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Sex Differences in Aggression in Real-World Settings: A Meta-Analytic Review

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Meta-analytic reviews of sex differences in aggression from real-world settings are described. They cover self-reports, observations, peer reports, and teacher reports of overall direct, physical, verbal, and indirect forms of aggression, as well as (for self-reports) trait anger. Findings are related to sexual selection theory and social role theory. Direct, especially physical, aggression was more common in males and females at all ages sampled, was consistent across cultures, and occurred from early childhood on, showing a peak between 20 and 30 years. Anger showed no sex differences. Higher female indirect aggression was limited to later childhood and adolescence and varied with method of measurement. The overall pattern indicated males' greater use of costly methods of aggression rather than a threshold difference in anger.

Sex differences in aggression have been reported since the 1920s, and findings were first summarized in narrative reviews, followed by meta-analyses. The first of these analyses (Hyde, 1984, 1986) involved a range of methods but was restricted to North American studies conducted up to 1981. Three others concentrated on laboratory studies from the United States (Bettencourt & Kernahan, 1997; Bettencourt & Miller, 1996; Eagly & Steffen, 1986). There have been no contemporary meta-analyses of sex differences in aggression from real-world settings involving methods such as self-reports, observations, and peer reports. The present article describes meta-analyses of these sources and assesses whether conclusions from the laboratory generalize to them.

The main theoretical focus of previous meta-analyses has been social role theory (SRT; Bettencourt & Kernahan, 1997; Bettencourt & Miller, 1996; Eagly & Steffen, 1986). Sex differences in aggression have also been explained in terms of sexual selection theory (Archer, 1996; Daly & Wilson, 1988). The exchange between these two perspectives (Archer & Lloyd, 2002; Wood & Eagly, 2002) is important because both address the broad picture: the historical origin of sex differences and its implications for their development and causation. The present findings are assessed in relation to both perspectives rather than, as in previous reviews, being restricted to SRT.

In addressing the two perspectives, some old issues are revisited and some new ones raised. Among the old issues are changes in the size of sex differences with age: throughout childhood, at adolescence, and in adulthood. New issues concern whether greater male than female aggression is restricted to its overt confrontational forms (as specifically predicted by sexual selection theory) or whether it is a more general attribute. To address this question, I included (for the first time) measures of indirect aggression and anger in the present meta-analyses. Also, in seeking to redress the geographic imbalance of most previous reviews, I included English-language studies from outside the United States.[1]

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[1] However, studies from the United States formed the majority of the evidence.

In the next two sections, the two theoretical frameworks are described, and when possible predictions are drawn from them; this is followed by a summary of previous reviews of sex differences in aggression, leading to the novel aspects of the present review. The review is then outlined to specify the methods included, forms of aggression, and the crucial variable of sex of the opponent.

Theoretical Frameworks

Sexual Selection Theory

Sexual selection theory (SST) locates the origins of greater male physical aggression in human evolutionary history, as a consequence of unequal parental investment leading to greater male than female reproductive competition and, therefore, overt aggression (Trivers, 1972). From this principle, and from its observed consequences in the animal kingdom, the sex difference in human aggression is to be expected. It is the psychological accompaniment of physical sex differences such as those in size, strength, and longevity.[2] How it appears in human development and the processes controlling it are less clear. In many vertebrates, the rise in testosterone at maturity causes males to become aggressive toward other males (Archer, 1988), and some researchers have generalized this to humans (e.g., Book, Starzyk, & Quinsey, 2001). However, pubertal testosterone does not seem to increase aggression (Halpern, Udry, Campbell, & Suchindran, 1994). Data on the magnitude of sex differences in physical aggression before and after puberty can provide further evidence on this issue.

Evolutionary accounts tend to emphasize the early emergence of sex differences in behavior (Bjorklund & Pellegrini, 2000), the subsequent development of which is sensitive to social context yet preparatory for adaptive sex differences in adulthood. Contrary to previous conclusions (e.g., Keenan & Shaw, 1997; Tieger, 1980), it is clear from observational studies of children (described subsequently) and from parent reports (e.g., Baillargeon, Tremblay, & Willms, 2004; Tremblay et al., 1999) that sex differences in aggression occur early in life, from approximately 2 years of age. Their initial cause is unknown. It may involve a direct effect of prenatal testosterone on the disposition to act aggressively or an indirect effect that can be substantially modified by the environment.

Several evolutionary analyses have identified the degree of risk an individual is prepared to take during a conflict as the crucial difference between the sexes. The greater variation in male than female reproductive success that is typical of mammals leads to more intense male competition. Daly and Wilson (1988) showed that, under these circumstances, selection favors risky strategies even when mortality rates are high, provided that the reward of victory is high (and the consequence of losing is little or no chance of reproducing). Such an analysis predicts that sex differences in physical aggression will be largest when reproductive competition is highest, during young adulthood, and for the most risky and escalated forms of aggression, such as those involving the death of a protagonist. They will also be larger for physical than verbal aggression and larger for direct than indirect aggression (see also Bjorkqvist, 1994). Because the sex difference resides in a greater male willingness to escalate when angered, a difference in motivation to aggress would not be expected.

Therefore, in analyses based on SST, sex differences in aggression are viewed as characteristic of humans, to be found across cultures. They arise at a particular point in development, either early in postnatal life or at puberty, and are maximal during the peak years of sexual activity. They are greater for risky forms of aggression, rather than involving a difference in arousal to anger.

Social Role Theory

According to SRT, sex differences in social behavior arose from the historical division of labor into homemaker and worker outside the

[2] Wood and Eagly (2002) challenged the link between the extent of sex differences in size and male dispositional aggressiveness among primates. Their argument involved the following: first, that humans have relatively low sexual dimorphism (and minimal canine dimorphism), and, second, that this is partly a result of increased female weight from *Australopithecines* to modern humans. Their first point would seem to be undermined by the importance they attach to greater male size and strength as a constraint on gender roles. The second point suggests that potentially larger dimorphism has been obscured by selection pressures not connected with sexual selection.

home (Eagly, 1987). Roles produce expectancies about gendered characteristics, leading to different patterns of behavior that are transmitted to future generations through socialization processes (Eagly, 1987, 1997; Eagly, Wood, & Diekman, 2000). These patterns involve masculine agentic (instrumental) traits and feminine communal (expressive) traits. Boys but not girls learn that aggressive responding is appropriate as part of a set of instrumental behaviors that fit them better for the masculine role. Expectancies associated with the masculine role maintain aggression as part of an instrumental set of responses, and expectancies associated with the feminine role inhibit it as part of an expressive set of responses.

Status is regarded as another route whereby men acquire a more aggressive tendency (Eagly, 1987). Not only is the domestic role of lower status than is paid employment, but women tend to occupy lower status occupations (Archer & Lloyd, 2002). Higher societal status is also associated with agentic characteristics, and because men's status is generally higher than women's, this further influences their behavior. Although higher status does not necessarily mean more aggression, especially its physical form, the pursuit and maintenance of high-status positions may require and facilitate more verbal and indirect aggression. Particular forms of the masculine role, such as athletic and military roles, can produce further expectancies in that they legitimize a wider range of aggressive and violent behaviors.

One prediction from SRT is that there will be an "overall" sex difference in aggression in the male direction, and it will be of a similar magnitude to other sex differences in social behavior (Eagly, 1987, p. 74). Physical aggression may be particularly encouraged by the masculine role and among individuals associated with specific physically based masculine roles, such as the military. There will, however, be considerable variation according to the extent to which particular contexts activate role expectancies and to which particular socialization backgrounds discourage or encourage aggressive solutions to conflicts. Therefore, SRT predicts moderation of sex differences in aggression according to the action of role-related variables such as perceptions of provocation or empathy with the victim (Bettencourt & Miller, 1996; Eagly & Steffen, 1986). These variables were manipulated in experimental studies that formed the focus of most previous reviews of sex differences in aggression.

Eagly's SRT does not make specific predictions about anger. In contrast, SST locates the sex difference in aggression in different responses to anger-arousing situations, and therefore it would not predict a sex difference in anger. This issue was assessed in the present review by examining trait anger, that is, the experience rather than the expression of anger.

Social learning theory parallels SRT but emphasizes the learning processes through which aggressive behavior is acquired and maintained during development. These processes enable cultural values to be transmitted by parents, peers, the educational system, television, and other media, to produce greater male than female direct aggression (Bandura, 1973; Tieger, 1980). Although indiscriminate physical aggression is generally censored for both sexes, toughness is viewed as an important component of social status in boyhood (Archer, 1992a), and boys learn that being afraid to fight is unmanly. It is widely believed that parents, peers, and teachers react differently to the aggression of boys and girls, boys receiving more encouragement and fewer restraints than girls do. However, there are few studies that have assessed whether this is the case, and the evidence from these studies is mixed, at least for children of preschool ages (Archer & Lloyd, 2002; Maccoby & Jacklin, 1980). One prediction from classic social learning theory is that sex differences in aggression should initially be small and progressively increase as a consequence of the cumulative effect of socialization experiences (Tremblay et al., 1999).

In summary, SRT predicts that sex differences in aggression are relatively small in magnitude and will be more pronounced for physical aggression. Greater consistency across different forms of aggression is expected from SRT, because there is no emphasis on risk taking. Social learning theory involves a progressive and cumulative influence of cultural values, so the magnitude of the sex difference should increase with age in childhood. There are no particular predictions regarding age trends after the childhood years.

Previous Meta-Analytic Reviews of Sex Differences in Aggression

Studies reporting sex differences in children's aggression began in the 1920s and 1930s, and experimental and questionnaire evidence began to be available for adults in the early 1960s. In narrative reviews summarizing these studies (e.g., S. Feshbach, 1970; Frodi, Macaulay, & Thome, 1977; Maccoby & Jacklin, 1974; Oetzel, 1967), there was agreement that males are more aggressive than females. In the first meta-analysis (Tieger, 1980), which involved a series of observational studies of children 6 years of age or younger, the conclusion (contrary to Maccoby & Jacklin, 1974) was that there were no sex differences at these ages. Maccoby and Jacklin (1980) replied with a more extensive analysis and found that males were indeed more aggressive below the age of 6 years.

