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PSYCHOPHYSIOLOGICAL INDICES OF SCHOOL BULLYING AND SCHOOL VICTIMIZATION EXPERIENCES IN RESTING BASELINE AND IN TONE-CUED AFFECTIVE IMAGERY

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CHRYSOSTOMOS A. LAZAROU

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The present Doctoral Dissertation was completed in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the ***Department of Psychology*** *and was approved on the* ***14th of May 2013*** *by the members of the* ***Examination Committee****:*

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ABSTRACT IN GREEK (ΠΕΡΙΛΗΨΗ)

Η παρούσα μελέτη πραγματεύεται το φαινόμενο του εκφοβισμού στο σχολείο. Η 1η φάση της μελέτης περιλάμβανε τη μετάφραση και στάθμιση του Ερωτηματολογίου Θυματοποίησης-Εκφοβισμού (Β = 907), το οποίο βασίστηκε στο αντίστοιχο εργαλείο που χρησιμοποιήθηκε στην Ανατολική Φινλανδία (BVQ; Olweus, 1996), ενώ η 2η φάση περιλάμβανε τη διερεύνηση των ψυχομετρικών ιδιοτήτων της ελληνικής εκδοχής του εργαλείου. Η δειγματοληψία της 1ης φάσης περιλάμβανε 3 δημοτικά σχολεία της Αττικής (3ης δημοτικής περιφέρειας) και 3 σχολεία της Κρήτης (Ηρακλείου και Χανίων). Η δειγματοληψία της 2ης φάσης περιλάμβανε 1 δημοτικό σχολείο της Αττικής (1ης δημοτικής περιφέρειας). Η μεθοδολογία της 1ης φάσης περιλάμβανε τη μετάφραση του ερωτηματολογίου από τρεις ειδικούς στο αντικείμενο και τη δοκιμαστική εφαρμογή του σε δείγμα 3% των μαθητών των σχολείων της Αττικής. Η μεθοδολογία της 2ης φάσης περιλάμβανε τη δοκιμαστική εφαρμογή του ερωτηματολογίου σε δείγμα 4% των μαθητών της Αττικής και 4% των μαθητών της Κρήτης. Η ανάλυση των δεδομένων της 1ης φάσης περιλάμβανε τον υπολογισμό των συχνοτήτων εμφάνισης των διαφόρων μορφών εκφοβισμού-θυματοποίησης, τον υπολογισμό της εσωτερικής συνέπειας των υποκλιμάκων του ερωτηματολογίου με τον συντελεστή α του Cronbach και τον υπολογισμό της δομικής εγκυρότητας του ερωτηματολογίου με τη μέθοδο της παραγοντικής ανάλυσης κατά συνιστώσες με περιστροφή Varimax. Η ανάλυση των δεδομένων της 2ης φάσης περιλάμβανε τον υπολογισμό της εσωτερικής συνέπειας των υποκλιμάκων του ερωτηματολογίου με τον συντελεστή α του Cronbach και τον υπολογισμό της δομικής εγκυρότητας του ερωτηματολογίου με τη μέθοδο της επιβεβαιωτικής παραγοντικής ανάλυσης (Confirmatory Factor Analysis) με τη χρήση του προγράμματος LISREL 8.54. Τα αποτελέσματα της 1ης φάσης έδειξαν ότι το ερωτηματολόγιο παρουσιάζει ικανοποιητικά ψυχομετρικά χαρακτηριστικά (Β = 61) και ότι μπορεί να χρησιμοποιηθεί για τη διερεύνηση του φαινομένου του εκφοβισμού στο σχολείο. Τα αποτελέσματα της 2ης φάσης έδειξαν ότι το ερωτηματολόγιο παρουσιάζει ικανοποιητικά ψυχομετρικά χαρακτηριστικά (Β = 52) και ότι μπορεί να χρησιμοποιηθεί για τη διερεύνηση του φαινομένου του εκφοβισμού στο σχολείο. Τα ευρήματα της μελέτης συζητούνται σε σχέση με τη διεθνή βιβλιογραφία, ενώ προτείνονται κατευθύνσεις για μελλοντική έρευνα και παρεμβάσεις.

ABSTRACT

The present dissertation included three studies. *Study 1* involved Greek-Cypriot children and adolescents (N= 907) responding to various questionnaires, including the Revised Bullying and Victimization Questionnaire (BVQ; Olweus, 1996) in order to screen for participant identification to a tone-cued imagery experiment (*study 3*) and to examine associations of school bullying and school victimization with personality and behavioral characteristics. Study 1 suggested that about 3% of the children and adolescents were identified as bullies, 4 % as victims and 4 % as bully-victims. Also study 1 results partially confirmed expectations suggesting that bullies and bully-victims have both high reactive and proactive aggression and high callous-unemotional traits. Additionally, as expected Grayôs (1987) BIS was associated with victimization while BAS was associated with bullying. *Study 2* involved norming and selecting, through childrenôs and adolescentôs ratings (N = 61), twelve imagery scripts (three for each of four emotions: anger, fear, joy and pleasant relaxation) to be used in the experiment. Results supported expectations showing that childrenôs ratings matched those of adultôs found in past studies: negative emotion scripts (i.e. anger and fear) received significantly lower ratings on valence and dominance and higher ratings on arousal compared to positive emotion scripts (i.e. joy and pleasant relaxation). *Study 3* aimed to experimentally examine the psychophysiological responding of children and adolescents (N= 52) involved in bullying and victimization, in the context of a tone-cued affective imagery paradigm and during a 5-minute resting baseline condition. Results partially confirmed expectations in that high bullying negatively predicted resting heart rate and startle eyeblink reflex magnitude during fear scripts but only for children and adolescents with high victimization (i.e. bully-victims). As expected, victimization combined with low bullying (i.e. victims) positively predicted startle eyeblink magnitude during fear imagery, but results approached statistical significance. However, the expected positive association between victimization and bullying-victimization combined with autonomic reactivity during anger scripts (provocation) was not supported by results. Implications for interventions targeted to school bullying behavior are discussed.

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Æ ÚÚúíÜ³ædÜ, ¤ůɛg³Ü´Ý³ÚŒÚÜÜúíɛůª¤ɛy³dɽ ůi÷ɛgɔɛgƒ¤Ü³´dɔ¤ ÜɔÝ´dɽƒ¤Ü³y€´³Ůĝůdɽƒɔ¤Ü Ů£y³Ü ¢ Ů³g´³ÝŸüÜ ¤Ü³ dɽ ɛ¡ƒdɛª¤ɔª¤ůÚŒª¤¤ ůɛg ůª¤yɣdɽ g´ɛ¡³Ü³ Ü¡ª¤ÚÚŷgƒ ű ɛ¡ygƒ dɽ Ü´Ý³ÚŒ]ůdɽ ůÚÜ Ů£´ĥüª¤Ü´ɛg ¥fo¡ª¤ůª¤Ü ůÚŒ]³´ɛ¡ÚœÜı ůÚÜ³Ü ű¥y¡ª¥ Ů³gƒ´y¡Ügƒ Ú]³ üi÷ůª¤ɛª¤dɽ Ü´ɛůŒª¤ª¤ ɛɛg. ɑÚ³ ¥gª¥ ´Ü¡Y³Ü ůɛg Ů³ű¡Ý ůª¥ Ú]³ Ü´y¡Ü³Ú]ɽ ÜɔÝ´dɽª¤Ü³ůgɔ³ª¥ ɛɛůi÷3dɽ ɛɛg.

ŪÜ¤dÚª¤Ü ÚůdƒgÜ³ůgɛÜ¡ª¤ůŒůª¥ ÚÜ´Ü³üª¤Ý´ɛɛg ɹ ³ü¡ª¥Ü Ý¤Ü¡ɛ ª¤Ü³ ɔɔÚª¤ª¤¤ ?Ůű¥ª¤dɽ ´ɛg ¤ŒÜ³ ª¤Ü³´Ü¡Ůɛy³ɛg³´dɔ¤ ɛÜ¡Ý¥ƒª¤Ü³Ü³ůª¤ü³ª¤dÜƒɔª¤Ü ɛy³Ü. ɑÚ³ ɛ´ɛ¡ı ³Ü³ÚůÝ³ª¥ ĥÚÜ³ ´Ý³¥ ůÚŒ ɔ¡ÜűÚª¤¤ ɛɛg ¥fo¡ª¤ůª¤Ü Ü³Ü³ÜŒŸɛy³Ü ɛÜŒ¤ ɛÜ ŒÜ ɛÜ¡Ý¥ƒª¤Ü³ ŒÜ ɓ¤ɔª¤dÜ ɛɛg ÚŒƒ Ü´¤dÜ³Ůƒ£¥ɔ¡ÜűÚª¤yƒŒggƒ, ÚŒƒůɓ¤i÷¡Ůƒª¤Ü³ÚŒƒª¤ɛi÷ª¤ª¤Ůƒ ŒggƒŒ...Ɪ Ü³ª¤Ů³ ɛ´ɛ¡ı ³Ü ª¤důɛɛ³ª¤ůª¥ ĥÚª¤´Ü¡ĥɔª¤ ŒŒ³ ůŒª¤ɛɛ³ÜŒª¤ Ů³ª¤Ůg¡³ůɛĥ ɛɛg ´¡ɛª¤Ü³ª¤i÷ůÜ³ ɛª¤ ůgɛ³yƒ «Ů³ůª¤y¥Ůª¤ƒ» ŒɛggƒůŒ ɔ¡ÜűÚª¤¤ ª¤Ü¡ı ƒ ɛŮª¤ŮŒi÷ůÜ, ´Ý³ŒÚÜ ¤ɛɛg³ ÝŒ³ɛƒ ³Ü Üűɛgɔɔª¤¡ÜůÚÜ ÚŒƒ Ů³dɛgůª¤ üŮª¤ƒ ³ůŒ¡ª¤dŮƒŒggƒª¤Ü³ª¤Ü³ª¤Ü£Ü¡ı ůª¥ ÚÜª¤ÜŒ¡ª¤dı ɛÜŸŒggƒª¤Ü¡ı ƒüÜ³ ¤dŮª¤Ü³Ü³ÜɛÝůª¥ ɛi÷ÚŮůŒª¤ɛ¤ Ü´ĥ Ú]ɽª¥¤ Œɛggƒ. ȳ ª¤Ü³ÜgÚŸ¤ɛg ÝüɜÜ³ Ü´ɑůÚŮgÚ]ɽ üi÷³Ü£dɽ³Ü ůg³Ů£ɑůª¥ ª¤Ü¡ı ƒüÜ³ ¤ŒÚ³ ¤dɔª¤Ü ɔɔƒŮƒ ɛɔ ű¡ª¤yƒ ɛɛg ůª¤y¥ÚŒ]ª¤Ü ³Ü ÚÜ ´Ü¡ÜŒª¤ůª¥. Ü³Ü¤ÝɔªÜ ɛɛg ůÜƒ Ůgɛ³Ü¡ª¤ůÚ ª¤Ü³ ůÜƒ Ü³Ü´ı, ´Ý³ŒÚÜ

