



ELSEVIER

Available online at www.sciencedirect.com

SCIENCE @ DIRECT®

Journal of Adolescence 28 (2005) 381–395

Journal of
Adolescence

www.elsevier.com/locate/jado

The association between bullying behaviour, arousal levels and behaviour problems

Sarah Woods*, Eleanor White

^a*Department of Psychology, University of Hertfordshire, UK*

^b*Computer Science Department (STRC), Hatfield Campus, College Lane, Hatfield, University of Hertfordshire, Herts AL10 9AB, UK*

Abstract

Research into bullying behaviour has identified two main categories of bullying behaviour, direct bullying and relational bullying, within which different profiles are evident, namely 'pure' bullies, 'pure' victims, bully/victims and neutral children. The current study examined the relationship between direct and relational bullying profiles, arousal levels, and behaviour problems. 242 (males: 121, females: 121) Secondary school pupils (mean age 13.5 years) completed three questionnaires; the Arousal Predisposition Scale (APS) (*Behav. Res. Therapy* 26 (1988) 415); the School Relationships Questionnaire (SRQ) (detailed in *J. Child Psychol. Psychiatry* 41(8) (2000) 989; *Br. J. Psychol.* 92 (2001) 673); the Strengths and Difficulties Questionnaire (SDQ) (*J. Child Psychol. Psychiatry* 38(5) (1997) 581). Results revealed that the bully/victim profile for direct and relational bullying had the highest levels of arousal compared to other bullying profiles. Conversely, direct 'pure' bullies had low levels of arousal. Clinical behaviour problems as measured by the SDQ were associated with high levels of arousal. Clinically low arousal was not related to either bullying profiles, or behaviour problems. These findings were largely consistent with the arousal theory of behaviour (Crime and personality, 1964), which indicates that arousal levels are differentially associated with distinct behaviour patterns. The results provide implications for bullying intervention strategies, and methods to manage the school environment in relation to arousal levels.

© 2004 The Association for Professionals in Services for Adolescents. Published by Elsevier Ltd. All rights reserved.

*Corresponding author. Tel: +44 1707 281 133; fax: +44 1707 285 073.

E-mail address: s.n.woods@herts.ac.uk (S. Woods).

Introduction

Parents, teachers, and other professionals involved with children and adolescents, are becoming increasingly concerned about the effects of bullying at school, and how successful intervention strategies might be implemented (Guerin & Hennessy, 2002). Research studies show that bullying and victimisation are frequently experienced by children worldwide (Olweus, 1991; Smith et al., 1999; Wolke, Woods, Stanford, & Schultz, 2001a). Bullying is defined as involving repeated exposure to negative action on the part of one or more other people (Olweus, 1999). This negative action must be deliberate and carried out with the intent of causing harm to the victim (Farrington, 1993). A physical or psychological imbalance of strength, either real or perceived, is also essential in the definition of bullying behaviour.

Bullying behaviour can be viewed within two main categories, direct and relational, although neither bullying type is mutually exclusive. Direct bullying involves physical aggression, such as hitting, kicking, or taking money/belongings (Boulton & Underwood, 1992). In contrast, relational bullying involves the manipulation of peer relationships/friendships to inflict harm on others, and includes name-calling, malicious rumour spreading, and social exclusion (Crick & Grotpeter, 1995).

There are four distinguishable character profiles associated with bullying; bullies, victims, bully/victims, and neutral children who are characterised as being either bystanders or defenders to the victim (Salmivalli, Lagerspetz, Björkqvist, Österman, & Kaukiainen, 1996). Researchers have considered the distinctive nature of bullying profiles in terms of individual differences, social cognitive styles, peer status and family functioning (Wolke & Stanford, 1999). The characteristics of the bully profile are a controversial issue. Theories range from bullies as 'cool' and confident planners (Sutton, Smith & Swettenham, 1999), through to anxious and depressed individuals (Salmon, James, & Smith, 1998). Victims are reported to be introverted and frequently suffer from low self-esteem and anxiety (Boulton & Smith, 1994). Bully/victims, involved in the roles of both bully and victim, have been characterised as both anxious (as a bully) and provocative (as a victim; Guerin & Hennessy, 2002). Previous research has suggested that this group are at the highest risk of behavioural problems, and being referred for psychiatric consultation (Kumpulainen & Räsänen, 2000; Wolke, Woods, Bloomfield, & Karstadt, 2000).

Involvement in bullying has serious implications both at school and in later life. Studies have revealed that the probability of being deviant is increased if a child is involved in bullying at a younger age (Kumpulainen & Räsänen, 2000; Farrington, 1995). One study found that 60% of subjects who had been bullies during adolescence (compared with 10% of controls) had their first criminal conviction by the age of 24 years (Olweus, 1991). Farrington (1995) termed this an "antisocial tendency", a trait that is relatively stable from childhood to adulthood.

Arousal levels refer to the different states of consciousness associated with different activities (Eysenck & Gudjonsson, 1989). For example, a person watching a tedious television program in the evening would be in a low state of arousal, whereas the same person waiting to begin an important exam would be in a high state of arousal (Eysenck & Gudjonsson, 1989). Though the level of arousal within each person varies throughout the day, individuals have their own natural level, ranging from low to high (Eysenck & Gudjonsson, 1989). Psychophysical measures of

arousal can be taken in a number of ways, including electroencephalogram (EEG), skin conductance levels (SCL) and electrocardiogram (ECG; Connor, 2002). The self-completion Arousal Predisposition Scale (APS; Coren, 1988) can be used to measure individual differences in susceptibility to different arousal levels quickly and conveniently.

