivity and specific acts of aggression is more complex than original thought. Also it further supports the parental investment model that impulsivity is dependent upon the sex of a person and the context of aggression.

In the zero-order correlates the relationship between impulsivity and same-sex indirect aggression were significant for males and females but there were no significant sex differences in associations. In the multiple regressions, the relationship

between same-sex indirect aggression and impulsivity was significant in both males and females models. For females, same-sex indirect aggression is a mechanism to damage their peer reputation (Campbell, 1999).

5.11 Dominance

As expected, dominance and partner direct aggression were significantly associated for both sexes, in zero-order correlations and standard multiple regressions. This confirmed previous research into similar measures of dominance, such as control being related to partner direct aggression (Graham-Kevan & Archer, 2003). An individual who gains a net benefit from the relationship is able to either increase their chances of producing more offspring and to increase their offsprings' chances of surviving. Therefore from an evolutionary perspective an individual who dominates the relationship are likely to have evolutionary advantage. There is a payoff between the costs of partner aggression, such as not injuring their partner and/or causing their partner to leave and a desire to gain dominance over their partner. It should be pointed out that in the majority of circumstances there is no aggression between partners. Therefore, the consequences for aggression are a lot higher than the benefits of being the dominate one in the relationship. However, at the extreme end of partner violence, the desire for dominance can be maladaptive by causing serous injury to their partner, their partner leaving them and being arrested.

In both the zero-order correlations and multiple regressions dominance was a significant predictor of partner indirect aggression in males and females. The data contradicts the argument of dominance is solely being a desire to establish control

over another person by directly controlling the person but the results can be explained by two reasons. Firstly, indirect aggression can itself help to establish dominance over a person by manipulating friendship groups. Secondly, participants perception of their dominance in the intimate relationship may be explained by the participant wanting to feel that they are the dominate partner.

The relationship between dominance and same-sex aggression is more complex than partner aggression. In the multiple regressions, the relationship between dominance and same-sex direct aggression was significant in the male analysis whilst not significant for females. Males' desire to gain resources and peers status is more likely to take form of direct aggression compared to females whose need for dominance will take on a less risky form (Archer, 1996; Campbell, 1999; Daly &Wilson, 1988). This study links dominance and same-sex direct aggression in young male adults this linking it with previous research focusing on children or primates (See Hawley, 1999; Pellegrini, 2002).

On the other hand, the dominance relationship with same-sex indirect aggression was significant in the female but not the male in both the zero-order correlations and multiple regressions. Females' peer relations focus on manipulating friendship groups and social networks. There are several key motives to female aggression that are linked to dominance, such as damaging a rival's reputation and protecting heterosexual relationships (Buss & Shackleford, 1997; Campbell, 1999), in contrast, to male peer groups that mainly focuses on directly dominating peers (Pellegrini, 2002). Overall, the relationship between dominance and specific forms of aggression

was as predicted in the introduction, which gives good support for the evolutionary theory role of dominance.

5.12 Competitiveness

In the zero-order correlations, the relationship between competitiveness and specific forms of aggression was significant in only three out of eight Pearson's correlations. In the male analysis, competitiveness was significantly related to both partner and same-sex direct aggression and partner indirect aggression whilst for females competitiveness was not significantly related to any of the specific forms of aggression. However in the multiple regressions, competitiveness was not significantly related to any of the AQ. A plausible reason why competitiveness was not significantly related in any of the male multiple regressions was the strong association between dominance and competitiveness. Dominance and competitiveness are similar concepts: dominance is a desire to control people whilst competitiveness is a desire to gain resources. Therefore, dominance and competitiveness accounted for similar amounts of variance in predicting specific acts of aggression.