Neither analysis involved effect sizes, the currency of modern meta-analysis. Hyde (1984, 1986) carried out a comprehensive analysis, initially of 143 studies involving a variety of measures and designs, of all available ages. The findings reported here are mostly derived from the 1986 reanalysis, which involved the use of more modern methods (Hedges & Olkin, 1985). The mean weighted sex difference (*d*) across all measures was .50 for 69 samples, with a slightly larger value for physical ($d = .60$) than verbal ($d = .43$) aggression, and the value for observations ($d = .51$) was larger than that for self-reports ($d = .28$). Hyde (1984) found a slightly smaller value for children than for college students. A later reanalysis of Hyde's data (Knight, Fabes, & Higgins, 1996), controlling for covariance among study characteristics, revealed a positive association between aggression and age, indicating that there was a spurious negative correlation in the original analysis owing to features associated with age. The same reanalysis enabled effect sizes to be calculated for many additional studies from the original data set. This generally resulted in larger effect sizes: The overall *d* was .66; effect sizes for physical and verbal aggression were .91 and .46, respectively; and observations and self-reports had *d* values of .83 and .33, respectively.

Eagly and Steffen (1986) analyzed sex differences in aggression from social psychological experiments. There is continuing controversy over the usefulness of such measures of aggression (e.g., Giancola & Zeichner, 1995; Tedeschi & Quigley, 1996, 2000). Anderson and Bushman (1997) found that effects of individual and situational variables were similar in direction in laboratory and field studies, leading them to conclude that laboratory measures of aggression are more useful than the critics acknowledge. Nevertheless, much larger effects were typically found in real-world studies. For example, for the association between aggression and Type A personality, *d* values were .97 outside and .34 within the laboratory; for trait aggressiveness and aggression, they were .42 outside and .25 within the laboratory. Although sex differences were an apparent exception to this pattern, with no substantial difference between the two sets of studies, the "real-world samples" were restricted to experimental field studies.

Eagly and Steffen (1986) found a small overall sex difference ($d = .29$) from North American experimental studies. There was a larger effect ($d = .40$) when pain, such as an electric shock or noise, was involved than when psychological or social harm, such as insults or criticisms, was used ($d = .18$). This parallels the larger effect sizes found for physical than verbal aggression in Hyde's data set. In comparison with men, women reported more guilt and anxiety after aggressing, as well as more concern about the harm their aggression might do. These influences had a positive effect on the size of the sex difference in aggression and had a stronger influence when the researcher did not require aggression. In a follow-up meta-analysis (Bettencourt & Miller, 1996), the number of samples was increased by 33%. The overall *d* value (.24) was very similar to before, as were other conclusions. The main purpose of the review was to assess the effect of provocation on the sex difference in aggression, which was found to be significantly smaller under provoking conditions. This resulted from the greater difference in aggressive responding between provoking and neutral conditions for women than for men. A subsequent meta-analysis of 20 studies involving violent cues (Bettencourt & Kernahan, 1997) revealed a small sex difference ($d = .22$) that was markedly reduced when there was provocation but doubled when there was none. Although the authors viewed these findings as supporting SRT, they are also consistent with

SST (Archer, 1994), which predicts that men would be more likely to compete with one another in the absence of provocation.

Knight, Guthrie, Page, and Fabes (2002) combined experimental and nonexperimental designs, different measurement methods, and different target sexes in their meta-analysis of sex differences in aggression. Although the impact of these variables could to some extent be distinguished in categorical analyses, they were usually confounded; for example, the overall effect size for physical aggression combined different designs, measurement methods, and target sexes.

Altogether, previous reviews provide a useful starting point but are limited in terms of geographical area, methodology, and analytic strategy. All have excluded studies from outside North America. All except those of Hyde (1984) and Knight et al. (2002) have excluded studies employing observations, peer and teacher reports, and questionnaires. The most inclusive—that of Knight et al.—aggregated studies at too high a level. The present analysis covered only data from real-world settings and separated different measurement methods and types of aggression in a series of analyses. It can therefore complement previous reviews of experimental studies and considerably extend previous analyses of aggression in real-world settings.

Scope of the Present Review

Although most existing reviews are limited by choice, any review of this area is also limited by the available evidence. Most research on sex differences in aggression has been conducted in modern Western individualist societies and has involved children or young adults (usually students). At younger ages, the methods are principally observations, along with reports by peers, parents, or teachers. Adults are typically studied by means of questionnaires or laboratory methods. As indicated, laboratory experiments were excluded because they have been the focus of previous reviews. Parent reports were also excluded, because they involve an age range well covered by three other methods and because of doubts about the objectivity of parents reporting on their own children.[3]

Measures of Aggression

Self-reports. Two standardized aggression questionnaires, the Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957) and the Aggression Questionnaire (AQ; Buss & Perry, 1992) are self-assessments of people's tendency to use physical and verbal aggression. The first also provides a measure of "indirect hostility" that is different from later measures of indirect aggression; the second also measures anger. The present review covered physical, verbal, and indirect aggression, as well as anger, measured by these and other questionnaires. Other self-report methods include asking about the frequency of specific forms of aggression, or of aggression in general, and whether the person has been in a physical fight. Responses to hypothetical scenarios provide another self-report method.

Observational methods. Older observational studies do not contain data suitable for effect size calculations. Those undertaken after 1945 in the United States typically involve global categories of behavior and are associated with the social learning tradition. In the 1960s, small-scale British studies used observational methods derived from ethology to study children. Some involved comparisons of aggression between boys and girls, although they were often limited by reporting incidents of aggression rather than frequencies per individual. Some previous reviews (e.g., Maccoby & Jacklin, 1980) adopted a wide definition of observational methods, to include, for example, competitive laboratory studies. The present analysis included only observations of interactions with other children.

Peer reports. Peer nominations and ratings are commonly used to measure children's aggression. Nominations involve the child naming a specific number of other children who display a particular type of behavior, for example who fights the most. Ratings involve the child assessing all of the children in his or her class on a scale denoting the frequency of particular aggressive acts. Nominations have been used in

[3] This is a particularly important criticism, because most aggression that is studied in children involves their interactions with other children. From the school ages onward, a substantial proportion of this aggression will occur away from parental observation.

well-known North American studies, including a 22-year longitudinal study of childhood and adulthood aggression (Eron, 1992; Eron, Huesmann, Dubow, Romanoff, & Yarmel, 1987). Peer ratings have typically been used in Finnish studies (Bjorkqvist, Lagerspetz, & Kaukiainen, 1992; Lagerspetz, Bjorkqvist, & Peltonen, 1988), children being asked to rate what each other child in the class did when he or she was angry. The purpose of these and subsequent studies was to study indirect aggression, which is not well suited to self-reports owing to its covert nature.

Teacher reports. Teacher reports also rely on people who know the target child acting as informants. They have been used since the 1930s, although most studies included in the present review were from the 1990s. They include the same categories used in peer reports, and they generally involve ratings along dimensions describing aggressive behavior rather than nominations.

Forms of Aggression

In experimental studies of aggression, the dependent variable is usually a specified response, such as level of shock or verbal criticism. Studies of real-world settings have to organize people's aggressive actions into manageable categories. The main distinction is among physical, verbal, and indirect forms of aggression. Some studies involve subcategories, for example, "swears" and "abuses and calls names" for verbal aggression and "kicks or hits" and "trips up" for physical aggression (e.g., Lagerspetz et al., 1988). It was not possible to preserve these subcategories in the present analysis, in that they were used in relatively few studies.

It was, however, possible to summarize quantitatively for the first time[4] "indirect" or "relational" aggression, which is of particular interest given that several studies have shown that it is more common among girls than boys. This form of aggression involves deliberate social exclusion and ostracism. Terminology is varied and contentious and includes "indirect aggression" (Lagerspetz et al., 1988), "social aggression" (Cairns, Cairns, Neckerman, Ferguson, & Garie'py, 1989), and "relational aggression" (Crick, 1995; Crick & Grotpeter, 1995). Although these terms are not exactly equivalent (Archer, 2001), "indirect aggression" is used here, following the researchers who began its systematic investigation (Bjorkqvist, 2001).

The first studies of indirect aggression (N. Feshbach, 1969; N. Feshbach & Sones, 1971) introduced newcomers into established dyads or small groups and measured social exclusion and rejection of them, actions that were viewed as equivalent to overt aggression. Indirect aggression has been extensively investigated by the Finnish research group, using peer ratings (Lagerspetz et al., 1988). They recommended this method for measuring indirect aggression, which was identified through factor analyses of different forms of aggression. Indirect aggression was clearly distinguishable from direct aggression, which consisted of physical and verbal forms. North American studies of children have revealed similar factors (Crick, 1996; Crick & Grotpeter, 1995).

Crick's "relational aggression" category involved four items with the same themes of social inclusion and ostracism that defined indirect aggression, although the emphasis was on the relational consequences of the acts rather than their indirect nature. Three of the items are thematically very similar to those included in the scales designed by Bjorkqvist, Lagerspetz, and Kaukiainen (1992). The fourth ("Tells friends they will stop liking them unless friends do what they say") involves a direct confrontation with the target of the hostility and, thus, does not fit the definition of indirect aggression. Two other North American studies (Cairns et al., 1989; McCabe & Lipscomb, 1988) used different methods. The first involved content analysis of interviews, including a category defined as "manipulation of group acceptance, through alienation, ostracism or character defamation." The second involved an analysis of classroom utterances, forming a category labeled "nonconfrontatory verbal aggression."

The BDHI includes a scale labeled "indirect hostility." This scale was included in the present analysis, albeit with the recognition that it differs from the categories of indirect and relational aggression used in more recent studies. The BDHI subscale includes "spreading gos-

[4] Although Knight et al. (2002) included "relational" aggression in their analysis, they sampled only eight studies.

sip," but other items can be better characterized as "displaced aggression" (Marcus-Newhall, Pedersen, Carlson, & Miller, 2000). They include throwing and breaking objects, banging on tables, slamming doors, and temper tantrums.