ŪÜ ¤dÚª¤Ü Ůɑůdƒ ³Ü Ůgɛ³Ü¡ª¤ůŒůª¥ ŒÜ ´ÜŸ¡Ü ɛɛg ɹ ³ü¡ª¥Ü ɔɛÜ Ú]³ ůg³Ů£¤ª¤ ůgɛ´Ü¡Ý¥ÚÜÜ¤ª¤ ŒÜg, ɔɛÜÚª¤ɛy¥ÚÜ Ü´ĥ ŒÜ ´Ü¡Ý¥ÚÜª¤ɛÜŒɛg ɛɛg ü¤ÜŒ³Ü³ÚÜ]³ Ü³¤dÜ´Ú]ƒg³Ü£ĥÚ]ÜÜƒ ª¤Ü³´ɛg ɛÚg´Ü³d÷ɛ¤£Ů ª¤ÜŸ¥ŒÜ³ ɹ ¡ª¤ůŒÜ£Ÿª¤d, ĥÚª¤ «¢Ü Ü³Ü¤dÝ´ª¤ĥ´ɛgƒª¤Ü³ÜŒÜª¤». Á´ɑůdƒ dÜ ¤dÚª¤Ü³Ü ůgɛÜ¡ª¤ůŒůª¥ Ú]³ ɛd¥ŸɹÜ ɛɛg Æɛi÷ª¤ª¤Ü´ɛg ɛɛg ɛÝ¡ª¤ůÚŒª¤ ü¡ ɹɛ Ú]ƒg³ª¥ ¤ƒg³ª¤Ü³´ɛg ´Ý³ŒÚÜŮɛÚůŒ¡ª¤Ů³ª¤Ü³ɛɛg y¤Ůª¤ɛ³ÚÜ³Ý´dɽª¤Ü³ůŒª¤ɹɔɛ.

¢ yª¤ɛgƒ, dÜ¤dÚª¤Ü³Ü ůgɛÜ¡ª¤ůŒůª¥ Œɛ³´Ü´ɛi÷ ɛɛg ü¤ɹɔɛ, Ú]³ ɔ¤Ü³Ý´ɛɛg ō ɓdɽ ª¤Ü³Ú]³ dÚdÜ ɛɛg Æª¤´ɑÜ ɔ¤Ü Ú]³ Ü³¤ü¤ŒÚª¤¤ ŒɛggƒÜ³Ý´dɽ, ɔ¤Ü Œɛ ĥÚª¤ ¤ŒÜ³ ´Ý³ŒÚÜ´Ü¡ĥɔÜÚÜƒ ůÚª¤ƒ ůdɛÜ³Œª¤yƒ ůŒª¤ɛyƒ Ú]³ƒ ɛ¤ŒÜ³ ɛ¤ÜŸ¥ŒÜ³ ɛɛg ¤ɛÜ³ÚÜ³ ´ɛ¤ Ůª¤Ü³Œɛ´¡Ü³ÜɛÜÚª¤ĥ ɜĥdɛÜ³Ú]³ƒ ɛɛg.

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Thanks also to Dr. Christopher Patrick and Dr. Constantinos Kokkinos who accepted the invitation to participate in my examining committee and for their constructive remarks that improved my dissertation.

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CHAPTER 1: INTRODUCTION

Statement of the Problem

School bullying is a common experience for many children particularly in late childhood and early adolescence and can have negative consequences for the emotional health of both victims and perpetrators. School bullies run an increased risk of later criminality and alcohol abuse; about 40 % of former male school bullies have three or more criminal convictions by the age of 24, compared to 10 % of controls (Olweus, 1991). A recent meta-analysis of prospective longitudinal studies demonstrated a significant link between school bullying (perpetration and victimization) and aggressive/violent behavior later in life (Ttofi, Farrington & Lösel, 2012). Bullying and victimization are considered to have a negative impact on psychosocial health (e.g. van der Wal, de Wit & Hirasing, 2003) and have been associated with loneliness and school avoidance (Kochenderfer & Ladd, 1997), poor relationships and school dissatisfaction and stress (Karatzias, Power, & Swanson, 2002). Depression and suicidal ideation have also been found to be associated with being bullied (van der Wal et al., 2003; Kaltiala-Heino, Rimpela, Marttunen, Rimpela & Rantanen, 1999).

Early antisocial behavior can continue into later life stages and may culminate into antisocial personality disorder in adults (e.g. Patterson, DeBaryshe, & Ramsey, 1989). In fact, there is considerable developmental continuity in aggression and violence as part of the general continuity in antisocial behavior from childhood to adulthood (Farrington, 1991, 2005).

Past research has examined the biological correlates of antisocial and aggressive behavior (e.g. Raine, 1993; Scarpa, Tanaka & Haden, 2008). For over half a century, an extensive body of psychophysiological research, the domain that examines psychological states and processes using physiological measures, has been accumulated on antisocial, delinquent, criminal and psychopathic behavior (Raine, 1993). Psychophysiological research, to examine psychological states such as attention or emotional reactivity, for example, by measuring facial EMG, autonomic arousal, autonomic reactivity and startle reflex response, has an advantage in that it may be less prone to bias and measure-related error, compared to self-reports (e.g. Lorber, 2004).

Specifically, psychophysiological research findings suggest that, low resting heart rate is associated with antisocial and aggressive behavior in childhood and adolescence (e.g. Raine, Reynolds, Venables & Mednick, 1997). Furthermore, adolescents with callous

unemotional traits were found to respond with reduced reactivity to emotional stimuli (i.e. Loney, Frick, Clements, Ellis, & Kerlin, 2003) and highly delinquent adolescents with disruptive behavior disorders (van Goozen, Snoek, Matthys, van Rossum, & van Engeland, 2004) as well as adult psychopaths (Patrick, Bradley & Lang, 1993) have been found to exhibit smaller startle reflex when viewing negative pictures, compared to healthy participants. On the contrary, children whose parents have a history of anxiety disorder exhibit increased startle magnitude compared to those whose parents do not have a history of anxiety disorder (Grillon, Dierker & Merikangas, 1996). Finally, reactively aggressive children have been reported to exhibit increased autonomic reactivity during provocation (e.g. Hubbard et al., 2002).

Interestingly, research on school bullying has demonstrated that this type of behavior has also been associated with the behavior patterns described above; that is, bullying, victimization or the co-occurrence of those have been linked to, a) conduct problems (CP) and oppositional defiant problems (ODP) (i.e. Kokkinos & Panayiotou, 2004), b) psychopathic features such as callous unemotional traits (CU) (i.e. Fanti, Frick & Georgiou, 2009), c) proactive/ reactive aggression (i.e. Salmivalli & Nieminen, 2002) and d) social anxiety (Craig, 1998; Storch & Masia-Warner, 2004). Therefore, it is of interest to examine if some of the above psychophysiological findings apply to school bullying/victimization experiences as well.

Purpose of the Present Study

The purpose of the present study was built on the observation that specific psychophysiological responses (e.g. reduced startle reflex during negative emotion processing or increased autonomic reactivity upon provocation) have been associated with certain personality and behavioral features (e.g. elevated CU traits or high reactive aggression) and that these types of characteristics have also been found to be linked to school bullying and school victimization. Therefore, it was reasoned that, at a theoretical level, it is a possibility that bullying and victimization may predict certain types of psychophysiological responding (e.g. reduced startle potentiation during negative emotion processing or increased autonomic reactivity upon perceived provocation).

Specifically, the present dissertation study sought to experimentally investigate the psychophysiological reactivity associated with bullying and victimization to different types of emotional situations (i.e. aversive, provocative and pleasant) via the tone-cued imagery paradigm (i.e. van Oyen Witvliet & Vrana, 1995) and during a resting condition (e.g. no-task baseline). Parallel to that, the present dissertation study aimed to clarify, confirm and to further explore the extent to which externalizing problems (i.e. conduct problems &

oppositional defiant problems), personality traits [i.e. CU traits & behavior inhibition/ activation systems, (BIS/BAS; Gray, 1987a, 1987b)] and functions of aggressive behavior (i.e. reactive/proactive aggression) relate to bullying and victimization and consequently, may affect psychophysiological responding. Finally, the current study sought to norm and select affective imagery scripts (i.e. anger, fear, joy and pleasant relaxation) to be used in the experiment.

Originality of the Present Study

Past research (for a review see Hill, 2002) has identified several risk factors for antisocial and aggressive behavior in children, though few studies have examined the etiological reasons behind bullying, specifically. Some of these include parental practices and skills, heredity, temperament, information processing deficits, poverty, and gender differences.

Several previous studies investigated aggressive and antisocial youth via psychophysiological measures. Surprisingly though, hardly any studies have used this methodology with youth involved in school bullying even though they also exhibit highly antisocial and aggressive behavior, and while school bullying may be a prodromal manifestation of serious violent behavior that may emerge in later years. Also, although the issue of resting autonomic activity and autonomic reactivity to provocation has been examined in several studies, the affective startle modulation of aggressive children has only been examined in two previous studies, to our knowledge, and results regarding affective startle modulation in antisocial youth remain equivocal. Therefore, this study applies previous findings to a novel population and adds important new evidence to areas that have received very little prior attention by researchers.

Another innovation of the study has to do with the careful screening of children involved in bullying, their separation into distinct groups (i.e. bullies, victims, bully-victims and uninvolved) and the use of additional questionnaires that measure specific types of aggression. These manipulations will help clarify the specific profiles of aggressive children who respond in particular psychophysiological ways, which represents an addition to previous studies that may have lamped together individuals with different aggression patterns.

An additional original aspect of the study has to do with the random screening of children from a large population (representing a substantial percentage of all children of that age in Cyprus) making the sample quite representative of all children of that age in this country. This allows for better generalizability than reliance on opportunistic samples

from local clinics, in addition to providing data (that are locally novel) on the epidemiology, demographics, and predictors of this school problem behavior in Cyprus.

CHAPTER 2: LITERATURE REVIEW

Overview of School Bullying

This section attempts to present a (widely accepted) definition of school bullying, the characteristics associated with types of bullying involvement, prevalence rates, as well as when bullying occurs more frequently (i.e. grade level).

School bullying defined. According to Dan Olweus (1993), a pioneer in school bullying research, a student is said to be bullied when he/she is exposed, repeatedly and over time, to negative actions (i.e. physical, verbal and social bullying) on the part of one or more students. Examples of physical bullying are hitting, kicking, pushing, and the taking of personal belongings; examples of verbal bullying are name calling and threatening; and examples of social bullying are excluding, isolating, and gossiping. Bullying involves an imbalance of power (physical or psychological) between the bully and the victim (Karatzias et al., 2002; Olweus, 1993). Definitions of bullying, exclude playful fighting, a one-time attack, or good natured teasing between friends (Stassen Bergen, 2007).