5. 13 Sexual jealousy

The relationship between sexual jealousy and partner direct aggression was only significant for males. Previous research had found a strong relationship between sexual jealousy and partner direct aggression without examining the possibility of sex differences in the strength of association (Marcus & Swett, 2003; Russell & Wells, 2000; Wilkinson & Hamerschlag, 2005). From an evolutionary perspective, it is of

greater importance for a male to stop sexual access to his partner than visa-versa. If a female commits sexual infidelity it directly affects her partner's chances of producing offspring whilst a male who commits sexual infidelity does not directly affect her chances of producing her own offspring. This finding is of particular importance because the majority of items contain emotional infidelity items and are more strongly related to male than female aggression. A plausible explanation is that emotional infidelity is a cue to sexual infidelity therefore aggression is used as an attempt to dominate their partner in an attempt to stop sexual infidelity.

In the zero-order and multiple regressions sexual jealousy was significantly associated with partner indirect aggression for both males and females. However, in the male analysis the association was positively associated whilst in the female analysis it was negatively associated. It is straightforward to explain partner indirect aggression relationship with sexual jealousy as the male attempts to damage the reputation of his partner and manipulate friendship groups in order to gain dominance over their partner. But the relationship between partner indirect aggression and sexual jealousy is more complex with the negative association in females. Therefore, females when sexual jealousy are less likely to use indirect aggression against their partner, in order to reduce the prospect of their relationship being taken over by a rival female (See Campbell, 1995).

In contrast to partner aggression, sexual jealousy was not significantly related to either same-sex direct or indirect aggression in males and females in both the zero-order correlations and the multiple regressions. The discrepancy between partner and same-sex aggression relationship with sexual jealousy can be explained in terms of

the probability of producing offspring. Firstly, a partner is one person, therefore it is increases the probability of producing offspring if a male can reduce the chances of their partner spending time with other male competitors. In contrast, same-sex members who are endless in number therefore individuals make little difference to the probability of stopping a same-sex member's access to females.

6.0 Summary of major results

This chapter provides a brief re-cap of the main findings in the three results chapters (3, 4 and 6). Firstly, the four forms of aggression (partner and same-sex direct and indirect aggression) main findings are discussed and secondly, the four evolutionary-derived measures are discussed.

Partner direct aggression

In partner direct aggression there were five main findings: (1) no meaningful sex differences were found in partner direct aggression; (2) there were strong associations between partner direct aggression and proneness to physical aggression for both sexes; (3) the associations between partner direct aggressor and victimization measures were stronger for females than males; (4) for males, partner direct aggression was predicted by dominance and sexual jealousy; and (5) for females, partner direct aggression was predicted by only dominance.

Partner indirect aggression

In partner indirect aggression there were four main findings: (1) no sex differences were found in partner indirect aggression; (2) there was strong association between partner indirect aggression and hostility; (3) for males, partner indirect aggression was predicted by impulsivity, dominance and sexual jealousy; and (4) for females, partner indirect aggression was predicted by dominance and negatively related to sexual jealousy.

Same-sex direct aggression

In same-sex direct aggression there were five main findings: (1) higher reports of same-sex direct aggression were found in males than females; (2) same-sex direct aggression was strongly associated with proneness to physical aggression; (3) there were strong associations between same-sex direct aggressor and victimization measures for both sexes; (4) for males, same-sex direct aggression was predicted by dominance and impulsivity; and (5) for females, same-sex direct aggression was only predicted by impulsivity

Same-sex indirect aggression

In same-sex indirect aggression there were four main findings: (1) in same-sex indirect aggression higher levels were found in males than females; (2) there was a strong association between same-sex indirect aggression and hostility; (3) for males, same-sex indirect aggression was only predicted by impulsivity; and (4) for females, same-sex indirect aggression was predicted by impulsivity and dominance

Impulsivity

There were four main findings in relation to impulsivity: (1) no sex differences were found in impulsivity; (2) Impulsivity was not significantly associated with partner direct aggression for both sexes; (3) there were stronger associations between impulsivity and direct same-sex aggression in males than females; and (4) there was

strong support for impulsivity being dependent upon the sex and context of aggression.