Sex of Opponent

Eagly and Steffen (1986) analyzed a subset of 26 experimental studies that reported aggression against the two sexes separately and found that men were the recipients of a higher level of aggression than women. This analysis involved about half of the total sample; thus, in many studies sex of the opponent was not differentiated. Most real-world studies do not specify sex of the opponent. The few that have done so are summarized in Table 1. The overall pattern is clear: Although there is a consistent difference in the male direction for same-sex opponents, there is nearly always a difference in the female direction for opposite-sex opponents. The weighted mean effect size for same-sex opponents is $d = .89$, whereas that for opposite-sex opponents is $d = -.46$. This finding is similar to the contrasting pattern of sex differences found in general questionnaire measures of physical aggression and in self-reports of physical aggression toward partners. For example, a d value of .89 was found in Buss and Perry's (1992) student sample; in another study, the mean weighted d value for physical aggression toward partners in 42 student samples was $-.10$ (Archer, 2000a). As Table 1 shows, this pattern is not confined to partners but is also characteristic of direct aggression during childhood.

Because most aggression questionnaires show the pattern typical of same-sex aggression, it is likely that, unless people are asked about opposite-sex opponents or partners, they will answer with the same sex in mind. In the few studies included here that separated same- and opposite-sex aggression, the values for same-sex aggression were used. In studies of children, when the opponent is unspecified, one can assume that most aggression is directed toward the same sex, and several studies have shown this to be the case (e.g., Barrett, 1979; Perry, Kusel, & Perry, 1988; P. K. Smith & Green, 1975). This is consistent with sex segregation in childhood (Archer, 1992a; Maccoby, 1988).

Table 1
Studies Separating Same-Sex and Opposite-Sex Opponents

Study	Mean age (years)	Form of aggression	Same sex		Opposite sex	
			Direction	*d*	Direction	*d*
Barrett (1979)[a]	6.5	Physical	M	1.05	F	−.53
		Verbal	M	.85	F	−.24
Tucker (1989)[b]	10.5	Physical	M	1.11	F	−.15
		Verbal	M	.46	F	−.51
Cairns & Cairns (1994)[c]	8	Physical	M	.61	F	−.02
Cairns & Cairns (1994)[c]	11	Physical	M	1.02	F	−.17
Cairns & Cairns (1994)[c]	14	Physical	M	.75	F	−.36
Pellegrini & Long (2002)[a]	12.8	Physical	M	.32	M	.42
Pellegrini & Long (2002)[a]	13.3	Physical	M	.29	F	−.46
Pellegrini & Long (2002)[a]	13.8	Physical	M	.45	F	−.37
Pellegrini & Long (2002)[a]	14.2	Physical	M	.42	F	−.34
Hilton, Harris & Rice (2000)[c]	16.8	Physical	M	1.03	F	−.95
		Verbal	M	.68	F	−.42
Gergen (1990)[cd]	19	Physical fight	M	.94	F	−.45
Harris (1992)[cd]	19	Physical (mean of acts)	M	.76	F	−.32
Richardson & Green (1999)[c]	20	Verbal and physical	M	.61	F	−.02

Note. Effect sizes were calculated from means and standard deviations or frequencies, with DSTAT (Johnson, 1989). They are positive if in the male (M) direction and negative if in the female (F) direction.
[a] Observational methods. [b] Responses to scenarios. [c] Questionnaires. [d] Data from Archer (2000b).

Aims of the Present Review

The present analyses provided a comprehensive summary of sex differences in aggression, measured through self-reports, observations, peer reports, and teacher reports involving children and adults, from English-language sources. The effect sizes for overall (direct), physical, and verbal aggression were compared with those from laboratory studies to assess whether they were similar in magnitude (Anderson & Bushman, 1997).

Sex differences in physical, verbal, and indirect aggression, as well as in anger, were compared. This enabled an assessment of the predictions (from SST) that large sex differences (in the male direction) occur for more costly forms of aggression, no (or a reversed) sex difference occurs for low-cost indirect forms, and there is no sex difference in anger. Most versions of SRT also predict larger sex differences for physical than verbal aggression. Generally, there are no predictions about the experience of anger from SRT. Because the present analyses included studies conducted outside the United States, it may be possible to assess whether previous findings generalize outside Western cultures. This would be expected from SST, which holds that higher rates of male than female physical aggression are characteristic of the human species.

The present analyses also involved a variety of ages, enabling the following issues to be addressed. First, is there a gradual increase in the sex difference in direct aggression from early childhood to young adulthood, as predicted by social learning analyses, or does the sex difference in physical aggression occur early in life, consistent with SST? Second, is there an increase in the sex difference in direct aggression when testosterone levels rise at puberty in boys, followed by a decrease coinciding with the gradual decline in testosterone during adulthood?[5] Finally, are sex differences in physical aggression highest at the peak years of reproductive competition, as predicted by SST?

Method

Sample of Studies

Primary searches consisted of the following: (a) PsycINFO (1967–1996), using the keywords "human sex differences" (which also included a search for "gender differences") and either "aggressive behavior" or "violence"; (b) PsycLIT on CD-ROM (1976–2000), using the keywords "sex or gender" and "aggression or violence," excluding "sexual," "rape," "pornography," "dating," and "marital"; (c) Dissertation Abstracts Online (1961–1998, updated for 1998–2000 using the Web site wwwlib.uni.com/dissertation); and (d) PsycLIT (CD-ROM) and Dissertation Abstracts (CD-ROM; 1977–2000), using the keywords "aggression" and "teacher-rated/ing/ings" or "teacher-reported/ing/ings" (a supplementary search for teacher ratings).

Earlier studies were sampled from Oetzel (1967) and Maccoby and Jacklin (1974, pp. 230–233; 1980, pp. 986–989). The descendency method was applied to two questionnaires, the BDHI and the AQ. BIDS[6] searches were undertaken of studies citing these questionnaires.[7] The ancestry approach was also used. Reference sections in articles and books covering topics such as aggression and sex or gender were examined for references that had not been located from other sources. Lists of current articles on aggression published in the journal *Aggressive Behavior*, derived from keyword searches of ISI Science Citation Index, Social Science Citation Index, and Current Contents, were examined for the period 1987–2001.

Journals covering aggression, notably *Aggressive Behavior*, *Journal of Interpersonal Violence*, and *Violence and Victims*, were searched by hand, as were social psychology journals (*British Journal of Social Psychology*, *Ethology and Sociobiology* [*Evolution and Human Behavior]*, *Human Nature*, *Personality and Social Psychology Bulletin*, and *Journal of Personality and Social Psychology*). Unpublished data (other than dissertations) were also sought from various sources.

Criteria for Inclusion

Studies whose titles and abstracts indicated that they might contain usable information were assessed. They were included if an effect size could be calculated for sex differences in one or more of the following: overall direct aggression, physical aggression, verbal aggression, anger, and indirect aggression. The following measures were used: self-reports, observations, peer reports, and teachers' reports.

[5] An age-related decline in male direct aggression could also be the consequence of a decline in physical strength and, hence, the effectiveness of direct confrontation (Quetelet, 1833/1984; Walker, Richardson, & Green, 2000).

[6] BIDS is a British electronic information system providing access to ISI Science Citation Index databases.

[7] Despite 503 citations of the BDHI, only a small minority contained usable data.

Studies were excluded if they fell into one or more of several categories: (a) The object of aggression was clearly the opposite sex (thus excluding partner aggression, which was analyzed separately; Archer, 2000a, 2002); (b) the sexes were not matched for age (unless an age-adjusted effect size could be calculated);[8] (c) the samples were selected for aggression-related characteristics, or males and females were assessed with different measures; (d) the study involved "bullying" and asked only whether respondents had bullied someone, rather than assessing particular categories of aggression; (e) the study involved rough-and-tumble play (because this is motivationally distinct from aggression; Blurton Jones, 1972; P. K. Smith, 1989); (f) within-subject and between-subjects sources of variation were confounded in testing for sex differences (as in some observational studies; e.g., Lauer, 1992; Whiting & Edwards, 1973); or (g) the study derived an aggression score from measures that may not show uniform sex differences, such as direct and indirect aggression. Duplicate reports involving the same data were also excluded.

Effect Size Calculations

For each sample, *g* values were calculated for any of the five types of aggression included. In the case of continuous data, they were calculated from standard deviations and means, *t* values, or univariate *F* values for the main effect of sex. In the case of nominal data, they were calculated from the proportions (or frequencies) of males and females showing a particular form of aggression[9] or from chi-square values. Calculations were carried out with D-STAT (Johnson, 1989) and independently checked. Values were recalculated if there were discrepancies.

Analyses of Effect Sizes

The overall strategy was to report, in the case of each of the four methods of data collection, a mean weighted effect size for each form of aggression (overall direct, verbal, physical, and indirect) as well as for self-reported anger. All composite effect sizes were computed from study-level *d* values weighted by the reciprocal of the variance (giving more weight to more reliably estimated values; Hedges & Olkin, 1985), yielding mean weighted *d* values. Each data set was tested for homogeneity of effect sizes by calculating the homogeneity statistic, Q_w, which has an approximate chi-square distribution ($k - 1$ degrees of freedom, where k = number of effect sizes). If there was significant ($p < .05$) heterogeneity, outliers were removed until Q_w was nonsignificant, and the resulting *d* value was recalculated. Outliers were reinstated for subsequent analyses.