Types of bullying involvement: bullies, victims and bully-victims. Past research (i.e. Olweus, 1973; Pellegrini, Bartini, & Brooks, 1999; Schwartz, 2000; Stavrinides, Paradeisiotou, Tziogouros, & Lazarou, 2010) has identified three distinguishable profiles of children involved in bullying and victimization: bullies, victims and bully-victims (or aggressive victims). Research shows that bullies are more likely to be boys (Brunstein, Marrocco, Kleinman, Schonfeld, & Gould, 2007; Kepenekci & Cinkir, 2006; Veenstra et al. 2005; Seals & Young, 2003; Kaltiala-Heino et al., 1999); that lack empathy towards their victims and have a strong need to dominate them (Olweus, 1991). Bullies are characterized by high levels of aggression (Veenstra et al., 2005) or an ñaggressive reaction patternò (Olweus, 1993), and have a more positive attitude towards violence and use of violent means than students in general (Olweus, 1991). Furthermore, several studies found that bullies have low levels of anxiety (Craig, 1998; Olweus, 1991; Oô Moore & Kirkham, 2001; Pulkinen & Trembley, 1992; Salmon, James, & Smith, 1998). Instead, victims (of bullying) have been characterized as passive or submissive, anxious and insecure (Olweus, 1991, 1993). There is evidence that victimized children and adolescents experience elevated levels of social anxiety (Craig, 1998; Storch & Masia-Warner, 2004). They are also considered to have low self esteem, to be weak and to blame themselves for being attacked (Stassen Bergen, 2007; Smith, Talamelli, Cowie, Naylor, & Chauhan, 2004; Olweus, 1993; Oô Moore & Kirkham, 2001). According to Stassen Bergen (2007), bully-

victims (or aggressive victims) have been found to be disruptive, impulsive and to have poor social and problem solving skills. Aggressive victims exhibit low scores on measures of academic competence, prosocial behavior, self-control and social acceptance (Veenstra et al., 2005). They appear more temperamental than the rest of the bullying groups and have difficulty controlling their anger (Georgiou & Stavrinides, 2008). Their overly reactive behavior (displays of anger and emotional distress) maybe rewarding for aggressors who provoke them and therefore, continue to emerge as persistent targets of bullying (Schwartz, 2000). The bully-victims group has been characterized as the most disturbed one (Brunstein et.al. 2007), showing the greatest psychopathology (Kokkinos & Panayiotou, 2004); it has also emerged as the most aggressive, compared to the other bullying groups (Salmivalli & Nieminen, 2002).

Prevalence of school bullying/victimization. Bullying has been recognized as a world- wide problem (Andreou, Vlachou, & Didaskalou, 2005); research to date suggests that any school can anticipate the occurrence of bullying, however, with varying degrees of severity (Smith & Brain, 2000; Veenstra et al., 2005).

A United Nations supported survey in developed and transitional countries in Central and Eastern Europe (2001/02 Health Behaviour in School-aged Children HBSC) found that 35% of schoolchildren (ages 11, 13, 15) said they had been bullied within the past two months, with the percentage ranging from 15% in Sweden to 64% in Lithuaniaò (Violence against children report). In other countries such as Greece the percentage of children that said that they had been bullied within the last two months was 23% of females and 26 % of males (N=3788), in USA 33% of females and 36 % of males (N=4956), in the UK 32% of females and 32% of males (N=14122) and in France 36 % of females and 34% of males (N=8103). In addition, in Finland from a sample of 8th and 9th graders (ages 14-16 years), 11% reported bullying others at least weekly and 11% reported being bullied at least weekly (Kaltiala-Heino et al., 1999) ; in Scotland from a sample of adolescents in secondary schools, 7.5% reported bullying others and 16.7% reported being victimized since the beginning of the school year (6-8 month interval) (Karatzias et. al. 2002); and finally in Turkey, every participant, 100% reported being bullied at least once during the academic year (Kepenekci & Cýnkýr, 2006).

The above studies, however, did not report on involvement rates for each particular group (i.e. bullies, victims and bully-victims). One of the earliest report to do that was in Norway in 1983 (Olweus, 1993) with a sample of 568,000 primary and secondary students. It was found that 9 percent were victims, about 7 percent bullied others with some regularity and about 1.6 percent were both victims and bullies. Various other studies

involving adolescents in different countries reported the following findings: in the USA 13 % found to be bullies, 10.6% victims and 6% bully-victims (Nansel et al., 2001) and in the UK, a study involving elementary school children (average age= 7.6 years), found that 4.3% were identified as direct bullies, 10.2% as direct bully-victims and 39.8% as direct victims (Wolke, Woods, Bloomfield, & Karstadt, 2000).

In *Cyprus*, in a large sample study (Stavrinides et al., 2010), 1645 Greek-Cypriot children and adolescents from the 6th grade of primary school and from the1st, 2nd and 3rd grades of junior high school, completed the Revised Bullying and Victimization Questionnaire (BVQ; Olweus, 1996). It was reported that 5.4% of the children were involved as uniquely bullies, 7.4% of the children as uniquely victims, and 4.2% as bully-victims. In a different study, from a sample of 12-15 year old Greek Cypriots from two junior high schools, 8.4% reported being bullies only, 15.25% being bully/victims and 21.5% being victims only (Kokkinos & Panayiotou, 2004).

Since the 1970s when Dan Olweus begun studying bullying, researchers have been investigating the phenomenon in different parts of the world. However, as Stassen Berger (2007) precisely puts it:

> Differences in studentsô age, sex, ethnicity, and social class; in school size and class size; in educational funding, policy, and practice; in data source and methodology; in reporter bias and statistical analysis; in national values and history; and even in the month and circumstances of data collectionð make it impossible to find a universal, expected level of bullying. (p. 98)

Furthermore, differences regarding prevalence rates of bullying and victimization across regions may be due to cultural variations (Karatzias et al., 2002).

Finally, previous research findings suggest that children of foreign origin may experience higher victimization compared to children not being of foreign origin. For example, Eslea and Mukhtar (2000) and Verkuyten and Thijs (2002) found higher victimization to be associated with children of ethnic minorities in the UK and the Netherlands, respectively.

When does bullying/victimization occur the most? Even though it is not very clear during which grade level bullying and victimization occur most frequently, there are research findings indicating that these behaviors decline with age up to the end of secondary school (Arseneault, Bowes, & Shakoor, 2009; Eslea & Rees, 2001). Eslea and Rees (2001) conducted a retrospective study in which male and female adults aged 18ï 55 years completed questionnaires about their memories of being bullied at school. Results showed that bullying was most frequently remembered from around 11ï 13 years of age,

with incidents from earlier and later childhood being reported comparatively rarely. Furthermore, with a sample of 15 686 students in grades 6 through 10, Nansel et al., (2001) found that the frequency of bullying was higher among 6th- through 8th-grade students than among 9th- and 10th-grade students.

Taking the above findings into consideration, it appears that bullying and victimization peak between the last two grades of elementary school up to the first two grades of junior high school (about the age range of 10-14 years).

Links between Bullying/Victimization and Antisocial/Aggressive Behavior

This section of the paper aims to report past research findings linking school bullying and school victimization with antisocial/externalizing problems, with proactive and reactive aggression and with callous unemotional traits; potential associations with behavior inhibition/activation systems are also reported.

Links with antisocial/externalizing problems. Bullying has been considered to be an earlier stage on a developmental sequence leading to more severe forms of delinquency later in life (Baldry & Farrington, 2000; Perren & Hornung, 2005; Olweus, 1993).

Conduct Disorder (CD) as well as Oppositional Defiant Disorder (ODD) are both serious disorders characterized by repetitive and persistent antisocial behavior. Even though bullying does not receive a clinical diagnosis, it is one of the criteria for CD (DSM IV; APA 1994). Various studies found associations between bullying and victimization and childhood and adolescent antisocial behavior. For example, in a sample of Greek-Cypriot adolescents, Kokkinos and Panayiotou (2004) found that ODD was a predictor of victimization while bullying was highly predicted by presence of CD but not ODD. They suggested that as CD psychopathology is a precursor of adult antisocial behavior (also see Farrington, 2005), it may be that bullying behavior, which has been characterized by the lack of empathy towards victims and a strong need to dominate others (Olweus 1991), ñis the same trait that is prodromal to later, serious psychopathology and antisocial actsò (page 529).

Associations between bullying and victimization and conduct and oppositional defiant problems have been reported by others as well (e.g. Juvonen, Graham, & Schuster, 2003; Coolidge, DenBoer, & Segal, 2004; Arseneault, Bowes, & Shakoor, 2009).The present dissertation study will also examine associations between CP, ODD and bullying/victimization.

Links with proactive and reactive aggression. Buss (1961) made an early distinction between angry aggression and instrumental aggression, in that, the former was defined as behavior that is reinforced by pain or injury to the victim and the latter, as

behavior that is reinforced by the termination of aversive stimulation or by the acquisition of reward. In addition, Stanford, Houston, Villemarette-Pittman and Greve (2003) separated impulsive and premeditated aggression; the impulsive type was considered a reactive or emotionally charged aggressive response, characterized by a loss of behavioral control; the premeditated as a purposeful, controlled aggressive display that is usually instrumental in nature.

Similar to the distinction made above, Dodge and Coie (1987) differentiated between two different functions of aggression in children and adolescents: reactive and proactive aggression. Even though reactive aggression is highly correlated with proactive aggression-both forms of aggression are found to be associated with excessive fighting at age 7 and also at age 16 by paranoid ideation and stimulation seeking-factor analytic studies support the notion of two distinct types (e.g. Raine et al., 2006).

As Dodge and Coie (1987) suggest, reactive aggression is seen as anger expressions, temper tantrums, and vengeful hostility with an appearance of being out of control that is often preceded by a real or perceived threat or provocation; the processing mechanism responsible for the display of angry reactive aggression is hostile attributional bias. Reactively aggressive adolescents, are characterized as more impulsive, anxious, and having reality distortions and information-processing abnormalities (Raine et al., 2006).

Proactive aggression on the other hand, is viewed as involving domination, teasing, name-calling, object acquisition and coercive acts (Price & Dodge, 1989; Dodge, 1991; Dodge, Lochman, Harnish, & Bates, 1997). According to Dodge and Coie (1987), the processing mechanism involved in proactive, instrumental or dominant aggression may be the evaluation of such behavior as having positive outcomes. According to Raine et al. (2006), proactively aggressive adolescents are characterized as being psychopathy-prone, seriously violent, and coming from a poor social background.

There seem to be similar characteristics between school bullies and proactive aggressors i.e. highly aggressive, ñcold bloodedò, dominating, lacking empathy, striving for control, power, and being fearless. Furthermore, there seem to be at least some similar characteristics between school bully-victims and reactive aggressors i.e. highly aggressive, disruptive, impulsive and anxious. Indeed it has been suggested that bullying, which involves deliberate and systematic negative actions targeted at a defenseless victim, implies that, it is a form of proactive rather than reactive aggression and that as a group, bully-victims, or aggressive victims, seem to fit the description of a reactively aggressive child (Salmivalli & Nieminen, 2002). Others too have suggested that there may be an

overlap between aggressive victims and reactive aggressors as well as bullies and proactive aggressors (Toblin, Schwartz, Hopmeyer Gorman & Abou-ezzeddinea, 2005).