Dominance

There were five main findings in relation to dominance: (1) no sex differences are found in dominance; (2) dominance was significantly associated with partner direct aggression for both sexes; (3) for males, dominance was significantly associated with same-sex direct aggression but not same-sex indirect aggression; and (4) for females, dominance was significantly associated with same-sex indirect aggression but not same-sex direct aggression.

Competitiveness

There were two main findings in relation to competitiveness: (1) higher levels of competitiveness were found in males than females; and (2) competitiveness was not significantly associated with any of the four specific forms of aggression in the multiple regressions

Sexual jealousy

There were three main findings in relation to sexual jealousy: (1) higher levels of sexual jealousy were found in females than males; (2) sexual jealousy was significantly associated with partner direct aggression in males but not females; and

(3) sexual jealousy was not significantly associated with same-sex direct and indirect aggression for both males and females.

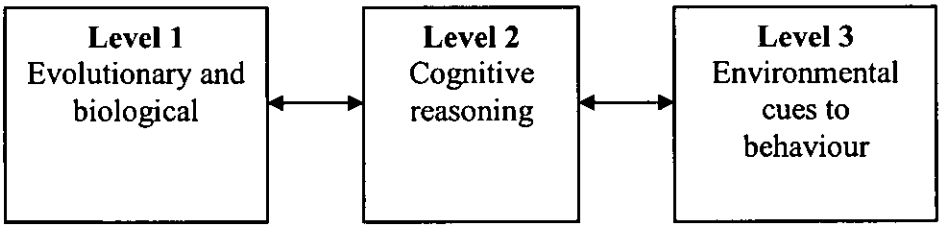
7.0 Overall Conclusions

The main purpose of this thesis is to assess whether sexual selection theory should be included within a theory of aggression, with previous models omitting sexual selection: e.g., Social Role Theory (SRT; Bandura, 1973) and biosocial model (Wood & Eagly, 2002). The present study found some support for the sexual selection theory applied to aggression. However, this thesis was not designed to test between the two competing theories of SRT and sexual selection, so that both theories may be able explain some of the findings. For example, sexual jealousy was more strongly related to aggression in males than females for partner aggression. SRT would explain sexual jealousy is a part of the masculine values whilst evolutionary theory would argue that it has evolved to reduce the amount of resources spent on their offspring.

Any attempt to explain aggressive behaviour should be able to explain findings from three types of research found in the aggression literature (See figure 7.1). The first type of research contains findings that belong to the biological basis of aggression, such as genetic, hormonal/neurotransmitters and evolutionary principles. The second type of research contains findings that belong to the cognitive research grouping, including social learning and the evolutionary principle of cost/benefit analysis. Obviously, there is an overlap between the first two types of research: i.e., by supporting evolutionary theory we make the assumption that sexual selection has shaped our cognitive functioning. The third type of research includes environmental cues such as the context, temperature, alcohol etc. There is also an overlap between

research types two and three: e.g., by consuming alcohol a person would impair their cognitive functioning.

Figure 7.1 shows the three levels that any complete theory of aggression must be able to account for the results. The arrows show where there is overlap between the theories of aggression.



The rest of this chapter will discuss the implications for evolutionary theory of the partner and same-sex direct aggression measures used in this study. This M.Phil report uses two statistical methods to assess evolutionary theory: (1) mean sex differences in evolutionary-derived measures and (2) whether there are sex differences in associations between evolutionary-derived measures and partner and same-sex direct /indirect aggression. This section will discuss the implications from chapters three too five, in two parts, evolutionary theory (results from Chapters 4 and 5) and forms of aggression (results from chapters, three, four and five).

7.1 Evolutionary theory

Overall there was some support for evolutionary theory being included into an interactive model to explain aggressive behaviour. However, this thesis does not

support evolutionary theory as a single theory explaining aggressive behaviour. A major limitation of evolutionary theory is that it accounts for more variance in males than females. On average, evolutionarily-derived measures explained 27% of variance in are multiple regression analysis of the four aggression forms in males, whilst only explaining13.5% of variance for females. This was particular evident in same-sex direct aggression where the variance accounted for was 36% in males and 9% in females.