Variables Coded From Each Study

The following categorical variables were coded from each study: (a) source of the data (journal article, book or book chapter, dissertation or other unpublished source), (b) country, (c) age, (d) type of sample for self-reports (e.g., school, college, or community) or context for observations, (e) method of measurement (for self-reports, peer reports, and teacher reports), (f) level of measurement, and (g) sex of first author.[10] Table 2 shows the numbers in each category for the four methods. The measures were coded independently by the author and by a research assistant. Discrepancies were noted and coefficients of agreement (Cohen's kappa values) calculated in each case. Kappa values ranged from .88 (age category) to .96 (source of data) for self-reports, .84 (level of measurement) to 1.00 (source) for observations, .76 (age category) to 1.00 (source) for peer reports, and .82 (level of measurement) to 1.00 (author) for teacher reports. Discrepancies were investigated and agreement reached by correcting errors and clarifying category definitions. These variables were used in categorical model analyses. In each case, mean weighted *d* values for each class were calculated, together with the Q_B values for between-classes comparisons (using D-STAT; Johnson, 1989). When appropriate, categories were combined to enable meaningful comparisons.

Selected regression analyses, with *d* values for the sex difference in aggression as the criterion variable, were computed. These analyses involved age as a predictor, in combination with variables associated with age: sample for self-reports (1 = school or college, 2 = community) and measurement (1 = nomination, 2 = ratings) and country (1 = United States, 2 = Finland or Australia) for peer reports. In the case of self-reported physical and indirect aggression, measurement level (1 = nominal, 2 = continuous) was included, because it was significantly associated with effect size. The analyses were least squares multiple regression analyses in which each *d* value was weighted by the reciprocal of the variance (Hedges & Olkin, 1985).

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[8] Several studies show that aggression declines with age.

[9] These values were calculated from proportions through the use of DSTAT. It should be noted that this is a conservative procedure, but the alternative of using odds ratios (Haddock, Rindskopf, & Shadish, 1998) produces large values that may be overestimates (Archer, 2002).

[10] This was included because it had been associated with effect sizes in some previous meta-analyses of sex differences in social behavior (Eagly & Carli, 1981; Eagly & Johnson, 1990).

Table 2
Study Characteristics

Characteristic	Self	Observational	Peer	Teacher
Sources of data	134	46	39	32
Numbers of studies for which effect sizes were derived	196	66	51	40
Journal articles	150	50	39	25
Books or book chapters	12	8	1	1
Dissertations	15	7	10	10
Other unpublished sources	11	1	1	4
Questionnaire manuals	8			
Measurement (numbers of studies)				
Aggression Questionnaire	25			
Behaviorally based scales	28			
Single-item measures	36			
Anger scales	21			
Buss-Durkee Hostility Inventory	38			
Scales derived from personality inventories	11			
Miscellaneous questionnaire measures	20			
Interview or diary methods	5			
Responses to hypothetical scenarios	12			
Ratings			19	32
Nominations			32	2
Child Behavior Checklist				6
Country (numbers of studies)[a]				
United States	128	38	37	29
United Kingdom	16	16	1	2
Canada	12	2	1	3
India	5		1	
Spain	3	1		
The Netherlands	3			
New Zealand	3			2
Japan	3			
Finland	2		4	1
Australia	1		4	
Age category (years; numbers of studies)				
1–6		35[b]	3	11
6–11	25	24[b]	29	28
11–13	11	1[b]	13	1
14–17	39		6	6
18–21	78			
22–30	17			
31–39	10			
40–55	3			
More than 55	1			
Not specified	12			
Type of sample (numbers of studies)				
School	69			
College students	72			
Community	31			
Prisoners/adolescent delinquents	6			
Psychiatric patients	7			
Medical/surgical patients	3			
Others[c]	8			
Context of study (observations)				
Nursery school/play group		26		
Classroom		11		
Home or experimental setting		8		
Free play (e.g., playground)		7		
Village		5		
Others[d]		9		

Table 2 (*continued*)

Characteristic	Self	Observational	Peer	Teacher
Level of measurement (numbers of studies)				
Continuous	158	60	49	37
Nominal	38	6	2	3
Sex of first author (numbers of samples)				
Male	103	36	22	13
Female	75	30	29	23
Unknown	18			
Mean age of respondents (years)	19.5	5.7	10.0	8.1
Mean number of males in each sample	386	29	195	193
Mean number of females in each sample	387	27	195	180
Total number of males	75,662	1,945	9,949	7,722
Total number of females	75,852	1,751	9,958	7,199

[a] Countries with fewer than 3 samples are not listed. These were as follows: self-reports (2), China, Germany, Greece, Iran, Russia, Singapore, self-reports (1), Argentina, Czech Republic, Hungary, Israel, Italy, Slovenia, Sweden, combined (U.S., Finland, Poland); observations (1), Belize, Hawaii, Italy, Kalmyk Republic, Kenya, Kung, Nepal, Russia, Samoa; peer reports (2), combined samples; peer reports (1), Italy; teacher reports (1), Russia, China, Italy. [b] There were also studies involving the ages of 2–13 years (4) and 7–13 years (2). [c] Homeless; from a military base; university employees; Old Order Amish. [d] Summer camp (3); with friend and mother (2); structured play session (3); newcomer to established dyad (1).

Results

Findings are presented for each type of aggression. In addition, mean weighted effect sizes and differences between measurement methods are reported, followed by categorical comparisons across nations, ages, and samples. Other categorical comparisons are noted at the end of the Results section.

Overall Direct Aggression

Mean weighted effect sizes. Table 3 shows the effect sizes. For self-reports, the *d* value of .42 was reduced to .30 after removing outliers (28% of 75 samples). Effect sizes were significantly lower ($Q_B = 40.7$, $p < .001$) for adaptations of the Minnesota Multiphasic Personality Inventory ($d = .27$, $k = 12$) than for other methods ($d = .47$, $k = 63$). For observations, the effect size was .49 from 27 samples; for peer reports, the effect size was .57, increasing to .63 after removal of outliers (22% of 36 samples); and for teacher reports, the effect size was .42 (from 31 samples), increasing to .47 after removal of three outliers.

Cross-national comparisons. For self-reports, there was a consistent sex difference in the male direction across 16 nations, although 2 showed no sex difference (India: $d = -.05$, confidence interval [CI] = −0.45, 0.34, $k = 2$; Russia: $d = .03$, CI = −0.23, 0.28, $k = 1$). Larger values were found in European than in North American or Asian studies (Table 4). For peer reports, all 4 nations showed values in the male direction (United States: $d = .56$, $k = 33$; Finland: $d = .99$, $k = 1$; Italy: $d = .97$, $k = 1$; India: $d = .38$, $k = 1$).

Ages and samples. For self-reports, effect sizes were larger in college or school samples than in community samples, and in younger samples than in those above 22 years of age (Table 5), although there were few genuinely older samples. For peer reports, effect sizes were larger ($Q_B = 14.6$, $p < .001$) for studies involving 12- to 13-year-olds ($d = .70$, $k = 9$) than for those involving 11-year-olds and younger ($d = .53$, $k = 27$). This may have been confounded by measurement method, in that values were slightly higher ($Q_B = 8.5$, $p < .01$) for ratings ($d = .67$, $k = 10$) than for nominations ($d = .54$, $k = 26$).

Regression analysis. For self-reports, effect size was significantly predicted by age and sample in a least squares multiple regression analysis (weighted by the reciprocal of the variance). The adjusted R^2 value was .16 ($p < .001$), and both variables showed significant beta coefficients (age: $\beta = -.17$, $p = .004$;

Table 3
Sex Differences in Overall (Direct), Physical, Verbal, and Indirect Aggression, Along With Anger, From Self-Reports, Observations, Peer-Reports, and Teacher Reports

Type and method	*d*	CI	*k*	Q_w	$P(Q_W)$
Overall					
Self-report	.42	0.39, 0.45	75	490.5	<.0001
Outliers removed	.30	0.27, 0.34	54	75.0	.05
Observation	.49	0.40, 0.58	27	30.0	.54
Peer report	.57	0.53, 0.60	36	180.5	<.0001
Outliers removed	.63	0.58, 0.67	28	41.3	.07
Teacher report	.42	0.37, 0.46	31	68.6	.0001
Outliers removed	.47	0.42, 0.51	28	37.0	.19
Physical					
Self-report	.39	0.38, 0.41	111	1,179.7	<.0001
Outliers removed	.59	0.56, 0.62	63	85.3	.06
Observation	.53	0.43, 0.62	43	68.4	.01
Outliers removed	.55	0.45, 0.64	42	55.8	.12
Peer report	.84	0.80, 0.89	21	174.8	<.0001
Outliers removed	.80	0.74, 0.86	14	20.3	.09
Teacher report	.40	0.36, 0.45	11	70.1	<.0001
Outliers removed	.33	0.27, 0.39	7	7.8	.25
Verbal					
Self report	.30	0.27, 0.33	68	248.9	<.0001
Outliers removed	.19	0.16, 0.23	56	73.8	.09
Observation	.14	0.02, 0.26	29	53.1	.004
Outliers removed	.09	−0.04, 0.21	27	40.4	.06
Peer report	.51	0.45, 0.56	14	30.4	.004
Outliers removed	.55	0.48, 0.61	13	20.9	.05
Teacher report	.24	0.13, 0.34	3	1.4	.49
Indirect					
Self-reports combined	−.02	−0.07, 0.02	40	145.9	<.0001
BDHI scale	−.16	−0.23, −0.09	18	44.1	<.001
Other methods	.05	−0.004, 0.10	22	81.8	<.0001
Observation	−.74	−0.94, 0.54	4	10.5	.01
Outliers removed	−.45	−0.72, −0.18	3	0.4	.81
Peer reports combined	−.10	−0.14, −0.06	26	164.4	<.0001
Peer rating	−.19	−0.25, −0.13	14	105.1	<.0001
Peer nominations	−.01	−0.07, 0.04	12	40.7	<.001
Teacher report	−.13	−0.24, −0.03	8	18.5	.01
Outliers removed	−.21	−0.33, −0.09	7	10.5	.10
Anger					
Self-report	−.003	−0.03, 0.02	46	104.9	<.0001
Outliers removed	−.035	−0.06, −0.01	43	60.1	.06

Note. Effect sizes are positive if in the male direction and negative if in the female direction. *d* = mean effect size weighted by sample size; CI = confidence interval; *k* = number of samples; Q_W = homogeneity of effect sizes; BDHI = Buss-Durkee Hostility Inventory.

sample: $\beta = -.30, p < .001$). Effect sizes were higher in the male direction at younger ages and were higher in school and college samples than in community and other samples. These two variables accounted for a small proportion of the variance ($Q_E = 380.1, p < .001$); that is, the model was not correctly specified.