However, research investigating the links between bullying and proactive and reactive aggression has given mixed results. Some findings suggest that bully-victims are less proactively aggressive but more reactively aggressive than pure bullies and that they are more proactively aggressive than pure victims (Unnnever, 2005; Schwartz, 1997, 1998). Other researchers have found that bullies and bully-victims score high on both proactive and reactive aggression, whereas victims score high on reactive aggression only (Salmivalli & Nieminen 2002; Pellegrini et al., 1999); that is, proactive aggressors (as well as bullies and bully-victims) will tend to defend themselves if attacked or provoked (Pulkinen, 1996).

Therefore, even though links between bullying/victimization and proactive/reactive aggression appear evident, it is not clear how bullying groups i.e. bullies, victims, bully-victims are associated with reactive/proactive aggression. The present dissertation study will attempt to clarify associations between bullying/victimization and reactive/proactive aggression.

Links with callous unemotional traits. Callous unemotional (CU) traits (e.g. lack of guilt, absence of empathy, callous use of others as well as shallow and constricted emotions) have been reliably assessed in childhood and adolescence (Burke, Loeber & Lahey, 2007) and are considered to be a childhood precursor to adult psychopathy (Frick, 2009). According to Essau, Sasagawa and Frick, (2006) ñin addition to designating a particular severe and stable pattern of conduct problems, high levels of CU traits have designated a subgroup of children and adolescents who show other characteristics that are consistent with adult conceptualizations of psychopathyò (p. 455). Indeed CU traits are considered to reflect the ñemotional detachmentò dimension of psychopathy -the other two being narcissism and impulsivity- and they are thought to distinguish among subgroups of antisocial youth exhibiting severe and stable delinquency/aggression (Frick & White, 2008).

Furthermore, research findings (e.g. Loney et al., 2003) suggest that the presence of CU traits differentiates between individuals who are both psychopathic and antisocial and those who are antisocial but not psychopathic. Elevated CU traits were also found to be associated with sensation seeking, disinhibition, fearfulness and reward-dominant response style, as well as an óinabilityô to feel stress when faced with negative events (Barry et al., 2000; Essau et al., 2006).

In addition, psychopathy-prone adolescents are more likely to be diagnosed with conduct disorder and oppositional defiant disorder and to report higher aggression and delinquency (Frick, O'Brien, Wootton & McBurnett, 1994; Salekin et al., 2005); CU traits have also been associated with proactive rather than reactive aggression (Frick & Dickens, 2006).

Research has demonstrated that there is a link between bullying others and CU traits. Viding, Simmonds, Petrides, and Frederickson (2009) found that the combination of CP and CU traits appears to represent an increased risk for bullying behavior in early adolescence among a large (n = 704) young adolescent (11ï 13 year olds) sample. Viding, Simmonds, Petrides, and Frederickson also demonstrated an independent association of CU traits with direct bullying, over and above the association with CP. Furthermore, in a study (Fanti, Frick & Georgiou, 2009) with Greek Cypriot adolescents (ages 12 -18), CU traits were found to be linked to both pure forms of bullying and combined bullying and victimization experiences. In addition, in a different study with Greek Cypriot adolescents (ages 12 to 14), Fanti and Kimonis (2012) found that individuals having combined CP and CU traits show a severe pattern of bullying, but not victimization, compared to those exhibiting low or moderate levels of CU traits and CP. Finally, not surprisingly, bullying has been negatively associated with affective empathy (Stavrinides, Georgiou, & Theofanous, 2010; Jolliffe & Farrington, 2006) that is, with the ability to be in touch with the feelings of another person, a characteristic also found in psychopathy.

The present dissertation study will investigate whether bullying and bullying-victimization combined, being associated with high CU traits, is linked with fear processing deficits observed in psychopathic personalities (i.e. Patrick et al., 1993, van Goosen et al. 2004).

Possible links with behavior inhibition/activation systems. Behavior inhibition system **(**BIS) and behavior activation system (BAS) proposed by Gray (1987a, 1987b) (see more extensive review in the next section of this paper) are temperamental characteristics considered to explain individual differences in negative emotions such as anxiety due to cues of punishment (i.e. BIS), and positive emotions such as happiness due to cues of reward (i.e. BAS).

On the one hand, evidence from research has supported links between low BIS and/or high BAS (independently measured or combined) with decreased empathy and poor socialization (Loney et al., 2003; Frick, Clements, Ellis, & Kerlin, 2003; Raine, 1993), primary and secondary psychopathy, elevated CU traits and conduct disorder (Essau, Sasagawa & Frick, 2006; Fowles, 2000; Quay, 1993; Knyazev & Wilson, 2004) as well as

externalizing problems in children and adults (Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008; Muris, Meesters, de Kanter, & Timmerman, 2005).

On the other hand, high BIS has been associated with anxiety and depression as well as internalizing symptoms (Kimbrel, Nelson-Gray, & Mitchell, 2007; Muris, Meesters, de Kanter, & Timmerman, 2005; Vervoort et al., 2010).

To our knowledge, there are no previously reported studies investigating associations between bullying/victimization and BIS/BAS. However, based on previous findings described above, it is a possibility that bullying, previously found to be associated with proactive aggression, externalizing behavior problems and high CU traits, may be associated with high BAS activation and on the opposite, victimization characterized by submissive behavior and anxiety, may be related to high BIS activation. The present study will attempt to examine these assumptions.

Psychophysiology of Antisocial/Aggressive Behavior

This section attempts to present theories linking psychophysiology with antisocial/aggressive behavior and to report past research findings connecting autonomic arousal, autonomic reactivity and startle eyeblink reflex response with such behavior.

Theories linking biology with antisocial/aggressive behavior. Various theories have attempted to link biology with antisocial/aggressive behavior. This part of the paper aims to describe a few of the important theories in this domain that also appear relevant to the study of bullying and victimization.

Reinforcement sensitivity theory. Gray and colleagues (e.g. Gray, 1987a, 1987b, 1991; Gray & McNaughton, 2000) linked biology with personality characteristics when they proposed the existence of two major neural subsystems guiding emotional behavior: the Behavioral Inhibition System (BIS) and the Behavioral Approach System (BAS). The BIS is thought to inhibit behavior in response to cues of punishment, novelty and frustrative nonreward; it produces negative feelings such as anxiety, arousal and fear and it is considered an *anxiety system*. The BAS, on the other hand, is thought to activate behavior in response to positive incentives, independently of cues of punishment or risk and it produces feelings of hope and happiness; it is considered a *reward-driven, approach (towards a goal) or impulsivity system*. According to Colder and Oôconnor (2004), Grayôs model is thought of being of ñgreat interest in the field of developmental psychopathology because it integrates biological differences with contextual risk and protective factorsò (page 435). In addition, Loney et al., (2003) suggested the possible role of BIS/BAS in antisocial behavior:

> Low behavioral inhibition can place a child at risk for missing some of the early precursors to empathetic concern that involve emotional arousal evoked by the misfortune and distress of others. This could lead a child to be relatively insensitive to the prohibitions and sanctions of parents and other socializing agents. It could also create an interpersonal style in which the child becomes so focused on the potential rewards and gains involved in using aggression or other antisocial means to solve interpersonal conflicts that he or she ignores the potentially harmful effects of this behavior on him or herself and others. (p. 66)

Bullying and victimization may be viewed in terms of BIS/BAS systems in that bullying may be characterized by approach behaviors ñindifferentò to punishment cues and victimization may be characterized by inhibited, anxiety-driven behaviors. For a more detailed analysis of this assumption, see chapter 3.

Bioinformational theory. Lang and colleagues (e.g. Lang, 1979, 1995; Lang, Bradley, & Cuthbert, 1990; Lang, Cuthbert, & Bradley, 1998; Bradley, Codispoti, Cuthbert, & Lang, 2001) view emotion networks as being connected to the brainôs two motivational systems: the Aversive (or Defensive System) and the Appetitive System. These systems are neural circuits located in ancient brain structures ñdeeperò in the brain and are basic to the survival of the individual and species. According to Lang, Cuthbert and Bradley (1998), the amygdala is considered a key area for the defensive system as ñstructures downstream from [this area] are implicated in the different forms of defenseò (p. 660). Lang, Cuthbert and Bradley suggest that these defensive behaviors can be organized in (a) defensive immobility, in which the organism ñfreezesò but remains vigilant to respond to aversive stimulations, and (b) defensive action, in which the organism assumes either a fight or flight reaction to respond to negative stimuli or attack. Furthermore, pleasant emotions are thought to be associated with the appetitive system and unpleasant emotions are thought to be driven by the defensive system. Emotional responses to stimuli or situations are defined in terms of two strategic dispositions: *Valence* and *Arousal*. *Valence* refers to the organismôs disposition to assume either an appetitive (i.e. driven by pleasure judgment) or defensive (i.e. driven by displeasure judgment) behavioral set. *Arousal* refers to the organismôs disposition to react with varying degrees of intensity.

Anger, aggression and bullying. According to Patrick and Zempolich (1998), from the perspective of a dimensional model of emotion, anger is considered a defensive state. That is, it is associated with negative emotional valence and heightened arousal similar to anxiety or fear. However, the person that is angry is not being avoidant but rather is being

ñconfrontative and agenticò as he/she is mobilized for defense. According to Harmon-Jones and Allen (1998) the dominant tendency evoked by anger is the one of approach and individuals with high dispositional anger have increased approach motivation and decreased withdrawal motivation.

Aggression can be differentiated on the basis of a defensive or an appetitive motivational system. Patrick and Zempolich (1998) present the example of a threatening stimulus that may prompt either a defensive withdrawal or defensive attack depending on the circumstances and previous learning of the individual; they also use the example of an aggressive act, which in a given situation can reflect different motivations i.e., a physical attack may be perceived as threat and prompt a defensive reaction or it may reflect an appetitively ï motivated effort to manipulate and control.

Bullying may be viewed in terms of both a defensive motivational system and an appetitive motivational system. This appears more clearly in the case of bully-victims, as their bullying behavior may be driven by the pleasure they feel by teasing and dominating others and at the same time, they become targets of bullying due their overreactions and uncontrolled behavior as a result of their effort to defend themselves from perceived threats.

Affective modulation of the startle eye-blink response. Past research has shown that the affective modification of the startle eyeblink reflex is a useful method in studying emotional processes in humans and other animals (Vanman et al., 2003), especially the valence (i.e. pleasantness or unpleasantness) dimension of emotion (Grillon & Baas, 2003).