Buss and Shackleford (1997) proposed there are seven adaptive problems where aggression has evolved as a strategy to solve conflicts (chapter 1, page 17). Three of the adaptations were not tested within this study: (1) inflicting costs on a same-sex rival; (2) reducing resources expended upon genetically unrelated children; and (3) deterring rivals from future aggression. Of those adaptations that were tested, three showed support for the evolutionary model whilst one found no support (i.e. did not predict aggression). There was support for defending against attack, with significant associations between aggressor and victimization measures in all forms of aggression, including indirect aggression. There was support for deterring mates from sexual infidelity, with cues to partner infidelity (emotional infidelity) being a predictor of partner direct aggression. There was further support for the evolutionary perspective with the associations between sexual jealousy and partner direct aggression being more strongly associated in males than females. There was support for adaptation, negotiating status and power hierarchies being a significant predictor of aggression in the form of dominance, and this applied across the context of aggression. However, co-opting the resources of others (competitiveness) was not a significant predictor of same-sex aggression. A plausible reason is that negotiating status and power

hierarchies overlap with co-opting the resources of others. Therefore, these two adaptations should not be considered as separate variables for predicting aggressive behaviour.

This thesis investigated two main principles of evolutionary theory, the parental investment hypothesis and the cost/benefit analysis system. Two types of statistics were used to investigate paternal investment hypothesis of aggression, mean differences and associations between evolutionarily-derived predictors and forms of aggression. In the mean differences there was support for the evolutionary-derived hypotheses. Sex differences were found in competitiveness (in the male direction) and sexual jealousy (in the female direction) has predicted. Also as predicted, no sex differences were found in impulsivity and dominance. However, the results could be explained by other theories, such as social role theory.

There was some indirect support for the cost/benefit analysis system existing in humans. There were significantly different strengths in the associations with impulsiveness, depending upon the sex of the person and form of aggression. Although, there were significant associations between same-sex direct aggression for males and females there were stronger associations in males. Interestingly, impulsivity was not a significant predictor of partner direct aggression in both sexes. For example, males are not impulsively aggressive towards their partner but are to a member of the same sex whilst in the female analysis impulsivity was a predictor of same-sex indirect aggression but not partner indirect aggression. This supports the view that there is some kind of processing in order to assess the context before entering conscious thoughts if we accept the definition of impulsivity acting without

conscious thought. Therefore, indirectly supporting the cost/analysis benefit system that has been purposed by evolutionary psychologists to explain animal behaviour (Dawkins, 1989: Bjorklund & Kipp,1996).

No sex differences were found in the impulsivity measure. Previous research has been mixed with some studies supporting with sex differences in the male direction (Vierikko et al, 2003) whilst some studies supporting no sex differences in impulsivity (Rammsayer & Rammstedlt, 2000). This supports our hypothesis that there would be no sex differences in a general population, i.e., in a student sample. However, we can not rule out methodological problems causing the results. For example, the study required participants to fill a relativity large questionnaire and those participants with higher impulsivity are less likely to complete the survey.

Also impulsivity was a significant predictor in five out of eight multiple regressions, supporting previous research linking impulsivity/inhibition to aggression (Barratt et al., 1989; Harmon-Jones et al., 1997; O'Connor et al., 2001; Stanford et al., 2003; Krueger et al., 1996). Impulsivity was significantly related to all same-sex aggression measures in both males and females whilst impulsivity was only a significant predictor of partner indirect aggression in males. In three out of four indirect aggression multiple regressions, impulsivity was a significant predictor with the only exception being female partner indirect aggression. One view of indirect aggression involves suppressing urges when confronting the person and realising their aggression away from the target person. The present research does not support this view, as indirect aggression is associated with impulsiveness.