Low levels of arousal have been linked to a number of personality traits and behavioural problems. Characteristics of under-aroused individuals include extraversion, impulsiveness, attention deficits and conduct problems (Eysenck, 1964; Knyazev, Slobodskaya, & Wilson, 2002; Matthews & Deary, 1998). However, in contrast to behavioural problems, research has revealed under aroused individuals to be highly socially skilled (Lieberman & Rosenthal, 2001). Under-arousal is believed to cause individuals to be less sensitive to signals of punishment in the presence of cues for reward (Knyazev et al., 2002). Low arousal correlates highly with antisocial and criminal behaviour in both longitudinal and cross-sectional studies (Raine, Venables & Williams, 1990b; Coren, 1999).

The sensation-seeking theory (Zuckerman, 1979) offers a plausible explanation for why young offenders have been found to have low arousal levels. This theory posits that chronic low arousal is an aversive physiological state. Individuals suffering from low arousal seek stimulation, often in the form of aggressive, or antisocial behaviour, in order to restore their arousal levels to their personal optimal level (Eysenck, 1964).

High levels of arousal are believed to cause individuals to have a heightened sensitivity to signals of punishment and non-reward (Knyazev et al., 2002). This can result in a number of distinctive behavioural characteristics, such as emotional problems, anxiety, shyness, inhibited and avoidant behaviour (Knyazev et al., 2002; Matthews & Deary, 1998). Individuals with high levels of arousal tend to avoid stimulating situations, in a subconscious effort to reduce anxiety, and escape potential punishment (Connor, 2002).

It is becoming increasingly evident that there is a relationship between arousal levels and behaviour. Bullying is considered to be an aspect of antisocial behaviour (Farrington, 1993) and it follows, therefore, that bullies may be expected to have low levels of arousal. According to the sensation-seeking theory (Zuckerman, 1979), this should be particularly true of direct bullies who use direct forms of aggression (Boulton & Underwood, 1992) to raise their arousal levels. Relational bullying does not necessarily require one-on-one conflict, but does require competent theory of mind skills, enabling them to manipulate others, and subtly inflict harm (Sutton et al., 1999). These social cognition skills may be associated with sub-normal levels of arousal (Lieberman & Rosenthal, 2001). Given the evidence, both direct and relational bullies would be expected to have low arousal levels. In contrast, direct and relational victim profiles, characterised as anxious and avoidant (Boulton & Smith, 1994) may be associated with higher levels of arousal. Direct and relational bully/victims are characterised as being both anxious bullies and provocative victims (Guerin & Hennessy, 2002). Bully/victim attempts to avoid victimisation could lead to anxious bullies, and an externalisation of their heightened feelings of tension and apprehension may contribute to them being provocative victims. This description of punishment avoidance is a characteristic of over-arousal (Connor, 2002).

There is a large void in existing research investigating the association between arousal levels and bullying behaviour. The results of such research could provide an invaluable insight into the possible precursors of bullying and victimisation, and allow the development of anti-bullying strategies within the classroom.

This study investigates bullying behaviour, arousal levels and behaviour problems comprised of two main aims:

1. To investigate whether there is an association between bullying behaviour and arousal levels. More precisely, whether direct or relational bullying profiles ('pure' bullies, 'pure' victims, bully/victims and neutrals) are differentially associated with high or low arousal.
2. To investigate if high- and low-arousal levels are differentially associated with behaviour problems such as hyperactivity, conduct problems, emotional problems, peer problems and prosocial behaviour.

Method

Design

A cross-sectional, within groups, design was used. Three questionnaires measured different aspects of behaviour; the APS (Coren, 1988); the Strengths and Difficulties Questionnaire (SFQ) (Goodman, 1997) to measure behavioural problems; the School Relationships Questionnaire (SRQ) (details in Wolke et al., 2000, 2001a; Wolke, Woods, Bloomfield, & Karstadt, 2001b) to measure bullying behaviour. The questionnaires were counterbalanced to avoid order effects.

Participants

Ten secondary schools were approached to take part in the study on a purely voluntary basis, of which two expressed an interest and agreed to take part. 242 secondary school pupils from the two schools (N : 121 male and N : 121 female) consented to participate in the study. Participants were year 9 pupils aged between 13 and 14, with a mean age of 13.5 years (SD 0.5). Of the total 271 pupils, 29 (10.7%) did not participate. 1 (0.4%) pupil's parents declined permission, and 28 (10.3%) were absent on the day of the study. The schools were mainstream state schools situated in urban locations (>50,000 inhabitants) with populations of predominantly middle social economic status. The adolescents who participated in the study were not considered at high risk for health or behavioural problems.

Procedure

The Ethical Committee of the University of Hertfordshire granted ethical approval for the study. The Headteachers were approached in writing and provided with full written documentation about the study, including the opportunity to contact the research supervisor to discuss the research further. Following agreement to participate, written information about the study, including a non-consent form (which parents were asked to sign only if they *did not* want their child to participate), was sent to the parents, via the children.

On a pre-arranged date, the researcher went into the pupil's classroom during the Personal, Social and Health Education (PSHE) session. During this lesson, pupils would typically be taught

about issues that concern them as adolescents. Pupils were given a detailed outline of what the study entailed. The questionnaires were distributed to participating students and they were asked to complete them individually and in silence. When the entire class had completed the questionnaires, they were collected and sealed in an envelope. Pupils were then debriefed and provided with details of whom they should contact within the school (according to the school's anti-bullying strategy) if any issues arose following the study. Finally, they were thanked for their participation in the study.