Physical Aggression

Mean weighted effect sizes. The effect size for self-reports was .39 from a heterogeneous set of 111 samples, and this value increased to .59 when 48 outliers (43% of the samples) were removed. For observations, the effect size was

Table 4
Cross-National Categorical Analyses

Form of aggression, method, and category	*d*	CI	*k*	Q_B
Overall (direct)				
Self-report				
North America[a]	.37[a]	0.33, 0.40	54	54.7**
Europe[b]	.57[a,b]	0.53, 0.62	13	
Asia[c]	.30[b]	0.21, 0.39	8	
Physical				
Self-report				
North America[d]	.39[a]	0.37, 0.40	81	96.3**
Europe[e]	.45[b]	0.39, 0.51	19	
Asia[f]	.85[a,b]	0.76, 0.95	7	
Peer report				
North America	.72	0.66, 0.78	11	6.4*
Others[g]	.87	0.77, 0.97	8	
Verbal				
Self-report				
North America[h]	.34[a,b]	0.31, 0.37	42	20.4**
Europe[i]	.22[a]	0.16, 0.28	17	
Asia[j]	.11[b]	−0.02, 0.24	7	
Indirect				
Self-report				
North America[k]	−.11[a]	−0.17, −0.05	21	20.7**
Europe[l]	.11[a]	0.04, 0.18	11	
Asia[m]	−.08	−0.23, 0.06	6	
Peer report				
North America[n]	.03	−0.03, 0.08	14	46.3**
Finland/Australia[o]	−.35	−0.44, −0.26	9	

Note. Effect sizes are positive if in the male direction and negative if in the female direction. The superscripts a–f after *d* values indicate significant z^2 values for post hoc comparisons ($p < .01$).

[a] Fifty-two studies from the U.S. and two from Canada. [b] Three studies from the U.K.; 2 each from the Netherlands, Germany, and Spain, and 1 each from Greece, Italy, Sweden, Hungary, the Czech Republic, and Russia. [c] Two studies from India, Japan, and Iran and 1 from China. [d] Eleven studies from Canada and 70 from the U.S. [e] Fourteen studies from the U.K., 2 from Greece, and 1 each from the Netherlands, Slovenia, and Spain. [f] Five studies from India and 1 each from Japan and Israel. [g] Four samples from Australia, 3 from Finland, 2 combined samples, and 1 from the U.K. [h] Thirty five studies from the U.S. and 7 from Canada. [i] Eleven studies from the U.K., 2 from Greece, and 1 each from Finland, the Netherlands, Spain, and Slovenia. [j] Five studies from India and 1 each from Japan and Singapore. [k] Seventeen studies from the U.S. and 4 from Canada. [l] Five studies from the U.K., 2 each from Spain and Greece, and 1 each from Finland and Slovenia. [m] Three studies from India, 2 from Iran, and 1 from Singapore. [n] One sample from Canada and 13 from the United States. [o] Five studies from Finland and 4 from Australia ($d = -0.35$ and $d = -0.37$ respectively). The comparisons indicated by superscripts k–m are compounded by the difference between the Buss-Durkee Hostility Inventory indirect hostility scale ($d = -.16$, CI = −0.23, −0.09, $k = 18$), used in North American studies, and other scales that together produced a small value in the male direction.

* $p < .01$. ** $p < .001$.

d = mean effect size weighted by sample size; CI = confidence interval; *k* = number of samples; Q_B = difference between contrasted categories.

.53, from an almost homogeneous set of 43 samples. For peer reports, the effect size of .84 was reduced to .80 when outliers (33% of 21 samples) were removed, and the effect size of .40 for teacher reports was reduced to .33 when outliers (36% of 11 samples) were removed. Table 3 provides further details of these findings.

For self-reports, the highest *d* values were associated with the two most commonly used

Table 5
Age and Sample Categorial Analyses

Form of aggression, method, and category	*d*	CI	*k*	Q_B
Overall (direct)				
Self-report: age				
6–11 years	.56[a,b]	0.49, 0.62	13	44.6**
11–17 years	.46[c,d]	0.41, 0.51	13	
18–21 years	.46[e,f]	0.41, 0.51	33	
22–30 years	.29[a,c,e]	0.22, 0.36	7	
More than 31 years	−.01[b,d,f]	−0.26, 0.23	4	
Self-report: sample				
School samples	.52[a,b]	0.48, 0.56	24	89.1**
College samples	.49[c,d]	0.43, 0.54	27	
Community[a]	.32[a,c,e]	0.27, 0.37	19	
Psychiatric samples	.04[b,d,e]	−0.08, 0.15	4	
Physical				
Self-report: age				
6–11 years	.26[a,b,c]	0.20, 0.31	12	319.4**
11–13 years	.35[d,e]	0.28, 0.41	7	
14–17 years	.37[a,f,g,h,i]	0.35, 0.38	27	
18–21 years	.66[b,d,f,j]	0.62, 0.69	44	
22–30 years	.60[c,e,g,h,k]	0.49, 0.71	8	
31–55 years	.25[i,j,k]	0.20, 0.30	8	
Self-report: sample				
School samples	.36[a,b]	0.34, 0.37	45	520.4**
College students	.79[a,c,e,f]	0.75, 0.82	45	
Community[b]	.32[c,d]	0.27, 0.36	11	
Psychiatric patients	.29[b,f,g]	0.18, 0.39	5	
Prisoners	−.00[b,d,e,g]	−0.12, 0.11	4	
Observation: age				
1–6 years	.57	0.43, 0.72	19	0.18
7–11 years	.53	0.37, 0.69	17	
Peer report: age				
Under 11 years	.69[a]	0.61, 0.77	7	25.6**
12–13 years	.82	0.73, 0.90	8	
14–17 years	.97[a]	0.90, 1.04	6	
Verbal				
Self-report: age				
6–11 years	.19	0.10, 0.27	8	17.8**
11–17 years	.36	0.26, 0.46	6	
18–21 years	.35	0.31, 0.39	35	
22–30 years	.22	0.12, 0.32	9	
31–55 years	.26	0.20, 0.32	7	
Self-report: sample				
School samples	.26[a]	0.20, 0.33	13	31.3**
College students	.35[b]	0.31, 0.38	40	
Community[c]	.30[c]	0.24, 0.37	7	
Prisoners	.01[a,b,c]	−0.10, 0.13	4	
Psychiatric patients	.26	0.10, 0.42	4	
Indirect				
Self-report: age				
6–13 years	.03	−0.06, 0.11	7	10.7
14–17 years	.12	−0.02, 0.25	4	
18–21 years	−.11	−0.18, −0.03	19	
More than 22 years	−.01	−0.11, 0.08	7	

Table 5 (*continued*)

Form of aggression, method, and category	*d*	CI	*k*	Q_B
Indirect (*continued*)				
Self-report: samples				
School samples	.05[a]	−0.02, 0.13	11	13.8**
College students	−.09	−0.16, −0.01	19	
Community[d]	−.22[a]	−0.37, −0.07	5	
Peer report: age				
Under 11 years	−.00	−0.06, 0.06	13	32.9**
12–13 years	−.13	−0.19, −0.06	8	
14–17 years	−.35	−0.46, −0.24	5	

Note. Effect sizes are positive if in the male direction and negative if in the female direction. CI = confidence interval; *d* = mean effect size weighted by sample size. The superscripts a–k after *d* values indicate significant z^2 values for post hoc comparisons ($p < .01$). *k* = number of samples; Q_w = homogeneity of effect sizes; Q_B = difference between contrasted categories.

[a] Includes medical or surgical patients ($k = 1$), Old Order Amish ($k = 1$), and relatives of patients with congenital adrenal hyperplasia ($k = 2$). [b] Includes 1 study from a military base and 1 of young people on a Job Corps program. One study of homeless people was omitted from this analysis. [c] Includes 1 study from a military base. [d] Includes 1 study of university employees; 2 studies of prisoners and 3 of psychiatric patients were omitted.

** $p < .001$.

questionnaires, the BDHI assault scale ($d = .69$, $k = 22$) and the AQ physical scale ($d = .79$, $k = 25$), as well as with scenarios ($d = .65$, $k = 7$). Values for behavioral ($d = .44$, $k = 15$) and single-item scales ($d = .35$, $k = 34$) were significantly ($p < .01$) smaller than those for the first three measures. Associated with the low value for single-item scales, effects sizes were smaller ($Q_B = 201.7$, $p < .001$) for nominal ($d = .35$, $k = 37$) than for continuous ($d = .57$, $k = 70$) data. Peer reports also showed a significant difference between measurement methods: *d* values were higher for general ratings of boys or girls ($d = 1.46$, $k = 4$) than when individual peers were rated ($d = .99$, $k = 9$) or nominated ($d = .64$, $k = 8$).

Cross-national comparisons. The sex difference was consistent across all 13 nations for self-reports, all 9 nations for observations, and 5 nations for peer reports. For self-reports, values range from 0.27 (New Zealand; $k = 2$) to 1.16 (Israel; $k = 1$). Asian studies yielded higher values than North American or European studies (Table 4). Values for observations varied from 0.34 (Belize, $k = 1$) to 1.97 (Kalmyk, $k = 1$), and values for peer reports ranged from 0.69 (Finland, $k = 3$) to 1.46 (Australia, $k = 4$); the United States showed a *d* value of .52 across 13 studies.