As expected there were no mean sex differences in dominance (Eagan & Angus, 2004). The dominance measure used in this study attempted to remove the context out of the measure, i.e., not specific to either a partner or same-sex members. Therefore, it is predicted that both sexes have a motive to be a dominant person when there is no specific situation. Although there is never a measure that can remove any contextual effects but it does demonstrate in general that both males and females have a need to dominate people. However, research into social dominance across cultures finds higher levels of social dominance in males than females (Sidanius, Pratto & Rabinowitz, 2002). Therefore, more research is needed into the need for dominance scale.

Throughout this study dominance is a consistent predictor of the self-reported aggression measures (in six out of eight multiple regressions). In the multiple regressions, partner and indirect direct aggression was predicted by dominance in both sexes. Previous research has found control measures to be a predictor of partner direct aggression (Graham-Kevan & Archer, 2005; Wilkinson & Hammerschlag, 2005). Both sexes have evolved to gain a net benefit out of the relationship. Therefore, a tactic of gaining dominance is using aggressive behaviour. This study also found the same in partner indirect aggression, which is a relativity new finding. The relationship between dominance and partner indirect aggression can be explained by several hypotheses. Firstly, the person manipulates their partner's peer relationship therefore affecting their social standing. Secondly, people may use indirect aggression for the feeling that they are the dominant one in the partnership.

The relationship between dominance and same-sex direct and indirect aggression is more complex than that of partner aggression. Same-sex direct aggression was predicted by dominance in males but not females whilst the reverse was found for same-sex indirect aggression. This was as predicted by the parental investment hypotheses. Males seek to dominate their peer relations directly to gain access to resources and status, whilst females seek to indirectly dominate their peer relations to maintain their sexual reputations (Campbell, 1999; Buss, 1999; Daly & Wilson, 1988).

As expected higher levels of competitiveness were found in males than females. Males have evolved to compete directly for resources in order to attract a high reproductive female (Buss, 1999; Wilson & Daly, 1993). But the relationship between competitiveness and forms of aggression were not significant in the multiple regressions. This demonstrates that competitiveness is not a strong predictor of aggression and contradicts the prediction that male competition will lead to same sex-aggression.

There was mixed support for the evolutionary-derived hypotheses of sexual jealousy. As expected higher levels of sexual jealousy were reported by females than males because of the higher emotional infidelity items in the sexual jealousy measure (See Schzwohl & Koch, 2004). However, the evolutionary theory that males would be more upset by sexual infidelity was not supported within this study because both sexes were extremely upset my sexual infidelity items, so much so that sexual infidelity items had to be removed from the measure because nearly all the

participants rated themselves has extremely upset if they where to see their partner committing sexual infidelity.

However, the relationship between sexual jealousy and forms of aggression is more complex than original thought. Sexual jealousy was related to partner direct aggression in males but not females. This supports the parental investment hypothesis of sexual jealousy: that cues to sexual infidelity (i.e., emotional infidelity) are more likely to produce an aggressive response in males than females (Buss, 1999). Partner indirect aggression was significantly predicted by sexual jealousy. However, the direction of relationships differed; with the relationship in males being positively correlated whilst in females the relationship was negative. The evolutionary framework can provide an explanation for this. If a male has a high trait measure of sexual jealousy they will try to damage their sexual reputations by manipulating their peer group whilst if a female gets sexually jealous she will attempt to build up the relationship in order to protect it from being taken over by a rival female.

Unexpectedly, sexual jealousy was not related to same-sex direct or indirect aggression in either males or females. A possible reason may lie in the evolutionary cost/benefit analysis system. For example, if a person reduces access to their partner they would reduce the chances of their partner having sexual encounters with members of the opposite sex whilst reducing access of same sex members to their partner would be impossible to do therefore having no effect the amount of sexual encounters their partner performs. Therefore, sexual jealousy may lead to aggression in situations where it directly affects his ability to produce offspring, i.e., attempting

to control his partner. The rest of the final discussion will focus on the forms of aggression.