The startle reflex is a diffuse skeletomuscular response of humans and animals that follows intense stimuli with rapid onset (Cook, Hawk, Davis, & Stevenson, 1991). The sudden closure of the eyelids (eye blink response) is the first, fastest and most stable element in the startle reflex sequence (Lang et al., 1990). For experimental purposes, the eye-blink response amplitude is the most easily measured component (Wilson, Kumaria, Gray, & Corr, 2000) and perhaps the most widely used. Researchers using the startle eyeblink response, commonly measure action potentials generated within the orbicularis oculi muscle (the muscle that closes the eye during a blink), with surface or needle electromyographic (EMG) recording electrodes (Blumenthal et al., 2005). The large majority of studies rely on acoustic startle, evoked by short (up to 50 ms) noises, usually broadband or white noise with a high intensity 90ï 110 dB (A) (Grillon & Baas, 2003).

Miller, Patrick and Levenston (2002) cite evidence indicating that factors modulating the magnitude of the startle reflex include habituation, attention and emotional state. With regards to the latter, studies with healthy adult subjects have repeatedly shown

that there is a linear relationship between valence and startle magnitude in that the acoustic startle eye-blink response increases significantly from pleasant slides (i.e. ski jump) to neutral (i.e. spoon) to unpleasant (i.e. snake) (e.g. Cuthbert et al., 1996; Lang, et al., 1990). Startle reflex is modulated by affect in that during the viewing of unpleasant pictures (that prompt a defensive readiness) the response is larger as it matches with the aversive emotional state created by the startle probe (i.e. abrupt, intense noise) and the defensive nature of the reflex itself. On the contrary, positive slides elicit an appetitive disposition and therefore, produce smaller startle reactions (Lang et al., 1990; Patrick et al., 1993).

In a tone-cued study with *affective imagery* (i.e. imagining emotionally valenced scripts), Van Oyen Witvliet and Vrana (1995) manipulated valence and arousal separately, with fear conceptualized as a negative/high arousal emotion, sadness as a negative/low arousal emotion, joy as a positive/high arousal emotion and pleasant relaxation as a positive/low arousal emotion. They found that healthy adultsô startle blink magnitudes were larger during negatively valent than during positively valent imagery and in addition, during high arousal than during low arousal imagery. The only study, to our knowledge, that examined startle modulation in *affective imagery* scripts in normal children (ages 8-11), reportedly found almost identical startle magnitude during imagery of pleasure, joy, sadness, fear, and anger (Cook, Hawk, Hawk & Hummer, 1995).

The few studies of *affective picture* modulation of the startle reflex in normally developing children have also shown that they respond differently than adults. For example, Waters, Lipp and Spence (2005) found that startle reflex magnitude did not differ significantly during unpleasant, compared with neutral or pleasant pictures, in 8ï 12-year-old children; and McManis, Bradley, Berg, Cuthbert and Lang (1995) failed to demonstrate startle facilitation during unpleasant compared with neutral pictures in 7ï 10 year-old children. However, van Goozen, Snoek, Matthys, van Rossum, and van Engeland (2004) demonstrated that both a group of behaviorally disruptive children and a group of control children (7-12 years) showed the adult-like linear relationship between slide valence and startle magnitude.

Furthermore, Grillon, Dierker and Merikangas (1996) cite research evidence indicating that startle reflex is increased by fear and anxiety. For example, high-fear adults exhibit greater valence modulation of startle than low-fear adults (Cook et al., 1991). In their study, Grillon, Dierker and Merikangas, found that children with a parental history of anxiety disorder exhibited an increased magnitude of startle compared to those without a parental history of anxiety disorder. They suggested that this was true for baseline startle (i.e. startle reflex in the absence of stress) which they interpreted in terms of being trait-

related independently of participantôs emotional state, as well as for startle during an aversive state which they explained in terms of an anxiety-driven reaction to either the stress induced by the lab environment or the anticipation of an unpleasant event or both.

On the contrary, (see also further sections of this paper) highly antisocial youth, similar to incarcerated psychopaths, fail to show normal probe potentiation when viewing unpleasant slides, a response interpreted in terms of fear processing deficits (Patrick et al, 1993; Van Goosen et al, 2004).

Therefore, so far startle reflex studies involving children and adolescents have not shown the adult-like potentiated startle response to negative conditions. These studies are limited and are even fewer, if one considers differences in methodology used (i.e. pictures vs. scripts); therefore, more studies are needed in order to further investigate this domain. In addition, to our knowledge there are no previous studies investigating startle reactivity, especially fear-potentiated startle, in children and adolescents at risk of being involved in bullying and victimization. Examining fear processing in children involved in bullying/victimization appears both intriguing and valuable.

Fearlessness theory and sensation/stimulation seeking theory (e.g. Raine, 1993, 2002). According to fearlessness theory, low autonomic activity [i.e. low resting Heart Rate (HR) and low resting Skin Conductance Response (SCR)] predisposes antisocial and criminal behavior due to lack of fear among these populations. For example, individuals who exhibit low arousal during a resting period of psychophysiological testing, which is considered a mildly stressful situation, appear to lack anxiety and fear. Since antisocial and violent acts require a degree of fearlessness to execute and because lack of fear impairs learning the consequences of such behavior, fearlessness has been suggested to be the explanation of why certain individuals are involved in fighting and assaulting.

According to sensation/stimulation seeking theory, aggressive individuals act antisocially because, due to low levels of autonomic arousal, are easily bored and are not discouraged by situations that the average person finds too exciting, stressful or dangerous. It is argued that a certain amount of stress is needed in order to feel pleasant and that too little or too much stress is experienced as aversive.

Taken together, low resting HR may relate to personality profiles that are high in fearlessness, sensation-seeking, risk-taking, or impulsivity (Scarpa, Tanaka & Haden, 2008). On a theoretical level, it is a possibility that school bullying (entailing physically and verbally violent acts) would be associated with low resting HR (see also further sections of this paper).

SCR, HR and the autonomic nervous system (ANS). The ANS plays an important role in emotional behavior (Raine, 1993) and through its sympathetic and parasympathetic divisions controls the ñfight or flightò reaction and governs critical life functions. The sympathetic branch enables the body to prepare for fear, flight, or fight. Stimulation of the sympathetic branch typically produces, among other things, a rise in blood pressure, acceleration of the heart, and changes in the electrical conductance of the skin. The parasympathetic branch, in contrast, is concerned with the conservation and restoration of energy. The parasympathetic branch typically causes a reduction in HR and blood pressure and facilitates digestion (van Goozen et al., 2007).

SCR is thought to be a direct measure of sympathetic autonomic activity and usually reflects arousal (Lang et al., 1990). It is measured by placing electrodes on two sites of the hand (i.e. the fingers) and involves the passage of subtle current across the electrodes. SCR reactivity indicates changes in the electrical activity of the skin which can be caused by increased sweating (Raine, 1993). HR reflects both sympathetic and parasympathetic nervous system activity and it is also influenced by metabolic and attentional demands (Grillon & Baas, 2003). HR is usually measured by placing electrodes to right and left inner arms of the two hands to record beats per minute. Both SCR and HR are used to assess the extent of autonomic arousal and reactivity to neutral and aversive events (Scarpa & Raine, 1997).

Associations of autonomic arousal and autonomic reactivity with antisocial/aggressive behavior. This section attempts to report previous research findings connecting autonomic arousal (i.e. resting HR/SCR) and autonomic reactivity (i.e. HR/SCR reactivity) with antisocial/externalizing problems and proactive/reactive aggression.

Antisocial/externalizing problems. Ortiz and Raineôs (2004) meta-analysis demonstrated lower resting HR in antisocial children and adolescents, compared to both normal controls and psychiatric controls with an overall effect size of d = - 0.44. Similarly, in his meta-analysis Lorber (2004) reports lower resting HR to be associated with higher levels of aggression and conduct problems (effect size: -.38 and -.33, respectively). Low resting HR has been also reported in children and adolescents with ODD diagnosis (Van Goozen et al., 1998) as well as in boys with disruptive behavior (Maliphant, Watson, & Daniels, 1990.). In addition, examining the results of fourteen previous studies, Raine (1993) concludes that low resting HR has been associated with milder delinquency entailing non selected, non-institutionalized, young subjects. Raine also suggests that low

resting heart rate in antisocial youth does not appear to be affected by gender, body weight or physical exercise.

However, a few studies found no relationship between resting heart rate and antisocial behavior. For example, van Bokhoven, Matthys, van Goozen and van Engeland (2005) found no significant correlation between externalizing problems and basal HR. Similarly, Schneider, Nicolotti and Delamater (2002) found that aggressive children (age range 7-13) exhibit increased HR at baseline and decreased HR reactivity (during a stress provoking task) when compared to nonaggressive children. However, their results showed that as age increased, basal HR decreased. This may indicate that younger children, as oppose to children approaching adolescence, may differ in autonomic arousal and reactivity. In line with this hypothesis, Van Hulle, Corley, Zahn-Waxler, Kagan, and Hewitt (2000) found that HR measured on children at ages 14, 20, &36 months did not predict externalizing behaviors at 7 years of age.

Furthermore, according to Lorberôs (2004) meta-analysis, low resting SCL has been linked to conduct problems, but not aggression, in children. Low resting SCL has also been found to be associated to serious adolescent delinquency (Gatzke-Kopp et al., 2002).

The relationship between heart rate and skin conductance reactivity (i.e. HR and SCR change from baseline during conditions of stress or provocation) in antisocial/aggressive youth has not been very clear.

On one hand, research findings such as Ortiz and Raineôs (2004) study, report an effect size of (d = ï 0.76) of the association between antisocial behavior and HR reactivity during a stressor. Similarly, according to a review by Kibler, Prosser and Ma (2004) regarding the relationship between child and adolescent misconduct and cardiovascular regulation, low HR reactivity during mental challenge was related to greater misconduct. In addition, delinquent adolescents with disruptive behaviors showed a significantly decreased HR response, during a public speaking task aimed to produce anxiety, however, no significant effects were found for SCL (Popma et al., 2006). Furthermore, boys rated by their teachers as refractory, showed less heart rate reactivity in conditions of threat of electric shock or punishment (fining for errors) than their nonrefractory peers (Davies & Maliphant, 1990).

In contrast, Lorber (2004) found greater HR reactivity and lower SCR reactivity to be associated with conduct problems in children during task performance. Children with ODD have also been found to exhibit increased HR reactivity during stress and provocation (i.e. playing a game against an imaginary provocative child) (Van Goozen et al., 1998).

Finally, in their study Williams, Lochman, Philips and Barry (2003) found that *moderately* aggressive boys exhibited greater increases in heart rate than those with lower or higher levels of aggression after threat induction [(i.e. informing their subjects that ñIn the other room another kid is in a bad mood, does not want to participate for the interaction task and he is planning to pick up a serious fight with youò (p. 571)].