Ages and samples. For self-reports, sex differences were larger in the 18–21-year and 22–30-year age categories than at younger or older ages (Table 5). College students showed the highest effect sizes of the various samples (Table 5), although type and level of measurement were also likely to have a significant influence (as described earlier). For observations, there was no indication that younger children (1–6 years) showed a lower effect size than older children (6–11 years). Peer reports showed slightly larger sex differences at 12 to 17 years than at younger ages, although this result paralleled differences in study location (United States or elsewhere) and method of measurement (as described earlier). Children of younger ages, studied in the United States by means of peer nominations, tended to show smaller sex differences, although the differences were modest.

Regression analysis. For self-reports, a weighted least squares multiple regression of level of measurement, sample, and age onto effect sizes showed that all three variables were significant predictors (level: $\beta = .45$, $p < .001$; sample: $\beta = -.50$, $p < .0001$; age: $\beta = .29$, $p < .001$); the adjusted R^2 value was .24. Effect sizes were higher (a) for continuous than for nominal data, (b) at younger ages, and (c) in college than in community or other samples. The model was not correctly specified ($Q_E = 839.0$, $p < .001$).

Verbal Aggression

Mean weighted effect sizes. Effect sizes for verbal aggression were generally smaller than those for overall or physical aggression (Table 3). For self-reports, the *d* value was .30, and this was reduced to .19 by removing outliers (18% of 68 samples). For observations, the value was 0.14, decreasing to 0.09 when outliers (7% of 29 samples) were removed. For peer reports, the effect size was .51 from 14 studies, and for teacher reports, it was .24 from 3 studies.

Cross-national comparisons. For self-reports, there were no reversals of the sex difference in 13 nations; in 6, however, values were not significantly different from zero. Effect sizes were larger for North American than for European or Asian studies (Table 4). For observations, 3 of 5 nations showed values significantly in the male direction (Kalmyk: $d = 1.24$, $k = 1$; Canada: $d = .52$, $k = 1$; United States: $d = .17$, $k = 17$), and 2 showed values not significantly different from zero (United Kingdom: $d = -.16$; Russia: $d = .31$, $k = 1$). Values for peer reports were all significant in the male direction for 4 nations and two combined samples.

Ages and samples. Values were similar for self-reports across ages and samples (Table 5) with the exception of prisoners, who showed no overall sex difference (mainly as a result of one large-sample study). There were too few studies involving the other methods to allow meaningful comparisons.

Indirect Aggression

Mean weighted effect sizes. There were large differences between measurement methods, and thus the mean weighted values for self-reports and peer reports (Table 3) are misleading. These methods were therefore divided as follows. Self-reports involving the BDHI "indirect hostility" scale (which includes items focusing on displaced aggression) were separated from those involving measures of indirect or relational aggression. Peer reports were separated into those involving ratings and those involving nominations.

The largest effect size, in the female direction, was that for observations ($d = -.74$), although this was based on only four studies. Peer ratings showed the next largest value ($d = -.19$), followed by the BDHI "indirect hostility" scale ($d = -.16$) and teacher reports ($d = -.13$). There was no sex difference for peer nominations ($d = -.01$) or for self-reports of specific acts of behavior ($d = .03$), which mainly involved adult samples. These values (shown in Table 3) suggest that measurement method is an important variable when considering indirect aggression.

Cross-national and other comparisons. Other comparisons may have been confounded by this difference between measurement methods. For example, self-reports, mostly used with adults, showed effect sizes in the female direction for North American samples, which involved mainly the BDHI, and in the male direction for European samples, which involved other methods (Table 4). Effect sizes for community samples were in the female direction, whereas those for school samples were near zero in the male direction (Table 5). There was another set of influences likely to be confounded in the case of peer reports. U.S. studies of children under 11 years of age, involving peer nominations, showed no sex difference, whereas studies of 14- to 17-year-olds from Finland or Australia, involving peer ratings, showed values in the female direction (Tables 3, 4, and 5).

Regression analysis. For self-reports, a weighted least squares multiple regression analysis shows that *d* values were significantly predicted by measurement level ($\beta = -.60$, $p < .001$) and sample (school vs. college; $\beta = -.49$, $p = .004$) but not by age ($\beta = -.05$); values were higher in the male direction for nominal data and for school than for college samples. These findings paralleled categorical comparisons and were likely to be confounded by the measure used, as just indicated. The adjusted R^2 value was .25; the model was not correctly specified ($Q_E = 73.8$, $p < .001$).

For peer reports, *d* values were predicted by age ($\beta = -.51$, $p < .001$) but not by method (rating or nomination; $\beta = .12$) or whether or not the study was conducted in the United States ($\beta = -.05$). Values were higher (in the female direction) in older samples, but neither method nor study location influenced effect sizes when age was controlled (adjusted $R^2 = .25$; model not correctly specified: $Q_E = 92.2$, $p < .001$).

Anger

Self-reported anger showed no significant overall sex difference (Table 3). Removal of outliers (7% of samples) produced a very small effect size ($d = -.04$ in the female direction. For most of the 11 countries, values were not significantly different from zero; values for the United Kingdom ($d = -.17$, $k = 6$), New Zealand ($d = -.17$, $k = 1$), and Singapore ($d = -.28$, $k = 1$) were significant in the female direction, whereas values for Australia ($d = .27$, $k = 1$) were significant in the male direction. There were no differences ($Q_B = 3.16$, $p = .37$, $k = 41$) between age categories (6–17, 18–21, 22–30, and 31–55 years).

Other Categorical Comparisons

Possible publication bias. In the case of self-reports, there were no differences between published and unpublished sources in regard to overall direct aggression. For physical aggression, although dissertations showed lower effect sizes ($d = .06$, $k = 6$) than journal articles ($d = .39$, $k = 85$) or books ($d = .48$, $k = 9$), other unpublished sources showed values comparable with published sources ($d = .49$, $k = 11$). The low value for dissertations was attributable to two relatively large-sample studies of prisoners (Ireland, 2000) wherein values were slightly higher among women than men. For verbal aggression, values were significantly higher ($Q_B = 24.5$, $p < .001$) for published ($d = .33$, $k = 56$) than for unpublished ($d = .14$, $k = 12$) sources. For indirect aggression, effect sizes were in the female direction for published sources ($d = -.11$, $k = 31$) and in the male direction for unpublished sources ($d = .14$, $k = 9$).

For peer reports, physical aggression showed higher values ($Q_B = 30.1$, $p < .001$) for unpublished ($d = 1.00$, $k = 6$) than published ($d = .74$, $k = 15$) sources. Also, for teacher reports, effect sizes were higher ($Q_B = 10.3$, p .01) in unpublished ($d = .54$, $k = 8$) than published ($d = .37$, $k = 23$) studies in the case of overall aggression.

Sex of author. Values for overall self-reported direct aggression were higher ($Q_B = 21.5$, $p < .001$) for female ($d = .49$, $k = 24$) than for male ($d = .35$, $k = 40$) authors. The reverse was found for verbal aggression (male: $d = .37$, $k = .34$, female: $d = 0.24$, $k = 26$; $Q_B = 20.5$, $p < .001$); physical and indirect aggression showed no differences. For peer reports, higher values ($Q_B = 73.5$, $p < .001$) were found for male ($d = 1.09$, $k = 10$) than for female ($d = .69$, $k = 11$) authors in the case of physical aggression. For indirect aggression, there were higher values ($Q_B = 18.3$, $p < .001$) in the female direction for male ($d = -.21$, $k = 8$) than female ($d = -.03$, $k = 18$) authors.

Discussion

Comparison With Findings From Previous Meta-Analyses

Experimental social psychological studies. In previous reviews of experimental studies, mean weighted *d* values have been .40 for physical and .18 for verbal aggression (Eagly & Steffen, 1986), .36 for physical and .18 for verbal aggression in the absence of provocation (Bettencourt & Miller, 1996), and .30 and .05 when provocation has been used (Bettencourt & Miller, 1996). The nearest comparisons in the present study are with self-reports from college students, in which *d* values were .49 (overall), .79 (physical), and .35 (verbal). This suggests that the claim (Anderson & Bushman, 1997) that experimental studies replicate sex differences found outside the laboratory applies only to the direction of these differences, in that effect sizes have been considerably larger in real-world settings. This is consistent with the larger effects found for other influences on aggression in real-world settings (Anderson & Bushman, 1997), suggesting that use of experimental field studies as a comparison group with laboratory studies is misleading.

Self-reports assess different forms of aggression from those measured in the laboratory. On a questionnaire physical aggression refers to admitting a readiness to attack or fight someone or having done so, whereas in an experiment it means delivering a noise or electric shock. On a questionnaire verbal aggression refers to shouting, insulting, or arguing with someone, whereas in the laboratory it means making critical comments about a confederate. Several studies have shown the external validity of questionnaire measures; for example, they have been positively correlated with peer assessments (Buss & Perry, 1992; Huesmann, Lefkowitz, & Eron, 1978), partner ratings

(O'Connor, Archer, & Wu, 2001), and fighting histories among young men (Archer, Holloway, & McLaughlin, 1995).

Studies of children. Knight et al. (1996) found mean weighted *d* values of .66 for overall aggression, .91 for physical aggression, and .46 for verbal aggression among samples of children. These values are generally higher than those found in the present analyses of peer reports and observations. Knight et al. (1996) reported *d* values for overall aggression only for specific methods; these values were .83 for observations (cf. present value of $d = .48$ overall) and .61 for peer reports (cf. present value of $d = .57$). Thus, effect sizes for peer reports were very similar in the present analysis, whereas those for observations were lower.

Sex Differences in Different Types of Aggression

The sex difference was smaller for verbal than for physical aggression, consistent with previous reviews (Bettencourt & Miller, 1996; Eagly & Steffen, 1986; Hyde, 1984, 1986; Knight et al., 2002; Maccoby & Jacklin, 1974). There was no overall reversal in the sex difference for verbal aggression (cf. Bardwick, 1971; S. Feshbach, 1970). Although some studies (e.g., Archer, Pearson, & Westeman, 1988; Bjorkqvist, Osterman, & Kaukiainen, 1992) showed a reversal, the vast majority showed sex differences in the male direction. There was more evidence that indirect aggression was in the female direction, mainly among children and with particular forms of measurement.