Instruments

School Relationships Questionnaire (SRQ): The SRQ was developed from the “Bullying & Friendship Patterns” child interview (Wolke, Woods, Stanford, & Shulz, 2001). The interview was modified into a self-completion questionnaire. Changes were made to reduce the number of questions and make them appropriate for adolescents.

Standard questions were used, asking about the student's behaviour in relation to their peers. The questions used were similar to those in the Olweus (1991) Bullying Questionnaire. First, pupils were asked what behaviours they had experienced, for example, ‘Have you been hit or beaten up?’ and ‘Have other pupils called you nasty names?’ Secondly, pupils were asked what behaviours they had carried out, for example, ‘Have you threatened/blackmailed someone?’ and ‘Have you told lies, said nasty things, or told stories about other pupils that were not true?’. In order to direct the pupils' time reference to approximately 6 months, a time frame was set specifying that answers should refer to events that had occurred since the beginning of the school year. The questionnaire was subdivided into 4 sections; ‘Direct Aggression Received’, ‘Verbal & Relational Aggression Received’, ‘Direct Aggression Given’, and ‘Verbal & Relational Aggression Given’. Responses were scored 0–2 depending on how often the individual had been involved in a bullying situation (“not at all/seldom”=0, “frequently”=1 or “very frequently”=2). Scores of 1 or 2 (frequently or very frequently) in the ‘Direct Aggression Received’ section resulted in categorisation as a direct victim. Scores of 1 or 2 (frequently or very frequently) in the ‘Direct Aggression Given’ section resulted in categorisation as a direct bully. Classification as both a direct victim and a direct bully (scores of 1 or 2, frequently or very frequently, in both the ‘Direct Aggression Received’ and ‘Direct Aggression Given’ sections) resulted in categorisation as a direct bully/victim. All other subjects were categorised as direct neutrals. The same principles were applied for categorisation as a relational victim, bully, bully/victim and neutral.

The Arousal Predisposition Scale: The APS (Coren, 1988; Coren, 1990; Coren & Mah, 1993) was designed to measure an individual's susceptibility to arousal, viewed as a ‘trait’, or a predisposition. The APS is a quick and convenient self-report measure of an individual's arousal level, avoiding the need for physiological measurements. Evidence suggests that the APS is a good predictor of individual differences in arousal, and is in concordance with physiological measures of arousal. For example, Coren and Mah (1993) discovered that subjects with high APS scores had larger physiological (electromyographic and electrodermal) responses to arousing stimuli. There is evidence that the APS predicts individual differences in arousal that occur when individuals are required to do high cognitive load tasks under conditions of distraction (Coren & Aks, 1991). Furthermore, the brief self-report APS seems to be sensitive to detect variations in arousability that are correlated with delinquency.

Using an empirical selection and validation procedure, an initial pool of 314 items (Coren, 1988) was reduced to a 70-item preliminary inventory (Coren & Mah, 1993). The current version of the APS consists of 12 items. Each item is given a score of 1–5 according to the subject's response (1 = never, 2 = not often, 3 = occasionally, 4 = frequently, 5 = always), excepting the first item, which is scored in reverse. A total arousal score is calculated by summing the scores for each question. The total can range from 12 to 60, with 12 indicating low levels of arousal and a score of 60 indicating high levels.

As recommended by Coren (Coren & Mah, 1993), subjects scoring in the top 10% (≥ 90 th percentile) and bottom 10% (≤ 10 th percentile) were categorised as clinically over or under-aroused, respectively. The remaining 80% ($> 10\%$, $< 90\%$) were categorised as normal/borderline. If one answer from the questionnaire was missing, the remaining scores were pro-rated. If more than one answer was absent, the arousal data for that subject was considered missing.

Strengths and Difficulties Questionnaire: The SDQ (Goodman, 1997) is a widely used measure to assess behavioural problems, and has the advantage over other measures in that it is short, and quick to complete. Results of the SDQ correlate highly with other measures of behaviour problems, such as the Child Behaviour Checklist (0.87, $p < 0.001$; Goodman, 1999).

The SDQ measures a total of 25 positive and negative behavioural characteristics which are divided into 5 categories; emotional symptoms, conduct problems, inattention-hyperactivity, peer problems, and prosocial behaviour.

Each item is given a score of 0–2, (0 = “not true”, 1 = “somewhat true” or 2 = “certainly true”) resulting in a maximum score of 10 for each of the subscales, indicating the magnitude of problems in each area. For each subscale, with the exception of the prosocial scale, higher scores reflect more problems. A total difficulties score with a maximum of 40, is calculated by summing the score for emotional symptoms, conduct problems, hyperactivity and peer problems.

If one answer from any subscale was missing, the total was pro-rated. If more than one answer was absent, the results for that subscale (and therefore total difficulties score) were considered missing.

Goodman (2001) recommended from previous research that 80% of children fall within the normal range, 10% borderline, and 10% abnormal (in the clinical range). This distribution pattern was repeated in the current study where adolescents above (or equal to) the 90th percentile, on all scales excepting prosocial, were categorised as being in the clinical range. All other subjects (< 90 th percentile) were categorised as normal/borderline. For the prosocial scale, adolescents below (or equal to) the 10th percentile were categorised as clinical, and those above were categorised as normal/borderline.

Results

Prevalence of bullying

Of the 242 pupils who took part in the study, 15 (6.2%) were identified as direct bullies, 29 (12%) as direct victims, and 12 (5%) as direct bully/victims. The remaining 186 (76.9%) were classified as neutrals.

Relational bullying occurred more frequently, with 24 (9.9%) adolescents identified as relational bullies, 67 (27.7%) as relational victims, 44 (18.2%) as relational bully/victims, and 107 (44.2%) as neutrals.