In sum, with regards to autonomic arousal, even though there are a few contrary findings, the overwhelming majority of past research replicated the strong association between low resting HR /SCL and antisocial/aggressive behavior in children and adolescents. Interestingly, even though no studies have examined the relationship between resting HR and bullying, Gower and Crick (2011) have recently found that low HR predicted elevated levels of both physical and relational aggression in preschoolers. Since bullying is a type of aggressive/antisocial behavior, it is hypothesized, in line with fearlessness and sensation/stimulation seeking theories, that bullying and bullying-victimization combined may have a negative association with resting HR and SCL.

With regards to autonomic reactivity, mixed results described above, may be due to the differences in participants (i.e., selection criteria, age) and the experimental procedure (i.e. mental challenge, task performance, threat or provocation). Nevertheless, this calls for further investigation of the relationship between HR and SCR reactivity and antisocial and aggressive behavior, especially in ñprovocation situationsò aiming to induce anger (the condition most relevant to aggressive reactions).

Proactive and reactive aggression. Scarpa and Raine (2000) suggested that proactive aggression would be associated with physiological under-arousal and reactive aggression would be associated with physiological over-arousal. Indeed, proactive aggression has been seen as ñcold bloodedò and calculating and in line with the fearlessness theory. This would suggest that during a resting state, proactive aggression would be related to a low HR and a low level of SCR (Kempes, 2005; Scarpa & Raine, 1997). The opposite would be expected (i.e. high resting HR and SCR) for reactive aggression since it has been characterized as ñhot bloodedò and impulsive but this may be mostly apparent as reactivity, not as a resting state. However, these speculations have not been empirically tested except in one study (Pitts, 1997), in which (3^{rd} to 6^{th} grade) boys exhibiting both reactive and proactive aggression had lower resting HR compared to those exhibiting reactive only or proactive only aggression.

Furthermore, in Hubbard et al. (2002) study, 2^{nd} grade proactive and reactive aggressive children played a competitive game (i.e. against a peer), planned to provoke anger. Results showed that reactively aggressive exhibited large increases in SC during the

task (an indication of high emotional arousal) while proactively aggressive children, even though they also experienced increased anger (self-reported), did not. With regards to HR reactivity, researchers did not find the expected increase in HR indicating emotional arousal or anger but they found the opposite (aggression was related to decreased HR reactivity). They hypothesized that the method used in the lab may have provoked interest than anger in children and therefore decrease in HR reactivity. In addition, in the Pitts (1997) study, boys in a reactive-aggressive group responded with increased autonomic reactivity to a simulated provocation from a peer, whereas boys in a proactive-reactive group did not.

To summarize, if bullies can be matched with proactive aggressive behavior and bully-victims with reactive aggressive behavior, based on the under-arousal theory and previous research findings, bullying may be expected to be associated with lower levels of autonomic arousal at rest and during provocation compared to the other three groups of children. Furthermore, assuming bully-victims behave like reactive aggressors, then it is further hypothesized that bullying-victimization combined may be associated to high levels of autonomic reactivity during provocation. However, based on a different set of previous findings showing that bullies and bully-victims are high on both proactive and reactive aggression, whereas *victims* are high on reactive aggression (Salmivalli & Nieminen, 2002; Pellegrini, et al., 1999), it is alternatively expected that both bullying and bullying-victimization combined may be associated with low autonomic arousal and victimization may be associated with increased autonomic reactivity to provocation situations. Since none of these assertions have been previously examined, these hypotheses are tentative.

Associations of affective startle eyeblink response with antisocial/aggressive behavior. This section attempts to report past research findings with regards to affective startle eyeblink response in the context of antisocial/externalizing problems and CU traits.

Antisocial/externalizing problems. It seems that only a few studies examined the eye-blink reflex response in antisocial youth. Those found in the literature involving antisocial/aggressive children and adolescents, have used affective pictures as stimulus materials; no studies were found using affective imagery as stimulus materials. In Van Goozen et al. (2004) study, startle blinks of 21 disruptive behavior disordered (DBD) children (15 subjects were diagnosed with ODD and 6 subjects with CD; age was 7-12 years) were compared with those of normal controls, while viewing negatively, positively and neutrally valent pictures. They found that the eye blink magnitudes of DBD children were smaller for all categories of slides (i.e. reduced responding). In a study conducted by Fairchild et. al., (2008) the same methodology was used, however, this time conduct

disordered male adolescents (age was 14-18 years) were compared to healthy controls. The antisocial group had smaller eye-blink startle response compared to controls, however, the reduction was observed for all picture categories.

Therefore, it appears that adolescents diagnosed with disorders characterized by aggression and conduct problems exhibit reduced startle reactivity to pictures compared to healthy controls. Taking the connections between externalizing behavior problems and bullying into account, one can hypothesize that bullying and bullying-victimization interaction may be associated with an overall reduction of startle reactivity.

Callous Unemotional traits. Research has shown that adults who score high on the emotional detachment factor of psychopathy (as opposed to the impulsivity/behavioral disinhibition factor) are characterized by less affective modification of startle (Vannman et al., 2003); similarly, men reporting high levels of psychopathy, fail to show the normal increased startle response when exposed to aversive pictures (Justus & Finn, 2007). Patrick et al., (1993) showed pleasant, neutral, and unpleasant pictures to a sample of incarcerated male offenders while measuring their eyeblink startle magnitude to acoustic probes. Results showed that compared to both a non-psychopathic and a mixed group (i.e. low and middle scores on the Psychopathy Checklist Revised, respectively), a psychopathic group (i.e. high scores on the PCL-R) failed to show the magnified magnitude response to negative slides. According to the authors, their findings suggest a deficit in psychopathsô negative emotional responding, especially in fear reactivity.

In the van Goosen et al., (2004) study mentioned in the previous section, researchers found that more delinquent DBD children (e.g. those who are more likely to be at risk for later delinquent and criminal behavior) had smaller blink magnitudes during aversive slides. They explain their findings in line with the Patrick et al (1993) results, that is, psychopathy-like fear processing deficits.

Hence, even though relevant findings do not exist for antisocial children and adolescents with psychopathic features (i.e. high CU traits), one can extrapolate from the adult literature that this subgroup of children may exhibit deficits in fear processing (e.g. reduced startle reflex response). Unresponsiveness to fear processing may, therefore, be associated with bullying and bullying-victimization combined using the eye blink paradigm, assuming their connections with CU traits.

Summary of the Present Dissertation Study

The major goal of the present dissertation study was to experimentally investigate the physiological responding associated with school bullying and school victimization during a resting pre-task baseline as well as during tone-cued imagery situations designed

to produce negative emotions (i.e. fear and anger) as well as positive emotions (i.e. joy and pleasant relaxation) (i.e. van Oyen Witvliet & Vrana, 1995; Vrana, 1993; Panayiotou, Brown & Vrana, 2007). This was achieved through the experiment in Study 3, described in Chapter 3.

Study 3, was built on Study 1 and Study 2 also described in Chapter 3. Study 1 involved subjects responding to various questionnaires including the BVQ (Olweus 1996); specifically, this screening phase aimed to differentiate between the various groups of children and adolescents (e.g. bullies, bully-victims, victims, uninvolved) and to clarify, confirm, as well as to further explore, associations between bullying/victimization and a) proactive and reactive aggression (i.e. Salmivalli & Nieminen, 2002), b) callous-unemotional traits (i.e. Fanti, Frick & Georgiou, 2009), and c) BIS/BAS (i.e. Gray, 1970). The purpose of study 2 was to norm and select, through childrenôs ratings of affective scripts, the final set of twelve imagery scripts (three for each of four emotions: anger, fear, joy and pleasant relaxation) to be used in the experimental phase (study 3).

CHAPTER 3: METHOD, RESULTS AND DISCUSSION

Study 1

Screening for Participant Identification and Prediction of Bullying/Victimization Through Personality and Behavioral Characteristics

Overview

Study 1 had two main purposes, a) to screen for the selection of potential participants (e.g. students involved in bullying and victimization) in the experimental phase of this dissertation (study 3), and b) to clarify, confirm as well as to further investigate associations of bullying/victimization with behavioral and personality characteristics (i.e. proactive/reactive aggression, CU traits and BIS/BAS).

Previous research conducted in Cyprus and elsewhere has documented associations between bullying/victimization and proactive/ reactive aggression (i.e. Fanti et al., 2009; Salmivalli & Nieminen, 2002) as well as CU traits (i.e. Fanti et al., 2009; Viding et al., 2009). Associations between bullying/victimization and BIS/BAS appear not to have been investigated yet and this was an additional aim of study 1.

Furthermore, past psychophysiological research findings demonstrated associations between low resting heart rate and antisocial and aggressive behavior in childhood and adolescence (i.e. Raine et al., 1997), psychopathy-like fearlessness reflected in reduced startle reactivity in aversive contexts in adolescents with CU traits and CP (e.g. Loney et al. 2003, van Goosen et al, 2008), as well as increased autonomic reactivity-reflected in elevated SCR- upon provocation in reactively aggressive children (i.e. Hubbard et al., 2002).

However, past psychophysiological research has not examined possible bullying/victimization correlates. This investigation will take place in Study 3 of this dissertation study described later in this paper. Though in order to be able to draw objective conclusions and interpret findings of the psychophysiological part of this research, there was a need to clarify, confirm and further explore past research findings regarding associations between bullying/victimization and behavioral and personality characteristics in this particular sample of Greek-Cypriot children and adolescents.

The only exemption to this line of reasoning was the inclusion of a BIS/BAS measure. High BAS and/or low BIS have been linked to antisocial and psychopathic samples (Essau et al., 2006; Fowles, 2000; Knyazev & Wilson, 2004; Quay, 1993) and high BIS has been linked to symptoms of anxiety and depression (Kimbrel, Nelson-Gray, & Mitchell, 2007; Muris, Meesters, de Kanter, & Timmerman, 2005; Vervoort et al.,

2010). In addition, associations have been documented between high BAS and enhanced activity of SCR, and deceleration of HR, in response to positive slides, as well as the reverse relationship, that is, high BIS and increasing activity in response to negative slides (i.e. Balconi, Falbo & Conte, 2012). Hence, firstly, to our knowledge no previous studies have examined the association between bullying/victimization and BIS/BAS, pointing to a need of such investigation, and secondly, the inclusion of this temperament measure to the investigation of psychophysiological reactivity among bullying/victimization individuals seemed very relevant and interesting.

Hypotheses of study 1 were as follows:

1. Bully-victims would be less proactively aggressive but more reactively aggressive than bullies and that they would be more proactively aggressive than victims (Unnnever, 2005; Schwartz, 1997, 1998).
2. Alternatively, bullies and bully-victims would have higher proactive and reactive aggression than victims and uninvolved and victims would have higher reactive aggression than uninvolved (i.e. Salmivalli & Nieminen 2002; Pellegrini et al., 1999).
3. Bullies and bully-victims would have higher CU traits (i.e. Fanti et al., 2009) compared to victims and uninvolved.
4. BAS would positively predict bullying behavior.
5. BIS would positively predict victimization behavior.