The absence of a sex difference in experienced anger is consistent with narrative reviews of questionnaire research (Fischer et al., 1993; Suter, Byrne, Byrne, Howells, & Day, 2002) and with a survey study of anger (Averill, 1983; Frost & Averill, 1982). It implies that the gender stereotype associating anger with men (Plant, Hyde, Keltner, & Devine, 2000) is unrelated to people's experiences of anger. It also eliminates one possible proximate explanation for sex differences in overt aggression: that they arise from a difference in the tendency to experience anger.

Overall, sex differences were highest for physical aggression, smaller but still in the male direction for verbal aggression, absent for anger, and in the female direction or absent for indirect aggression. The higher value for physical aggression is consistent with Eagly's prediction from SRT, although the overall pattern is more consistent with the expectation of SST that sex differences reflect the riskiness of that form of aggression (Bjorkqvist, 1994; Campbell, 1999; Daly & Wilson, 1988). Statistics on the use of weapons and homicides also show that more men than women use dangerous forms of physical aggression in same-sex conflicts. Several school and youth surveys conducted in the United States (Brener, Simon, Krug, & Lowry, 1999; Cornell & Loper, 1998; Kingery, Coggeshall, & Alford, 1988; Singer & Flannery, 2000) have revealed that most of those who report carrying a weapon are male. The values have been approximately 80% in youth surveys and lower in school surveys involving children of younger ages. In the case of same-sex homicides, data aggregated from 20 studies showed that when infanticides were excluded, 97.2% of 13,680 killings involved men (Daly & Wilson, 1990). It is therefore clear that men are vastly overrepresented in the most dangerous forms of physical aggression. These figures fit the view that males are more likely to risk committing dangerous acts of physical aggression.

If males are more prone than females to use risky forms of aggression when they are angered, and there are no sex differences in anger, the question arises as to what alternative responses females use when angered. Indirect aggression, which was analyzed in the present review, is the most obvious form. However, the sex differences from the meta-analyses were not as large or as consistent as would be expected from the better known studies of children (Bjorkqvist, Lagerspetz, & Kaukiainen, 1992; Crick & Grotpeter, 1995; Lagerspetz et al., 1988). Variation was attributable to the age of the sample and to the method of measurement. Peer ratings and teacher reports both showed a small sex difference in the female direction for school-aged samples, and four observational studies showed much higher values for girls. Peer nominations, typically used in the United States for children of young ages, showed no sex difference. Peer reports indicated a trend of increasing sex differences with age, but this may have been confounded by the use of nominations with children of young ages.

Self-reports of indirect aggression showed no sex differences for adults. The results of two other studies (Forrest, Eatough, & Shevlin, 2002; Forrest & McGuckin, 2002) are consistent with this finding. Three studies investigated possible sex differences in categories of indirect aggression among adults, but the results of these studies were inconsistent (Archer, Monks, & Connors, 1997; Bjorkqvist, Osterman, & Lagerspetz, 1994; Campbell, Sapochnik, & Muncer, 1997). One limitation of studies of indirect aggression in adulthood is that they mostly involve people in occupational settings, where direct aggression has high costs. In such settings, men are likely to use indirect aggression; in instances in which physical aggression entails more benefits and fewer costs, men may engage in this type of aggression more often (see Archer & Coyne, in press).

In contrast to the absence of a sex difference among adults for indirect aggression, the "indirect hostility" subscale of the BDHI showed a small effect ($d = -.16$) in the female direction. As indicated in the introduction, this scale includes a mix of items, such as "spreading gossip," that are indicative of indirect aggression, along with ones that can be better characterized as "displaced aggression." More of the items are of the second type, involving displacing anger onto inanimate objects. If the sex difference does arise from women reporting more displaced aggression, this would be an important new finding, indicating a sex difference in an alternative, nonconfrontational response to provocation.

Displaced aggression involves people aggressing to a target (a person or inanimate object) other than the one that provoked them. The concept has its origins in psychoanalytic theory and was transferred to empirical psychology in the frustration–aggression hypothesis (Dollard, Doob, Miller, Mowrer, & Sears, 1939). Experimental studies have shown that aggression that cannot be directed to the source of a provocation is likely to be displaced onto an alternative human target available shortly afterward (Marcus-Newhall et al., 2000). Most of the items indicative of displaced aggression on the BDHI involve inanimate objects or expressions of anger. However, they fulfill the criterion for displaced aggression by providing an alternative way of expressing an angry reaction to a provocation in the absence of being able to do so to the source. It is likely that the sex difference on the BDHI "indirect" scale arises from the stronger inhibition of direct retaliation in women than men. This would fit SST analyses emphasizing greater risk taking by men and would also be expected from the finding that men and women are equally easily aroused to anger.

Displaced aggression is unlikely to incur any costs in terms of retaliation but will have no benefit, because it avoids the instigator of the anger. It may simply be the consequence of an aggressive mood outlasting the instigating stimulus, something that has been found in studies of animal aggression (e.g., Heiligenberg, 1974; Potegal & tenBrink, 1984), in which displaced aggression also occurs (e.g., Peeke, 1982). This can be viewed in terms of extended physiological arousal or as part of the motivational mechanism underlying aggression, ensuring that it is maintained despite momentary changes in the input (Toates & Archer, 1978).

Variations Between Samples

Previous reviews have concentrated either on laboratory studies involving college students or on schoolchildren. In the present review, community samples showed lower effect sizes than school or college samples for self-reports of direct and physical aggression. The few studies involving psychiatric patients or prisoners showed reduced effect sizes for direct aggression or, in some cases, a reversal. Such findings (Archer & Haigh, 1997; Huesmann et al., 1978, Study 2; Ireland, 2000) are probably attributable to male and female prisoners representing different subsamples of their respective populations. Because there are fewer female prisoners, they may represent a more extreme part of the population in regard to characteristics such as physical aggression and anger (Suter et al., 2002).

Variations Between Nations

Previous meta-analyses were restricted to samples from the United States. The present analyses included, where available, studies from other nations and cultures. Although this evidence was relatively limited, it showed a pattern of sex differences for overall, physical,

and verbal aggression similar to that found in the United States, in that there were no reversals. Studies of children's aggression in non-Western settings showed the same direction and magnitude of sex difference as in Western samples. This consistency in terms of the sex difference in direct aggression in different nations supports the prediction from SST that it is a characteristic of the human species. It is also consistent with the SRT view that, historically as well as in present-day cultures, gender roles involve common features (Eagly, 1987; see also Gilmore, 1990; Whiting & Edwards, 1988). A "biosocial" version of SRT (Wood & Eagly, 2002) explains cross-cultural consistency in terms of consistent responses to constraints on the activities of the two sexes arising from women's reproductive role and men's greater size and strength.

Most evolutionary analyses, particularly those from behavioral ecology (E. A. Smith, Borgerhoff Mulder, & Hill, 2001), also predict variability according to the costs and benefits of aggressing in particular cultures. It was not possible to assess this prediction from the current analyses. Schuster (1985) analyzed women's aggression in two traditional cultures, those of Zambia and China, in terms of costs and benefits. In China, where men held all public power and women had few opportunities to form alliances, their competition with one another was pronounced, taking the form of physically beating subordinates within the household and indirect means of sabotaging others' efforts. In traditional Zambian society, where there were few possibilities of accruing wealth and alliances could be formed with female kin, aggression between women was much less frequent. This study identified conditions under which women showed more intense competition and, hence, more direct aggression. There are many other circumstances in which competition is intensified for men, such as in situations in which there is a high male-to-female sex ratio or men have few resources. Under such conditions, we would expect larger sex differences in the most overt and damaging forms of aggression.

Although the sex differences in direct aggression showed cross-national consistency, the present database was essentially a small convenience sample of different nations and cultures. Unfortunately, cross-cultural surveys that have involved broad and representative samples, for example the Human Relations Area Files, are either unreliable owing to subjective coding (Rohner, 1976) or have considered only female aggression (Burbank, 1987). Burbank's study showed that women's aggression was wide ranging and generally directed against other women, mostly co-wives and rivals. There is clearly a need for a more extensive analysis of sex differences in aggression from ethnographic sources and for more empirical studies conducted outside the United States.

Age-Related Changes in Sex Differences in Aggression

Observational studies showed a sex difference in physical aggression early in life, from 2 years of age or younger, which contradicts the view that there is no sex difference below the age of 4 years (Keenan & Shaw, 1997). There was no evidence that the difference progressively increased with age, as would be predicted by the cumulative impact of gendered social learning. The early occurrence of a sex difference in physical aggression specifically contradicts explanations of its occurrence rooted in differential observational learning of patterns of aggressive behavior by boys and girls (Bandura, 1973; Tieger, 1980). Instead, its early initiation and the high levels found in early childhood suggest an origin in the different dispositions and social preferences of boys and girls, consistent with SST. There is evidence of early sex-typical preferences for social or physical stimuli (Connellan, Baron-Cohen, Wheelwright, Batki, & Ahluwalia, 2000; Lutchmaya, Baron-Cohen, & Raggatt, 2002) and play activities (Alexander & Hines, 2002; Campbell, Shirley, Heywood, & Crook, 2000).

From an SST perspective, an early developmental origin of sex differences in aggression is either an adaptation to competition in same-sex groups during childhood or a preparation for adult aggression. Discussions of childhood antecedents of adult fighting capabilities have concentrated on rough-and-tumble play (Archer, 1992b; Bjorklund & Pellegrini, 2000; Pellegrini, 2004). Typically, this has been considered separately from aggression, because its antecedents, motivation, and associated emotional state all differ from physical aggression, which may function more in relation to immediate competitive necessities than (as with rough-

and-tumble play) preparation for adulthood. However, success in real fights would also contribute to learning to be an effective fighter in the longer term.