Chi-square analyses, in the form of cross tabulations, revealed no significant gender differences for the rate of direct or relational bullying.

Bullying profiles and arousal levels

Direct bullying

A one-way ANOVA between each of the direct bullying profiles (bully, victim, bully/victim and neutral) and the total arousal score revealed a significant difference between mean arousal level and direct bullying profile ($F(3, 227) = 6.16, p < 0.000$). Post-hoc analysis (Tukey–HSD test) indicated that direct bully/victims had significantly higher mean arousal levels compared with direct neutral pupils (Bully/victim: $M = 39.25$; Neutral: $M = 31.49$; Fig. 1).

Direct bullying profiles and arousal levels in the clinical range

Chi-square analyses, in the form of cross-tabulations, were computed between arousal levels (normal/borderline vs. clinically over-aroused) and direct bullying profiles (bully, victim, bully/victim and neutral). Statistically significant associations were revealed between arousal levels and bullying profiles ($\chi^2(3, N = 227) = 15.42, p < 0.05$). The results indicate that more direct bully/victims had arousal levels in the clinically over-aroused range compared with bullies, victims and neutral children. In contrast, few direct bullies had arousal problems in the clinical range (Fig. 2).

No significant associations were revealed between direct bullying profiles and clinically low arousal levels.

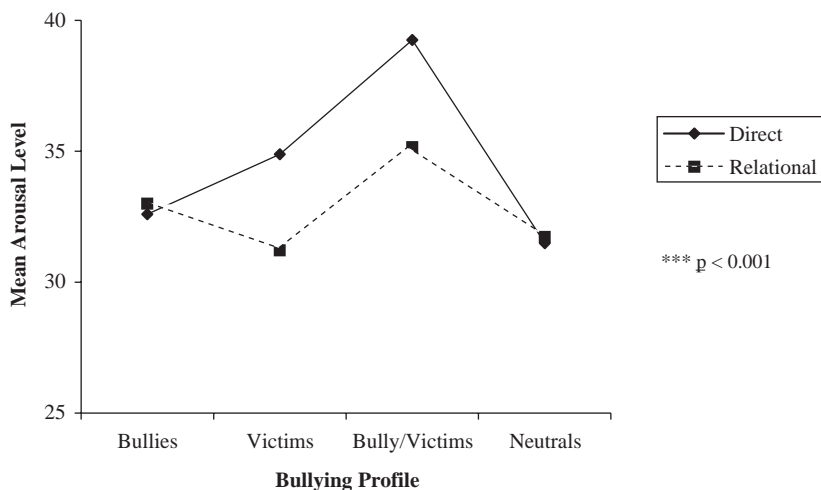


Fig. 1. Mean total arousal levels as a function of direct and relational bullying ($N = 227$).

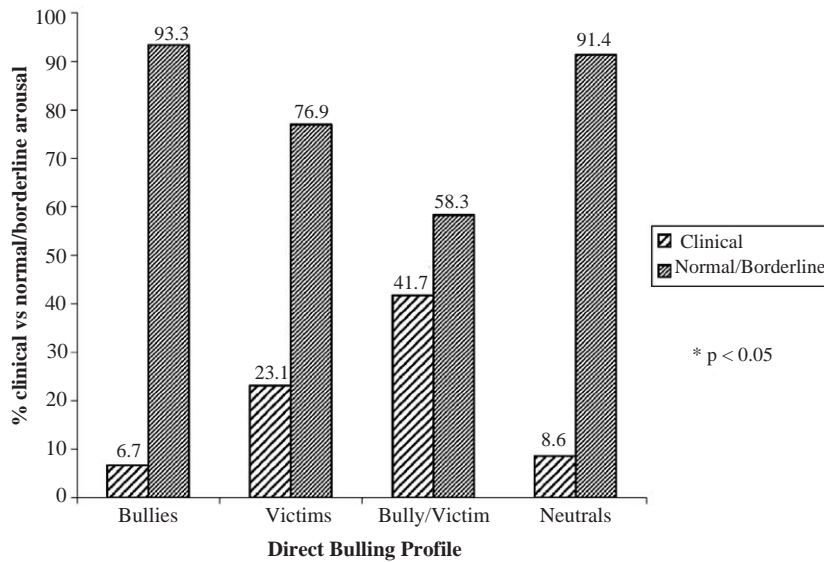


Fig. 2. Percentage of subjects according to direct bullying profiles with normal/borderline or clinical (≥ 90 th percentile) over arousal scores ($N = 227$).

Relational bullying

A one-way ANOVA between relational bullying profiles (bully, victim, bully/victim and neutral) and total arousal score revealed a significant difference between mean arousal level and relational bullying profile ($F(3, 227) = 3.20, p < 0.05$). Post-hoc analysis (Tukey–HSD test) indicated that relational bully/victims had significantly higher mean arousal levels compared with relational victims (Bully/victim: $M = 35.16$; Victim: $M = 31.21$; Fig. 1).

Relational bullying profiles and arousal levels in the clinical range

Chi-square analyses were computed between arousal levels (normal/borderline vs. clinically over-aroused) and relational bullying profiles (bully, victim, bully/victim and neutral). Statistically significant associations were revealed between arousal levels and relational bullying profiles ($\chi^2(3, N = 227) = 10.33, p < 0.05$). The results indicated that more relational bully/victims had arousal problems in the clinical (over arousal) range than any of the other relational bullying profiles (Fig. 3).

No significant results were found between relational bullying profiles and clinically low arousal levels.