7.5 Partner direct aggression

There were no sex differences in partner direct (both physical and verbal items) aggression, which supports previous research into community samples (Archer, 2000; Archer; 2002). But an important aspect of the research is the distribution of partner direct aggression, which was positively skewed, with a large number of participants showing no aggression in a relationship. Therefore, in the majority of intimate relationships there is no direct (mainly physical) aggression between partners. Several attempts have been made to explain the lack of sex differences, including problems with the measures, and different samples examining different patterns of aggression.

One of the controversial issues surrounding partner direct aggression measures is whether self-report measures are valid (Dobash et al, 1992; White et al, 2000). A strong relationship was found between proneness to physical aggression as measured by the AQ and partner direct aggression, with significantly stronger correlations for females than males. This provides support for the external validity of the partner direct aggression measure (Archer, 1999).

The second explanation for the results on partner direct aggression are dependent upon the sample used, focussing on different patterns of aggression (Johnson, 1995; Graham-Kevan & Archer, 2005). This research further expanded on Johnson's (1995) theory to include three types of relationships. Pattern 1 involves no violence in the

relationship (the majority of circumstances); Pattern 2 involves occasional outbursts (defined as not serious enough to gain the authorities attention; Pattern 3 involves patriarchal terrorism (the serious end of partner aggression spectrum where it is of interest to the authorities to get involved): this usually involves a partner or partners committing severe aggression against one another (Johnson, 1995; Graham-Kevan & Archer, 2005).

One of the most important questions in partner direct aggression research is whether there is sexual asymmetry in the motives of aggression (Dobash & Dobash, 1977/78). From Chapter 5 we have seen in the male standard multiple regression, dominance and sexual jealousy were significant predictors whilst for females, only dominance was a significant predictor. The multiple regression models accounted for a reasonable amount of variance: in male model it accounted for 25% of the variance whilst in the female model 16% of the variance were accounted for. This supports the view that any models of partner direct aggression needs to include evolutionary theory. However, there was not enough variance accounted for in the data to suggest that evolutionary theory can provide a full explanation of aggressive behaviour.

There are similarities and differences in male and female motives of partner aggression. It is possible that males seek to dominate a partner and reduce the chances of their partner having sex with other males in order to increase the likelihood that offspring produced by his partner are his own. From an evolutionary perspective, a male who as sex with another female does not affect his partner's chances of producing offspring but instead limits her resources. Females also seek to dominate an

intimate relationship in order to gain a net benefit from the relationship (Archer, 2002).

7.6 Partner indirect aggression

As with partner direct aggression, there were no sex differences in the mean frequency of partner indirect aggression, confirming previous research (Archer & Coyne, 2005). From a paternal investment theory model is when the costs of aggression are relativity low, both sexes will be equally has aggressive.

Partner indirect aggression was significantly related to all the AQ subscales. Of importance is the strong association between acts of partner indirect aggression and hostility, which has not theoretically or empirical found before this study, although, this relationship was not significant in the multiple regression

There were some sex differences in the associations between partner indirect aggression and evolutionary-derived measures. For males, partner indirect aggression was predicted by impulsivity, dominance and sexual jealousy whilst for females it was predicted by dominance and sexual jealousy. However, there were sex differences in the amount of variance explained; for the male model it accounted for 28% of the variance whilst in the female variance accounted for 13%.

The parental investment theory predicted stronger associations between impulsivity and partner indirect aggression in males than females. Again, this was supported. It is plausible that the greater inhibition displayed in relationships spills over into partner

indirect aggression in order to release their hostility towards their partner. Also in males and females, partner indirect aggression was predicted by dominance. Both sexes have the need to feel they are the dominant partner in order to gain a net benefit from the relationship. However sexual jealousy predicted partner indirect aggression in both males and females but differed in the direction of the associations: for males it was positively correlated whilst for females it was negatively associated. It is plausible that males attempt to damage the reputation of their partner in an attempt to stop other males accessing her, whilst females protect the relationship from a rival taking over, i.e., by gossiping behind their partner's back, this may indicate the relationship could be taken over.