There was no increase in the size of the sex difference in physical aggression at puberty, as would be expected if testosterone facilitated aggression in males. This finding is consistent with evidence, derived from a longitudinal study of boys during puberty (Halpern et al., 1994) and from studies of men administered exogenous testosterone (O'Connor, Archer, Hair, & Wu, 2002; O'Connor, Archer, & Wu, 2004), that testosterone has no effect on human aggression.

There were few studies that enabled changes across the adult life span to be assessed: 78 of 196 self-reports were from the 18- to 21-year age group, 10 were from the 30- to 39-year group, and only 4 were from the group above 40 years. The limited data showed that sex differences in physical aggression were largest between 18 and 30 years of age, which is consistent with the SST prediction that sex differences would be greatest during peak years of sexual activity. Men's involvement in violent crimes, and in same-sex homicides, is highest at these ages (Courtwright, 1996; Daly & Wilson, 1990; Quetelet, 1833/1984; Wilson & Daly, 1993), irrespective of the overall rate in the society. Because these peaks occur some years after puberty, they cannot be due to the influence of testosterone. Quetelet (1833/1984) referred to a change in "passion" with age, which parallels the SST view (Daly & Wilson, 1988, 1990) that young men's aggression represents reproductive competition. The immediate mechanism seems to involve the tendency of young men—particularly those with few resources and no sexual partner—to take risks and to view events from a short-term perspective (e.g., Daly & Wilson, 1990; Gilmore, 1990). A more cautious estimate of risk gradually develops with age. A decline in direct aggression with age could also be the result of declining physical strength in males, hence making direct confrontation less effective (Quetelet, 1833/1984; Walker, Richardson, & Green, 2000).

Sex differences in indirect aggression, measured through peer reports, increased with age in the female direction from 6 to 17 years; they were at their highest from 11 to 17 years. Studies of bullying (generally based on victims' reports) also show that indirect forms are more frequent among girls than boys beginning at the age of 11 years (Ahmad & Smith, 1994; Rivers & Smith, 1994). This supports the view that indirect aggression is used increasingly by girls in their teenage years. Bjorkqvist, Osterman, and Kaukiainen (1992) suggested that men subsequently "catch up" with women in their use of indirect aggression. The present analysis of self-report data (described earlier) supported this view, at least among young adults from Western nations in mixed-sex occupational settings. However, the limitations of cross-sectional data for drawing conclusions regarding developmental change need to be borne in mind, as does the limited database.

These findings indicate an early age of onset for sex differences in physical aggression, with differences in verbal aggression developing soon afterward. Differences did not increase at puberty, but there was a peak for the sex difference in physical aggression from 20 to 30 years. Indirect aggression was most prevalent in teenaged girls, but there was no sex difference in young adults.

Possible Publication Bias

Because sex differences are often incidental findings from studies primarily concerned with other issues, we would not expect studies appearing in refereed journals to be subject to publication bias. Such a bias would be indicated by overall higher values in published than unpublished studies. In the present analyses, this pattern was found in only one case, self-reported verbal aggression. In two other cases (peer reports of physical aggression and teacher-reported overall aggression), the opposite was found, and analyses of other measures showed no differences, indicating little sign of publication bias overall.[11]

Conclusion

This article has reported comprehensive meta-analyses of sex differences in aggression from real-world studies. The effect sizes from

[11] Two other analyses were also carried out to investigate possible publication bias (funnel plots and whether sex differences were the central concern of the study). Both indicated a lack of publication bias.

self-reports were substantially larger than those found in laboratory experiments with comparable samples. Values for peer reports of children's aggression were similar to those from an older data set (Hyde, 1984), whereas those for observations were lower.

The review also measured the pattern of sex differences for different forms of aggression using four methods and related these data to the sexual selection (SST) and social role (SRT) perspectives. Although researchers working within these frameworks vary in their exact positions, it was possible to set out a number of predictions about origins, development, and causal mechanisms. The pattern of sex differences in different forms of aggression was consistent with the SST view that effect sizes would be greater in the male direction as the degree of risk increased. Sex differences in direct aggression were consistent across those nations for which there was evidence, supporting both the SST view that the sex difference is characteristic of the human species and the SRT position that gender roles are consistent across cultures.

The sex difference in physical aggression showed an early onset, which is consistent with the position of evolutionary developmental psychologists. There was no sign of a cumulative increase during the childhood years, as expected from the gradual impact of gendered social learning. The sex difference did not increase at puberty, suggesting no discernible influence of testosterone, but it did increase from 18 to 30 years, the peak of reproductive activity; this is consistent with SST's emphasis on greater intermale competition during that age period. Indirect aggression showed an increase between 6 and 17 years, consistent with its importance for girls during the early teenage years.

Suggestions for Future Research

The present meta-analyses raised a number of issues that could not be resolved from the available evidence. For example, experimental studies show smaller sex differences under provoking than neutral conditions (Bettencourt & Kernahan, 1997; Bettencourt & Miller, 1996). In real-world settings, this would translate to smaller sex differences for reactive than proactive aggression. Most methods measure reactive aggression, in that both questionnaires and scenarios typically involve reactions to provocations. Peer ratings involve asking what individuals would be likely to do when angered. Whether there are larger sex differences for unprovoked aggression outside the laboratory remains to be investigated.

Research on real-world aggression typically involves the use of predefined categories such as physical and verbal aggression, the forms of direct aggression that have the longest research history. They are, however, not the only reactions to provocation. Indirect or relational aggression has been studied more recently and has important implications for sex differences, which are often in the female direction. The inclusion of the "indirect hostility" scale of the BDHI in the present meta-analysis also raised the possibility that another form, displaced aggression, might be a more frequent response to provocation among women than men. Because this BDHI subscale is not a pure measure of displaced aggression, this possibility requires further study. It is not clear whether there is a sex difference in displaced aggression under laboratory conditions (Marcus-Newhall et al., 2000).

There may be sex differences in reactions to provocation other than indirect and displaced aggression. Inhibiting direct aggression toward a provoking target may lead to thoughts and fantasies of revenge. Archer and Benson (2001) assessed the reported likelihood of young men responding in various ways, such as direct aggression, flight, or delayed aggression, under different conditions of provocation and perceived fighting ability of the opponent. When both the provocation level and the opponent's fighting ability were high, "delayed hostility" was a characteristic response. This involved doing nothing at the time but feeling frustrated and planning revenge later. Other studies suggest that this is a typically male way of responding. In a study of the extent to which people focused attention on past events that had angered them (Sukhodolsky, Golub, & Cromwell, 2001), men showed a greater tendency than women to harbor thoughts of revenge. Also, men have been shown to report more homicidal fantasies than women, and their fantasies are more frequent and long lasting (Crabb, 2000; Kenrick & Sheets, 1993).

Another possible response to provocation is "passive aggression," such as withdrawing social support, which was noted in a study of

aggression among older people (Walker et al., 2000). Straus (1979) included sulking and crying as part of a "verbal aggression" scale for partner aggression, and Campbell et al. (1997) included "avoided or ignored someone" as part of an indirect aggression scale. Although these responses do occur in situations that provoke aggressive responses, they are alternatives to aggression rather than forms of verbal or indirect aggression. Widening the range of responses to provoking situations that are studied would enable researchers to assess the relative frequency of alternatives to direct aggression and would put sex differences in aggression into a wider context.

According to SST, the probable mechanism underlying the sex difference in direct aggression is the greater male than female willingness to take risks. This is consistent with findings that impulsiveness and lesser weighting of long-term consequences are associated with greater physical aggression and violence in young men (Cherek, Moeller, Dougherty, & Rhoades, 1997; Daly & Wilson, 1990; O'Connor et al., 2002). Nevertheless, other variables may contribute to the overall sex difference. Campbell (1999) suggested that women more easily experience fear in potentially harm-inducing situations and that this inhibits their direct aggression. Reviews of experimental studies (Eagly & Steffen, 1986; Frodi et al., 1977) have concluded that women show more concern about the harm their aggression might bring to both themselves and the victim. Relatedly, women report more guilt and anxiety than men do as a consequence of aggressing (Eagly & Steffen, 1986). This is consistent with sex differences in empathy (Baron-Cohen, 2003). Boys become less empathic toward other boys from 10 to 16 years of age, whereas girls become more empathic toward other girls at this time (Olweus & Endereson, 1998). Although guilt and victim empathy have been viewed in terms of SRT (Eagly & Steffen, 1986), they also fit an SST cost–benefit analysis, in that direct aggression has a greater negative impact on the social networks of women than men, in view of women's closer friendships.

Consideration of variables that may moderate sex differences in direct aggression raises the issue of within-sex variation. Archer and Mehdikhani (2003) found that the variance in self-reported physical aggression was greater for males than females. Thus, some men are more like women in their use of physical aggression, whereas others show higher levels than these men and higher levels than women. This within-sex variation may be related to individual-differences variables identified by SST, such as risk taking and parental investment, or to those identified by SRT, such as gender role stereotypes.

SRT and SST also predict situational variations within each sex, but under different circumstances. SRT would predict that when gender is a salient category, or when gender inequalities are more pronounced, sex differences will be accentuated. SST emphasizes the costs and benefits of different situations. For example, when a man perceives that his reputation will be permanently affected by not responding with physical aggression to an insult, this will strongly influence the decision process in favor of physical aggression. Alternatively, when a man perceives that there is much to lose by direct aggression, for example if a professional man strikes a superior, this will strongly influence the decision process in the direction of alternatives to direct aggression. There are also circumstances in which the perceived benefits of direct aggression are weighted more highly by women, such as when the only access to important resources is through competing with other women for a few resource-rich men (Campbell, 1995). Cross-cultural analyses of interfemale aggression support this view by showing that the most escalated forms of aggression occur over rivalry for men (e.g., Burbank, 1987, 1994; Fry, 1992; Glazer, 1992; Hines & Fry, 1994; Schuster, 1985).

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Appendix

Additional References Used in the Meta-Analyses

References used only in the meta-analyses but not cited in the text are listed in the Appendix in abbreviated form. The full citations can be found at http://dx.doi.org/10.1037/1089-2680.8.4.291.supp.

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