Clinical behaviour problems and arousal levels

Chi-square analyses computed between arousal levels (normal/borderline vs. clinically over-aroused) and each of the subscales of the SDQ (normal/borderline vs. clinical) revealed statistically significant associations; emotions ($\chi^2(1, N = 223) = 42.31, p < 0.000$); conduct ($\chi^2(1, N = 222) = 21.93, p < 0.000$); hyperactivity ($\chi^2(1, N = 225) = 14.16, p < 0.000$); peer problems ($\chi^2(1, N = 225) = 8.31, p < 0.05$); prosocial behaviour ($\chi^2(1, N = 221) = 4.0, p < 0.05$).

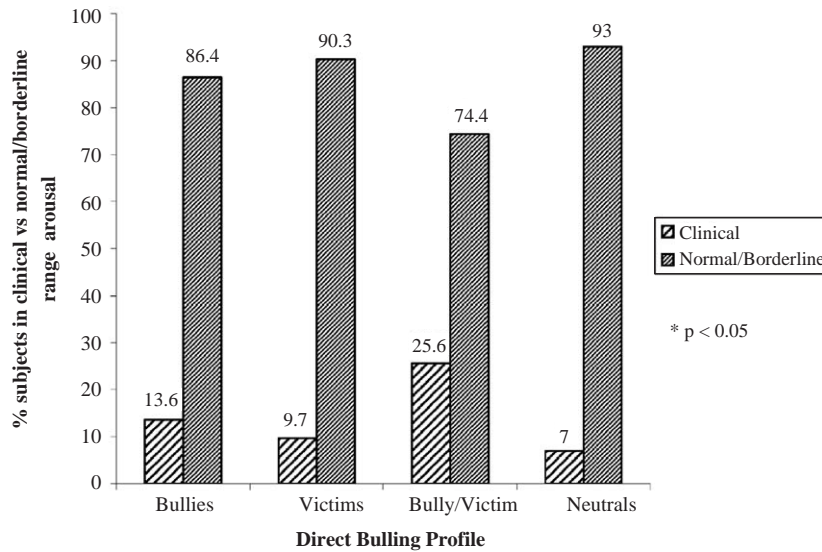


Fig. 3. Percentage of subjects according to relational bullying profile with normal/borderline or clinical (≥ 90 th percentile) levels of arousal ($N: 227$).

Table 1

Subscales of the SDQ in the clinical (≥ 90 th percentile) and non-clinical range, and percentage of subjects with clinical levels of arousal (≥ 90 th percentile), ($N: 222$ – 225)

Behaviour problems	% Clinical over arousal
<i>Emotional symptoms</i>	
Clinical	42.5**
Non-clinical	5.5
<i>Conduct problems</i>	
Clinical	35.1**
Non-clinical	7.6
<i>Inattention—hyperactivity</i>	
Clinical	29.3**
Non-clinical	8.2
<i>Peer problems</i>	
Clinical	25.6**
Non-clinical	9.1
<i>Prosocial behaviour</i>	
Clinical	23.3*
Non-clinical	10.5

* $p < 0.05$, ** $p < 0.001$.

The results indicated that behaviour problems in the clinical range were associated with clinical levels of over-arousal (Table 1).

Chi-square analyses revealed no significant associations between clinically low arousal levels and each of the subscales of the SDQ (normal/borderline vs. clinical).

Discussion

This study examined the relationship between direct and relational bullying profiles, arousal levels, and behaviour problems. The study found that relational bullying was more prevalent than direct bullying. This may be a reflection of the age group of the sample. Relational aggression increases with age (and direct aggression decreases), as individuals become more adept at using their social cognitive skills to manipulate others (Rivers & Smith, 1994). Bullies may also prefer relational aggression as a means by which they can torment others, yet avoid detection themselves (Sutton et al., 1999).

No gender differences were found in relation to the rate of direct and relational bullying. This is in contrast to previous research, which suggests that girls are more frequently involved in relational bullying than boys, and that boys are more often involved in direct bullying (Craig, 1998; Crick & Grotpeter, 1995, 1996; O'Moore, Kirkham, & Smith, 1997; Rivers & Smith, 1994).

This study revealed a significant difference between mean total arousal scores and direct bullying profiles. Direct bully/victims had significantly higher mean arousal levels compared to neutrals. This finding is consistent with the arousal theory of behaviour (Eysenck, 1964). The characteristics of bully/victims suggest that they have unstable personalities, being both anxious bullies and provocative victims (Guerin & Hennessy, 2002). High arousal levels have been reported to be associated with both anxiety, and an increased sensitivity to non-reward. This may cause an individual to become an anxious bully, striving for acceptance within the peer group whilst trying to avoid being bullied themselves. By the same virtue, their anxieties, and heightened feelings of tension, may be expressed externally, causing them to attract adverse attention, and being categorised as a provocative victim.

A similar pattern of findings was revealed for the association between arousal levels and relational bullying profiles. Relational bully/victims had significantly higher mean arousal levels compared to relational victims. Relational bully/victims were also found to have more arousal problems in the clinically over-aroused range than any other of the relational bullying profiles. The behaviour of bully/victims could be governed by increased anxiety levels (Guerin & Hennessy, 2002), which may be related to naturally high arousal levels. These findings provide some support for the finding that bully/victims are the most at risk group for developing psychiatric and behaviour problems (Kumpulainen & Räsänen, 2000; Wolke et al., 2000).