Method

Participants

Participants were 907 students (502 females, 405 males, *M*age: 12.6, age range: 9.9-14.8), randomly selected from 5th and 6th grades of 12 elementary schools and 1st and 2nd grades of 9 junior high schools of Nicosia and Larnaca (including urban as well as suburban areas) (Table 1). In terms of family origin and socio-educational background, the sample was stratified and representative of the population of 10-to-14-year-old children and adolescents in Cyprus (Tables 2, 3 & 4) (e.g. Statistical Services of the Cyprus Government web page: http://www.mof.gov.cy/mof/cystat/statistics.nsf).

Approval for the study was given by the administration of the Ministry of Education and Culture after the aims and procedures of the study had been reviewed by the Pedagogical Institute. The author of this dissertation study was, in addition, granted permission by The Office of the Commissioner for Personal Data Protection to obtain and maintain participantsô personal data. All aspects of the study have also received approval by the National Bioethics Committee.

After all approvals were granted, students were given an informed consent form, brief description of the study and sample of questionnaires, which they took to their parents; only those who had parental consent participated in the study. At that time, parents were also asked to indicate if they were willing to allow their child to participate in the experimental phase (study 3) and if so, to provide a contact number.

Measures

Bullying and victimization. Bullying and victimization among children at school was assessed by the Revised Bullying and Victimization Questionnaire (BVQ; Olweus, 1996). For the aims of the present dissertation study, only the eight items of the bullying subscale and the respective eight items of the victimization subscale were needed; also in the interest of saving time and effort by children who completed a total of four questionnaires on the same day, it was decided that only the sixteen items would be used (e.g. Stavrinides et al., 2010). The items used cover the 7 areas of victimization that is, having been called bad names, having belongings taken without permission, having lies told about them, having nasty tricks played on them, having been threatened or blackmailed, having been hit or beaten up and having been systematically excluded from groups. Children are asked to state whether they suffered any of the above experiences (i.e. ñDuring the last two-three months I was called bad names and I was verbally teased by other kids at schoolò; victimization items) and whether they had committed the same acts against other children (ñDuring the last two-three months I called bad names and I verbally teased other kids at schoolò; bullying items). Answers were given on a five-point Likert-type scale (1= never, 2= 1-2 times, 3= 2-3 times, 4 = once a week, 5= many times a week) for each subscale. Before answering the questionnaire, participants were given examples of bullying/victimization behaviors. The difference between bullying and merely fighting or teasing playfully was also explained to them. Kyriakides et al. (2006) examined the psychometric properties of the BVQ with a sample of Greek Cypriot students and found that it was a valid and reliable scale. Two different studies, (Georgiou & Stavrinides, 2008; Stavrinides et al., 2010) using the BVQ with Greek-Cypriot children and adolescents, successfully identified victims, bullies, and bully-victim groups. In the present dissertation study, exploratory factor analysis was conducted to verify the two factor solution, by selecting a 2-factor extraction on SPSS. The two factors, namely bullying and victimization, explained 44.64% of the variance. Cronbachôs alpha for the bullying scale was .82, and for the victimization scale was .79, indicating good internal consistencies (Table 5).

Reactive and proactive aggression. The Reactive-Proactive Aggression Questionnaire (Raine et al., 2006), is a 23-item scale used to measure proactive (e.g. ñHad fights with others to show who was on topò) and reactive aggression (e.g. ñGot angry when others threatened youò). Proactive aggression was based on 12 items and reactive aggression on 11 items. Items were rated via Likert scales (0 = never), (1 = sometimes), or (2= often) for frequency of occurrence. The items reflect either physical or verbal aggression for both proactive and reactive aggression. The Reactive-Proactive Aggression Questionnaire was previously used in a study with Greek Cypriot children and adolescents (Fanti et al., 2008), after being adapted and translated into Greek. In the previous study, the Cronbachôs alpha for proactive aggression was .81, and for reactive aggression was .82. In the present dissertation study, exploratory factor analysis was conducted to verify the two factor solution, by selecting a 2-factor extraction on SPSS. The two factors, namely reactive and proactive aggression, explained 41.82% of the variance (Table 5). Cronbachôs alpha for proactive aggression was .86, and for reactive aggression was .84, indicating good psychometric properties.

Callous-Unemotional traits. The 24-item self-report Inventory of Callous-Unemotional Traits (ICU; Frick, 2004), designed to assess callous and unemotional traits in youth, was used in this dissertation study. The ICU is composed of 12 positively worded items and 12 negatively worded items. A four-point Likert-type scale is used for scoring (0 = ñnot at all true,ò 1=ñsomewhat true,ò 2=ñvery true,ò and 3 = ñdefinitely trueò). Previous factor analytic studies identified three factors: *Callousness* (e.g., ñThe feelings of others are unimportant to meò), *Unemotional* (e.g., ñI hide my feelings from othersò), and *Uncaring* (e.g., ñI try not to hurt othersô feelingsò-reverse scored); all items also loaded onto a total single high-order callous-unemotional factor (Essau, Sasagawa & Frick, 2006; Fanti et al., 2008). However, in a more recent study (Fanti & Kimonis, 2012), 2 items (2 and 10) were deleted from the total score due to low corrected item-total correlations. In the present dissertation study, an exploratory factor analysis was initially conducted on the 24 items to test the single factor solution; three items (2, 10, 6) were deleted due to low corrected item-total correlations (-.02, .00, .08, respectively). For the remaining 21 items, the single factor (i.e. total CU traits) solution accounted for 23.26 % of the variance and demonstrated good internal consistency (Ŭ = .82). A second factor analysis was conducted on the 21 items to test the three factor solution. The three factors namely, uncaring (8 items), callousness (9 items), and unemotional (4 items), explained 41.82 % of the variance. Internal consistencies were as follows: uncaring, Ŭ = .82; callousness, Ŭ = .70;

unemotional, Ŭ = .52 (Table 5). Due to low Cronbachôs alpha, the unemotional scale was removed from further analyses.

Behavioral inhibition/activation systems. The Behavioral Inhibition System & Behavioral Activation System Scales for Children (Muris, Meesters, de Kanter, & Timmerman, 2005) is a twenty-item self-reported measure of the child version of Carver and Whiteôs (1994), BIS/BAS-scales. Items are scored on a 4-point scale (0 = not true, 1 = somewhat true, 2 = true, 3 = very true). Seven items make up the BIS scale and include statements such as ó*I feel pretty upset when I think that someone is angry with me*ò. Thirteen items make up the BAS-scale, and include statements such as ó*When I want something, I usually go all the way to get it*ò. BIS / BAS scales have been used in community samples, and have been associated with personality traits and psychopathology symptoms (Muris et al., 2005). The questionnaire was previously translated into Greek for the purposes of a different study in Greece (Savva, 2010) however, to our knowledge this is the first time that was being used in Cyprus with Greek speaking children and adolescents. Therefore, in the present dissertation study, principle components analysis was conducted on the 20 items of the questionnaire with orthogonal rotation (varimax) to test the two factor solution, by selecting a 2-factor extraction on SPSS. Item 11R was deleted due to very low inter-item correlations. As can be seen in Table 6, one factor consisted with the BIS items (6 items) and the other factor with the BAS items (13 items); the two factors accounted for 38.86 % of the variance (Table 5). The BIS/BAS scales appeared to be reliable in terms of internal consistency: Cronbachôs alphas were .70 for BIS and .85 for BAS.

Procedure

Children completed the questionnaires in groups during regular class time. They were informed that researchers were interested in studying children and adolescentôs emotions and behaviors. They were asked to work quietly and to raise their hand if they had any questions. Participants were also told that it was not a test and that they were no wrong or right answers; they were, in addition, informed that no teachers or parents would have access to their answers and that they had the right to either decline participation or to stop completing the questionnaires at any time.

Data Analysis

For goal a) of this study, subjectsô scores on the BVQ were used to categorize them into four distinct groups: bullies, bully-victims, victims and uninvolved. To determine which children and adolescent were bullies, victims and bully-victims, similar to procedures followed in previous studies conducted in Cyprus and elsewhere (e.g. Georgiou

& Stavrinides, 2008; Stavrinides et al., 2010; Pellegrini, Bartini, & Brooks, 1999; Scholte, Engels, Overbeek, de Kemp, & Haselager, 2007), participants whose score in bullying was 1 Standard Deviation (SD) above the mean of the respective distribution of scores and their score in victimization was below the mean of the respective distribution of scores, were grouped into a category called bullies (n = 27; 17 boys, 10 girls; 3%); Subjects whose score in victimization was 1 SD above the mean of the respective distribution of scores and their score in bullying was below the mean of the respective distribution of scores, were grouped into a category called victims (n= 35; 15 boys, 20 girls; 3.9%); Subjects whose score was 1 SD above the mean in both dimensions were grouped as bully-victims (n = 33; 25 boys, 8 girls; 3.6%); Subjects who scored 1 SD below the mean in both dimensions were grouped to the uninvolved category (n = 764; 320 boys, 444 girls; 84.2 %). Therefore, in this dissertation study sample, about 11 % of children and adolescents (n = 95; 57 boys, 38 girls) were reportedly systematically involved in either bullying or victimization or both, at school.

For goal b) a one way analysis of variance (ANOVA) was computed in order to identify the differences in dependent measures between the sub-groups of peer violence (i.e. bullies, victims, bully-victims, uninvolved).

Hierarchical multiple regression analyses were also conducted with the studyôs main variables as predictors and bullying and victimization as the outcome variables in order to identify the personality traits that are best associated with and best predict these behavioral patterns. Additionally, a correlation analysis was conducted with the studyôs main measures.

Results

Sample Characteristics

Results of the ANOVA show that there are significant group differences in all measures: Reactive Aggression, $F(3,855) = 12.03$, $p < .0001$; Proactive Aggression, $F(3, 855) = 34.76$, $p < .0001$; Behavior Inhibition, $F(3, 855) = 8.65$, $p < .0001$; Behavior Activation, $F(3,855) = 4.77$, $p = .003$; Callousness, $F(3,855) = 44.41$, $p < .0001$ and Uncaring, $F(3,855) = 11.46$, $p < .0001$.

Post-hoc comparisons using Bonferroni test (Figure 1) indicated that bullies had higher reactive aggression than victims and uninvolved ($p = .04$, $p < .0001$, respectively), higher proactive aggression than victims and uninvolved (both $p < .0001$), marginally higher BAS than uninvolved ($p = .08$), and higher callousness and uncaring than victims and uninvolved (all $p < .0001$). Bully-victims had higher scores on reactive aggression than uninvolved ($p = .001$), higher proactive aggression than victims and uninvolved (both $p <$

.0001) and higher BAS than uninvolved (p = .04); compared to victims and uninvolved, bully-victims had higher callousness (both p < .0001) and higher uncaring characteristics (p = .006, p = .01, respectively). Victims had higher scores of BIS compared to bullies and uninvolved children (both p < .0001).