7.7 Same-sex direct aggression

There were sex differences, as predicted, in same-sex direct aggression, with higher levels reported by males than females. This confirmed previous research findings from a number of different samples (Archer, 2004; Daly & Wilson, 1988; 1990; Gergen, 1994; Richardson & Green, 1999; Upson, et al 2004). From an evolutionary perspective, this occurs because of the lower parental investment in males. They are therefore more likely to risk of the cost of direct aggression (physical retaliation) because of the potential higher awards (number of offspring possible to produce). In females there is higher parental investment. Therefore females are less likely to risk the costs of aggression. Also both males and females reported higher levels of same-sex direct aggression in the aggressor measure than the victimization measures. A plausible explanation is that in the context of same-sex aggression (i.e., usually in public places) the person is fully aware of their intention but are not fully aware of the

other person's intentions. Or it is possible that the participant is more likely to remember behaviour when they are aggressive.

Importantly, same-sex direct aggression was strongly linked to proneness to physical aggression. This gives external validity to both the AQ and same-sex direct aggression measure. However, in the associations the AQ seems to be more strongly related to same-sex aggression than partner aggression. A possible explanation is the higher levels of aggression in same-sex direct aggression than partner direct aggression.

In the models of same-sex direct aggression, more variance was accounted for in the male model (36%) compared to the female model (.09). This is a similar finding to partner indirect aggression, i.e. that evolutionarily-based variables accounted for more variance in the male than female model. This provides some support to the view that evolutionary theory is more accurate in predicting male than female aggressive behaviour.

In the multiple regressions, same-sex direct aggression was predicted in males by impulsivity and dominance whilst for females it was predicted only by impulsivity. Although impulsivity was a predictor of same-sex direct aggression it was more strongly related in males than females, thus supporting parental investment theory. It was predicted that dominance would be a significant predictor in the male model but not the female multiple regressions. From evolutionary theory, males directly compete for resources and peer status but due to parental certainty in females competition is less intense as they are less likely to risk the costs of aggression (Buss, 1999;

Campbell, 1999; Daly & Wilson, 1988). It was expected that competitiveness would be significantly related to same-sex direct aggression only in males. However, because of the similarities between dominance and competitiveness, they may have accounted for similar variance in the multiple regressions. Sexual jealousy was not significantly related to same-sex direct aggression in either males or females.

7.8 Same-sex indirect aggression

Sex differences were found in the mean scores of same-sex indirect aggression with higher levels in males than females. This is inconsistent with predictors derived from the evolutionary analysis that the costs of indirect aggression are lower than that of direct aggression, therefore expecting no sex differences. An alternative theory is that males have a higher proneness to verbal aggression therefore a more likely to have higher level of same-sex indirect aggression. However, the pattern is not repeated for partner indirect aggression therefore leaving the results of indirect aggression inconclusive.

The amount of variance explained by the evolutionary theory in same-sex indirect aggression was moderate, i.e., 19% for the male model, and 15% in the female model. A plausible reason for the moderate level is that much of the variance in same-sex indirect aggression was explained by the AQ verbal hostility. It is plausible to suggest that same-sex indirect aggression can be seen as a type of hostility. But evolutionary variables do account for some of the variance in the data.

Same-sex indirect aggression was predicted only by impulsivity for males whilst for the female same-sex indirect aggression was predicted by impulsivity and dominance. This supports the parental investment theory of dominance that same-sex indirect aggression as a mechanism for dominating peer relations in females (Campbell, 1999). A plausible explanation for finding no sex differences in associations between same-sex indirect aggression and impulsivity is that it only applies to direct aggression because of the higher costs of direct aggression (Archer, 1996; Buss, 1999). As expected, dominance and same-sex indirect aggression were more strongly related in females than males. Females use indirect aggression in order to gain peer status, to damage the reputation of rivals, to manage heterosexual relationships and project from a rival from gaining their partner (Campbell, 1999).