Direct bullies and neutral pupils showed the lowest mean levels of arousal, and direct bullies were least represented in the clinically high arousal range. This result supports the sensation seeking theory (Zuckerman, 1979), which suggests that direct bullies, being under-aroused, may sensation-seek in order to enhance their natural arousal levels. Aggressive confrontations, instigated by direct bullies, could offer an under-aroused individual the opportunity to raise arousal levels. Ringleader bullies require good social cognition and theory of mind skills in order to manipulate the social environment to their advantage (Sutton et al., 1999). Low levels of arousal could enable bullies to control their behaviour in order to do this strategically and successfully. Alternatively, subtle forms of bullying styles could teach children how to regulate and display low arousal levels. However, it should be acknowledged that arousal levels are not likely to be the only explanation surrounding involvement in different bullying profiles. Cause and effect conclusions cannot be drawn from the present study.

Relational bullies had low levels of arousal, similar to those of direct bullies. The systematic manipulation of others is a characteristic of relational bullying (Sutton et al., 1999), and might be expected to be associated with low levels of arousal. However, in comparison to other relational bullying profiles, such as victims and neutrals, relational bullies had higher clinical levels of over arousal. This result only partially supports Eysenck's (1964) arousal theory of behaviour. However, the majority of relational bullying does not include one-on-one conflict, which could imply that relational bullying does not necessarily provide the sensation an under-aroused individual may seek.

Almost a quarter of direct victims and almost half of direct bully/victims had arousal levels in the clinically high range. This result is consistent with the arousal theory of behaviour (Eysenck, 1964) which indicates that victims may have high arousal levels. High arousal levels have been associated with shy, avoidant behaviour and increased anxiety (Boulton & Smith, 1994). These characteristics may irritate the peer group and result in these individuals being purposefully targeted (Troy & Sroufe, 1987). However, it cannot be concluded whether behavioural dispositions supersede arousal level styles or vice versa.

Relational victims had the lowest levels of arousal compared with all the other relational, and direct, bullying profiles. This result seems to contradict the arousal theory. Victims would be expected to have high arousal levels, as the results for direct victims indicate. However, according to the arousal theory, cohorts with low levels of arousal (in this case, victims) should seek sensation. It follows, therefore, that relational victims may seek sensation to raise their arousal levels. This may result in the attraction of unwanted attention within the peer group, causing them to suffer from relational victimisation.

Both direct and relational neutral bullying status was related to low levels of arousal and few problems within the clinical over arousal range. Neutral pupils may be stimulated elsewhere in their lives (for example, hobbies). They may also differ from direct bullies in terms of environmental factors, such as family background (Stevens, De Bourdeaudhuij, & Van Oost, 2002), which may contribute to one individual developing into a bully, and another to remain neutral.

Behaviour problems in the clinical range were associated with clinically high arousal levels, but not low arousal levels. This result is not entirely consistent with previous findings, which indicate that chronic levels of under-arousal are associated with antisocial behaviour (Moir & Jessel, 1995). However, previous research has considered adolescents who were older than those in the current sample (Raine, Venables, & Williams, 1990a, b). The present study also revealed that a large number of subjects in the clinically over-aroused range were bully/victims which is the bullying profile most at risk of behaviour problems (Kumpulainen & Räsänen, 2000; Wolke et al., 2000) during childhood and adolescence. Whilst under-arousal is known to be associated with behaviour problems, the bully/victim profile, which has been linked to over-arousal, is also associated with behaviour problems. In a 14-year longitudinal study, it was found that delinquent individuals with high levels of arousal in adolescence were less likely to persist with antisocial behaviour into adulthood than delinquents with low levels of arousal in adolescence (Raine, Venables, & Williams, 1995). In this study, clinical over-arousal was associated with behavioural problems. Previous research suggests that over-aroused bully/victims will desist from these behavioural problems in adulthood (Connor, 2002), suggesting that this may also be true of our sample.

There are a number of techniques, which can be employed in schools, to aid the reduction of arousal levels. These include a calm environment, in which pupils are aware of the presence of an authority figure. The development of short and long-term programmes (e.g. relaxation techniques, use of self talk, problem solving techniques), and strategies for coping with failure (which will nonetheless result in a satisfactory outcome), may also help to reduce arousal levels (Hodge, McMurrin, & Hollin, 1997). These measures would allow adolescents to deal with over arousal within a structured environment.

There are also techniques to raise arousal levels, which may be beneficial to bullies. The creation of challenges and suspense within a non-aggressive environment would provide the under aroused adolescent a channel for their energy. Novelty and uncertainty would also raise the level of excitement, and provide a means for arousal levels to be lifted without harming others. It is important that the role of family involvement in potential intervention programmes is considered. Workshops for parents and adolescents organised and hosted by school personnel, academic and health professionals about the nature of bullying behaviour and arousal levels, and strategies to reduce problems would benefit both the school and family life.

The concept of raising and lowering arousal levels within the confines of one classroom appears a difficult challenge. However, it can be achieved within a calm, stable and structured environment. The insertion of short and long term goals into teaching practice could aid both the over- and under-aroused adolescent. Planned classes where pupils will be stimulated (for example, sports lessons), and where the degree of participation is varied, would allow adolescents to manipulate their own environment in order to attain their optimal level of arousal.

It is important to take into account the interplay between genes and the environment when considering theories and intervention strategies related to aggressive behaviour and arousal. It is believed by some (DiLalla, 2002) that individuals have an inborn genetic disposition for arousal levels and aggressive behaviour but that the environment contributes to the display of certain behaviours. It is only recently that researchers have considered detailed studies to examine the possible genetic effects (e.g. temperament, physiological responses) and how they interact with environmental influences (e.g. parental discipline, peer delinquency) in developmental theories of aggression (Plomin, 1994). There is still considerable research needed to unfold the full extent of genetics and environmental influences. For example, studies have shown that children who play with more aggressive peers act more aggressively themselves but we do not know why these children choose to play with aggressive peers in the first place (Rourke, Wozniak, & Cassidy, 1999; DiLalla, 2002). It would therefore be interesting to shed light on the interaction between aggressive behaviour and arousal levels taking genetic and environmental factors into account.

Whilst this study has shed light on the association between bullying profiles and arousability, there are a number of limitations that future research should consider. Firstly, the research relied solely on self-completion questionnaires from adolescents to determine physical and relational bullying profiles, behaviour problems and arousability. Future studies should consider a multi-informant approach to ensure that responses are reliable. Secondly, the APS paper-pen test measures 'traits' or dispositions of arousability rather than physiological states. The physiological nature of arousal and possible fluctuations during the school day should be examined combined with the APS trait approach. Although research has demonstrated that the APS is predictive of over and under arousal physiological fluctuations among anti-social, delinquent adolescents

(Coren, 1999), this has yet to be verified within a school setting. A further limitation to this investigative study relates to the statistical approach taken and the reliance on χ^2 and ANOVA. As this was an initial study, this approach was deemed sufficient, however future work should consider the use of hierarchical models of logistic regression in an attempt to disentangle and control for the contribution of factors such as gender, behaviour problems and arousal levels in explaining individual differences and other mechanisms surrounding physical and relational bullying profiles.

Further studies will be necessary to investigate the relationship between bullying behaviour, arousal levels, and behaviour problems. Future research should make efforts to guarantee that arousal measurements are reliable, as they naturally fluctuate throughout the day. This may be achieved by examining arousal test–retest reliability, using arousal level measurements taken at different times. A more accurate measure of arousal may also be obtained by controlling the pupils' activities before and after the APS is completed. Future research should also consider gender differences, investigating any differentiation between the arousal levels of males and females, and resultant bullying behaviour. With regards to the relationship between arousal levels and behavioural problems, longitudinal studies have been more effective in investigating this relationship than cross-sectional studies (Raine et al., 1990a, b). Future research should use a longitudinal design to examine the association between concurrent and future clinical under- and over-arousal, and the persistence of behavioural problems.

This study provides an initial insight into the relationship between bullying behaviour and arousability. Bullying behaviour is an aspect of antisocial behaviour that has not previously been researched with regards to its association with arousal levels. The implications for this study, and future research of this kind, are worthy of further exploration. Should the findings in this study be robust in future work, it will be necessary to investigate efficient methods of raising and lowering arousal levels. Principles may then be extracted, which can be applied within a classroom setting and home situation, which may result in happier environments for pupils, teaching staff, and parents, aiding both the adolescent's learning, and future prospects.

Acknowledgements

I would like to thank Dr. John Done for his supervision of this study. I would also like to thank Mr O'Sullivan (Headteacher), Mr Walton (Assistant Head teacher) and Miss Bellamy (Head of Year nine) of The Chauncy School, and Miss Saunders (Headteacher), Mr Norman (Head of Lower School) and Miss Dudderidge (Head of Year nine) of Simon Balle School, and the children and their parents who made this study possible.

References

- Boulton, M. J., & Smith, P. K. (1994). Bully/victim problems in middle-school children: stability, self-perceived competence, peer perceptions and peer acceptance. *British Journal of Developmental Psychology*, *12*, 315–329.
- Boulton, M. J., & Underwood, F. (1992). Bully/victim problems in middle-school children. *British Journal of Educational Psychology*, *62*, 73–87.