7.9 Limitations

There are four main limitations in the sample and design of the experiment. Firstly, no counterbalancing was carried out between partner and same-sex aggression due to the online nature of the study. Secondly, no measure of response rate was recorded: therefore I was unable to determine how many people saw the advert but did not take part. Thirdly, in the sample, there was a higher number of female than male participants. This was not anticipated as there was an equal chance for males and females to participant in the study. A follow up study to recruit more males was not carried out as the questionnaire was in confidence and I could not be sure that the same participants would not fill in the questionnaire.

This study used the same type of measures (self-report) for all the measures within this study. Therefore, it involved the common method variance problem, which could have exaggerated the relationship between aggression measures and evolutionary-derived predictors. There are other limitations that have being discussed in the introduction and other sections of the discussion that are context-specific, such as agreement about partner violence between partners. But overall there was external validity for both the AQ and specific acts of partner and same-sex direct and indirect aggression.

It should be noted that there was no adjustment to the alpha levels during the analyses. Therefore raising the possibility of the type 1 error. It was decided not to adjust the alphas for several reasons: (1) the analysis conducted used both one and two-tailed hypotheses: therefore I felt the analysis would be inconsistent if adjustments were made due to the number of tests performed and type of hypotheses used; and (2) if I made adjustments to the alphas for the correlation analysis it would have caused type 2 errors. Therefore, I have decided to use the significant tests as a guide to the decision process rather than the sole test to make a decision. The decision process I used was to make the decision based on the magnitude of the results and the alpha level.

7.10 Future directions

In the aggression literature there is an over-reliance on single dimensional explanations for aggression. The majority of behaviours are more complex than been explained by a single theory. The best way to demonstrate this is in an extreme

hypothetical example. If a person who was watching an online violent programme and then commits a violent assault, the relationship is more complex than just a direct causation between watching violence and acting out. If the aggressor was not interested in violence then they would not seek out such material online in the first place: therefore they are already demonstrating a pre-existing interest in violence. Perhaps the violent material reinforced the behaviour but it is unlikely to be sole cause. If the violent material was not there it may not have resulted in aggression. Therefore, there is an interaction between the person and the environment viewing violence can act as a trigger for people predisposed to violence but not those who are not. This demonstrates a need for an interactive theory in order to explain aggressive behaviour.

In the majority of attempts to qualify how much variance is accounted for by environmental and genetic factors, estimates suggests each contributes around fifty percent (Plomin, DeFeirs, Craig & McGuffin, 2004; Rutter et al, 2001). This may be a reflection of the interaction between environmental and genetic factors. Although, attempts have been made to combine both genetic and environmental influences into one interactive theory do not include sexual selection influences (for example, Wood & Eagly, 2002). However, a problem exists with this approach has it generally ignores the influence of sexual selection in predicting aggression.

Overall there was some support for the evolutionary hypotheses of aggression. There was some support for the parental investment hypothesis of impulsivity that is not independent of sex and context. There is indirect evidence that there is a cost and benefit analysis system that needs to be further examined in future research.

Dominance was the best predictor that I used within this study and was consistently related to forms of aggression. However, the research into competitiveness does not support the evolutionary hypothesis of aggression. This study has advanced the evolutionary hypothesis of sexual jealousy by showing: (1) emotional infidelity cues are more likely to lead to aggression in males than females; (2) sexual jealousy was significantly related to partner aggression but not same-sex aggression; (3) males and females have different strategies for dealing with emotional cues to sexual infidelity, a male attempting to damage the sexual reputations of his partner whilst a female would reduce the amount of indirect aggression to the person if they suspect emotional infidelity. This study supports the position that if a model of aggression is to be made it needs to acknowledge some of the evolutionary principles demonstrated within this research, contrary to previous interactive models that ignore sexual selection, such as the biosocial model of Wood & Eagly (2002).

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