- Connor, D. F. (2002). *Aggression & antisocial behaviour in children and adolescents: research and treatment*. London: The Guildford Press.
- Coren, S. (1988). Prediction of insomnia from arousability predisposition scores: scale development and cross-validation. *Behaviour Research and Therapy*, 26, 415–420.
- Coren, S. (1999). Arousal predisposition as a predictor of antisocial and delinquent behaviour. *Personality and Individual Differences*, 27, 815–820.
- Coren, S. (1990). The arousal predisposition scale: normative data. *Bulletin of the Psychonomic Society*, 28, 551–552.
- Coren, S., & Aks, D. J. (1991). Prediction of task related arousal under conditions of environmental distraction. *Journal of Applied Social Psychology*, 21, 189–197.
- Coren, S., & Mah, K. B. (1993). Prediction of physiological arousability: a validation of the arousal predisposition scale. *Behaviour Research*, 31(2), 215–219.
- Craig, W. M. (1998). The relationship among bullying, victimisation, depression, anxiety, and aggression in elementary school children. *Personality and Individual Differences*, 24(1), 123–130.
- Crick, N. R., & Grotpeter, J. K. (1995). Relational aggression, gender, and social-psychological adjustment. *Child Development*, 66, 710–722.
- Crick, N. R., & Grotpeter, J. K. (1996). Children's treatment by peers: victims or relational and overt aggression. *Development and Psychopathology*, 8, 367–380.
- DiLalla, L. F. (2002). Behaviour genetics of aggression in children: review and future directions. *Developmental Review*, 22, 593–622.
- Eysenck, H. J. (1964). *Crime and personality*. London: Methuen.
- Eysenck, H. J., & Gudjonsson, G. H. (1989). *The causes and cures of criminality*. London: Plenum Press.
- Farrington, D. P. (1993). Understanding and preventing bullying. In Tonry, M. (Ed.), *Crime and justice*, Vol. 17 (pp. 381–458). Chicago: University of Chicago.
- Farrington, D. P. (1995). The development of offending and antisocial behaviour from childhood: key findings from the Cambridge study in delinquent development. *Journal of Child Psychology and Psychiatry*, 36(6), 929–964.
- Goodman, R. (1997). The strengths and difficulties questionnaire: a research note. *Journal of Child Psychology and Psychiatry*, 38(5), 581–586.
- Goodman, R. (1999). Comparing the strengths and difficulties questionnaire and the child behavior checklist is small beautiful? *Journal of Abnormal Child Psychology*, 27(1), 17–24.
- Goodman, R. (2001). Psychometric properties of the Strengths & Difficulties Questionnaire (SDQ). *Journal of American Academy of Child & Adolescent Psychiatry*, 40, 1337–1345.
- Guerin, S., & Hennessy, E. (2002). *Aggression and bullying*. Oxford: Blackwell.
- Hodge, J. E., McMurrin, M., & Hollin, C. R. (1997). *Addicted to crime?*. Chichester: Wiley.
- Knyazev, G. G., Slobodskaya, H. R., & Wilson, G. D. (2002). Psychophysical correlates of behavioural inhibition and activation. *Personality and Individual Differences*, 33, 647–660.
- Kumpulainen, K., & Räsänen, E. (2000). Children involved in bullying at elementary school age: their psychiatric symptoms and deviance in adolescence. An epidemiological sample. *Child Abuse & Neglect*, 24(12), 1567–1577.
- Lieberman, M. D., & Rosenthal, R. (2001). Why introverts can't always tell who likes them: multitasking and nonverbal decoding. *Journal of Personality and Social Psychology*, 80(2), 294–310.
- Matthews, G., & Deary, I. J. (1998). *Personality traits*. Cambridge: Cambridge University Press.
- Moir, A., & Jessel, D. (1995). *A mind to crime*. London: Michael Joseph Ltd.
- Olweus, D. (1991). Bully/victim problems among schoolchildren: basic facts and effects of a school based intervention program. In Pepler, D., & Rubin, K. (Eds.), *The Development and Treatment of Childhood Aggression* (pp. 411–448). Hillsdale, NJ: Erlbaum.
- Olweus, D. (1999). Norway. In Smith, P. K., Morita, Y., Junger-Tas, J., Olweus, D., Catalano, R., & Slee, P. (Eds.), *The nature of school bullying: a cross-national perspective* (pp. 28–48). London: Routledge.
- O'Moore, A. M., Kirkham, C., & Smith, M. (1997). Bullying behaviour in Irish schools: a nationwide study. *The Irish Journal of Psychology*, 18, 141–169.
- Plomin, R. (1994). *Genes and experiences: the interplay between nature and nurture*. CA, Sage: Thousand Oaks.
- Raine, A., Venables, P. H., & Williams, M. (1990a). Autonomic orienting responses in 15-year-old male subjects and criminal behavior at age 24. *American Journal of Psychiatry*, 147, 933–937.

- Raine, A., Venables, P. H., & Williams, M. (1990b). Relationships between central and autonomic measures of arousal at age 15 years and criminality at age 24 years. *Archives of General Psychiatry*, *47*, 1003–1007.
- Raine, A., Venables, P. H., & Williams, M. (1995). High autonomic arousal and electrodermal orienting at age 15 years as protective factors against criminal behaviour at age 29 years. *American Journal of Psychiatry*, *152*, 1595–1600.
- Rivers, I., & Smith, P. K. (1994). Types of bullying behaviour and their correlates. *Aggressive Behaviour*, *20*, 359–368.
- Rourke, M. T., Wozniak, R. H., & Cassidy, K. W. (1999). The social sensitivity of preschoolers in peer conflicts: do children act differently with different peers? *Early Education and Development*, *10*, 209–227.
- Salmivalli, C., Lagerspetz, K., Björkqvist, K., Österman, K., & Kaukiainen, A. (1996). Bullying as a group process: participant roles and their relations to social status within the group. *Aggressive Behavior*, *22*, 1–15.
- Salmon, G., James, A., & Smith, D. M. (1998). Bullying in schools: self-reported anxiety, depression, and self-esteem in secondary school children. *British Medical Journal*, *317*, 924–925.
- Smith, P. K., Morita, Y., Junger-Tas, J., Olweus, D., Catalano, R., & Slee, P. (1999). *The nature of school bullying: a cross-national perspective*. London: Routledge.
- Stevens, V., De Bourdeaudhuij, I., & Van Oost, P. (2002). Relationship of the family environment to children's involvement in bully/victim problems at school. *Journal of Youth and Adolescence*, *31*, 419–428.
- Sutton, J., Smith, P. K., & Swettenham, J. (1999). Bullying and 'theory of mind': a critique of the 'social skills deficit' view of anti-social behaviour. *Social Development*, *8*, 117–127.
- Troy, M., & Sroufe, L. A. (1987). Victimization among preschoolers: role of attachment relationship history. *Journal of the American Academy of Child and Adolescent Psychiatry*, *26*, 166–172.
- Wolke, D., & Stanford, K. (1999). Bullying in school children. In Messer, D., & Millar, S. (Eds.), *Developmental Psychology*. London: Arnold Publisher.
- Wolke, D., Woods, S., Bloomfield, L., & Karstadt, L. (2000). The association between physical and relational bullying and behaviour problems among primary school children. *Journal of Child Psychology & Psychiatry*, *41*(8), 989–1002.
- Wolke, D., Woods, S., Schulz, H., & Stanford, K. (2001a). Bullying and victimisation of primary school children in England and Germany: prevalence and school factors. *British Journal of Psychology*, *92*, 673–696.
- Wolke, D., Woods, S., Bloomfield, L., & Karstadt, L. (2001b). Bullying involvement in primary school and common health problems. *Archives of Disease in Childhood*, *85*, 197–201.
- Zuckerman, M. (1979). *Sensation seeking: beyond the optimal level of arousal*. Hillsdale, NJ: Erlbaum.