Prediction of Bullying/Victimization Through Personality and Behavioral Characteristics

Two distinct hierarchical regression analyses were also conducted with bullying and victimization as the outcomes (Table 7).

For bullying, demographics were entered in Step 1; they were gender (girls were coded as 1 and boys as 2), grade level, maternal and paternal education, maternal and paternal profession, and maternal and paternal nationality. Two dummy variables were firstly created in order to replace maternal and paternal nationality variables. For these new variables, Greek-Cypriot and Greek nationalities were coded as 0 and European and Other nationalities were coded as 1. Then, these two variables were combined to create a new variable called parental nationality to be used in the hierarchical analyses. Victimization was entered in Step 2. In Step 3, reactive and proactive aggression were entered, and in Step 4, BIS and BAS were entered. Step 5 included callousness and uncaring characteristics.

For victimization, hierarchical analysis included the same steps followed for bullying except from Step 2, where bullying was entered instead of victimization. Only significant interactions are reported below.

Bullying. In the 1st step, gender was associated with bullying behavior (b = .20, p = < .0001, ΔR^2 = .05); boys reported more bullying than girls [t (905) = -5.76, p < .0001, 2-tailed]. In the 2nd step, victimization was associated with bullying (b = .40, p = < .0001, ΔR^2 = .15), above and beyond demographics; gender remained a significant predictor. According to Step 3, proactive aggression was strongly positively and reactive aggression was negatively associated with bullying (b = .80, b = -.52, both p = < .0001, respectively, ΔR^2 = .16), above and beyond demographics and its association with victimization; gender and victimization remained significant predictors of bullying. According to Step 4, BAS was associated with bullying (b = .14, p < .0001, ΔR^2 = .02), above and beyond demographics, its association with victimization and its association with reactive and proactive aggression; gender, victimization, proactive and reactive aggression, remained significant predictors of bullying. In Step 5, callousness characteristics were associated with bullying (b = .25, p < .0001, ΔR^2 = .05), above and beyond demographics, its association with victimization, its association with proactive and reactive aggression and

its association with BIS and BAS; gender, victimization, reactive aggression, proactive aggression and BAS remained significant predictors of bullying.

Victimization. In the 1st step, gender was associated with victimization (ß = .07, p = .03, qpR^2 = .03) , [boys reported more victimization than girls; t (905) = -2.60, p = .009, 2-tailed], negatively by school class [ß = -.07, p = .03; a one-way ANOVA with Bonferroni correction indicated the following relationships: 5th grade (elementary) > 1st grade (Junior High), p = .04; 6th grade (elementary) > 1st and 2nd grade (Junior high), (p < .0001, p = .005, respectively)], and by parental nationality (ß = .12, p = .001) [children who have either one or both parents being from either a European or other foreign country reported higher victimization compared to those who have either one or both parents being Greek-Cypriot or Greek , t (896) = -2.60, p = .01, 2-tailed]. In the 2nd step, bullying was associated with victimization (ß = .40, p = < .0001, qpR^2 = .16), above and beyond demographics; class and parental nationality remained significant predictors of victimization, while gender was no longer a significant predictor of victimization. In Step 3, reactive aggression was associated with victimization (ß = .16, p = .02, qpR^2 = .00) above and beyond demographics and its association with bullying; school class, bullying and parental nationality remained significant predictors of victimization. In Step 4, BIS was associated with victimization (ß = .26, p < .0001, qpR^2 = .05), above and beyond demographics, its association with bullying and its association with reactive and proactive aggression. School class, bullying and parental nationality remained significant predictors of victimization; however, reactive aggression was no longer a significant predictor and gender became again a significant predictor (ß = .07, p = .03. In Step 5, neither callousness nor uncaring were associated with victimization (qpR^2 = .01), while class, gender, bullying, parental nationality and BIS remained significant predictors of victimization.

Additionally, Table 8 shows correlations among studyôs main variables.

Discussion

Results of study 1 replicate several previous findings regarding associations between bullying and victimization and behavioral and personality characteristics and in addition, they add new knowledge with regards to bullying/victimization correlates.

Specifically, hypothesis 1 was partially supported in that results showed that bully-victims were more proactively aggressive than victims but they were not more reactively aggressive or less proactively aggressive than bullies. Hypothesis one was based on previous findings (Unnnever, 2005; Schwartz, 1997, 1998) suggesting that bully-victims would be less proactively aggressive but more reactively aggressive than bullies and that

they would be more proactively aggressive than victims. Current results supported the second part of hypothesis 1.

The second hypothesis was also partially supported in that both bullies and bully-victims had higher proactive aggression than victims and uninvolved, but bullies had higher reactive aggression than both victims and uninvolved while bully-victims had higher reactive aggression than uninvolved only. Nevertheless, this finding is in line with previous research results indicating that bullies and bully-victims score high on both forms of aggression (Salmivalli & Nieminen 2002; Pellegrini et al., 1999). It has been suggested that these individuals use proactive aggression, characterized as ñcold bloodedò and calculating, to dominate and attack others and at the same time, use reactive aggression, characterized as ñhot bloodedò and impulsive, to defend themselves if they feel that are being attacked or provoked (Pulkinen, 1996). However, the second part of hypothesis 2 stating that victims would have higher reactive aggression than uninvolved was not supported by current results. Even though victimsô mean scores on reactive aggression were higher than uninvolved children, the difference was not statistically significant. Since reactive aggression scores were indicated through self-reports (as opposed to being teacher or peer nominated as in Salmivalli and Nieminen, 2002 study) it may be that the group of victims underreported their reactive aggression scores behaving in a socially accepted way, taken that they are characterized by low levels of self-esteem and high levels of insecurity (Oô Moore & Kirkham, 2001; Olweus, 1991). Even though victims were not found to have high reactive aggression, in the hierarchical regression analysis in this study, in line with previous research findings (Salmivalli & Helteenvuori, 2007) reactive aggression was associated with victimization ($b = .16$, $p = .02$) over and above demographics and its association with bullying.

Results from the current study confirmed the third hypothesis in that bullies and bully-victims had higher CU traits, more specifically, callousness and uncaring characteristics, than victims and uninvolved children. This is in line with previous findings linking CU traits to pure bullying as well as bullying-victimization combined (Fanti et al., 2009; Viding et al., 2009).

Findings from the hierarchical regressions performed in this study with bullying and victimization as the outcomes, give support to the fourth and fifth hypotheses in that BAS is found to be strongly associated with bullying and that BIS is found to be strongly associated with victimization (both $p < .0001$), respectively. To our knowledge, this is the first time that Grayôs (1987a, 1987b) BIS system is found to be associated with being victimized at school and BAS system is found to be linked to bullying others at school,

adding to previous findings connecting BIS with anxiety, depression and internalizing symptoms (i.e. Kimbrel et al., 2007; Muris et al., 2005; Vervoort et al., 2010) and BAS system with decreased empathy, poor socialization, primary and secondary psychopathy, elevated CU traits and conduct disorder (i.e. Loney et al., 2003; Frick et al., 2003; Raine, 1993; Essau et al., 2006; Fowles, 2000; Quay, 1993; Knyazev & Wilson, 2004).

Additional findings of study 1 suggest that, in agreement with prior work, a) boys are at higher risk for exhibiting bullying behavior (i.e. Brunstein et al., 2007; Kepenekci & Cinkir, 2006; Veenstra et al. 2005; Seals & Young, 2003; Kaltiala-Heino et al., 1999) and for being victimized (i.e. Pellegrini & Long, 2002) compared to girls, b) elementary school children reported higher victimization compared to junior high school children (i.e. Arseneault, Bowes & Shakoor, 2009; Eslea & Rees, 2001) and c) children of foreign origin reported higher victimization compared to those being of Greek-Cypriot or Greek origin (i.e. Eslea & Mukhtar, 2000; Verkuyten & Thijs, 2002). With regards to this last finding, there was a question on the BVQ asking children and adolescents to report how often they were being ñcalled names due to their nationality or teased about the way they spoke in Greekò, with 7% of them reporting one to three times in the last two months and 2% reporting one time to many times during a week.

Study 2

Norming and Selection of Imagery Scripts

Overview

Study 2 was conducted to prepare, standardize and select the final set of 12 affective scripts (3 for each of 4 emotions: fear, anger, joy and pleasant relaxation) to be used in the experiment (Study 3), drawn from a set of 32 original imagery scripts used in previous studies in Cyprus and elsewhere (van Oyen Witvliet & Vrana, 1995; Robinson & Vrana, 2000; Panayiotou, 2008).

Anger scripts were used in Study 3 in order to examine the emotional reactivity during provocational situations in individuals involved in bullying and/or victimization. In the case of aggressive victims (or bully-victims), these individuals are considered to react with anger and aggression characterized as reactive and impulsive, when provoked by bullies; this appears to be one of the reasons they remain targets of bullying (Schwartz, 2000). In the case of pure victims (as opposed to aggressive victims) it seems that even though they may feel angry when being attacked, they refrain from striking back (Olweus, 1991, 1993). The difference in reaction styles upon provocation between pure victims (i.e. inhibition) and aggressive victims (i.e. activation) may reflect differences in BIS/BAS (i.e.

Gray, 1987a, 1987b). This assumption is supported by the findings in study 1 showing that bullies and bully-victims had higher BAS than uninvolved children and victims had higher scores of BIS compared to bullies and uninvolved children. The difference between pure victims and bully-victims in the way they react to being provoked may also be explained in that the former assume a defensive withdrawal while the latter a defensive attack (Patrick & Zempolich, 1998) or that aggressive victims strike back due to being fearless (i.e. Raine, 1993) but in contrast, victims do not due to being anxious and fearful. With regards to psychophysiological responding, it has been suggested that reactive aggression, as opposed to proactive aggression, may be responsible for elevated arousal upon perceived provocation (i.e. Hubbard et al., 2002); children involved in bullying/victimization may be characterized by degrees of reactive aggression. At any case, it is of interest to investigate how children involved in bullying/victimization respond psychophysiologically in anger provoking situations. Anger scripts were modified from the original ones in order to represent provocation induction observed in bullying incidences, for example, ñWhile you are getting ready to sit in your seat, a child suddenly pulls your chair so that you fall on the floor and the whole class starts laughing with youò.

The emotion of fear is also important in the study of bullying, although for different reasons depending on the bully, bully-victim or victim status of the child. In the case of bullies and bully-victims, it may be that these children attack others because, due to their lack of anxiety and fear (i.e. fearlessness theory), they seem not to be concerned about the consequences of their actions. On the other hand, victims of bullying have been characterized as submissive and anxious/fearful (i.e. Olweus, 1991). As a result of an attack, victims may feel a mixture of anger and fear (and/or anxiety) however, opposite to bully-victims, fear (and/or anxiety) may overpower anger (i.e. defensive motivation/withdrawal; Bradley et al., 2001) resulting in the frequently observed ñignoring of the bullyò or inhibition of any reaction (i.e. elevated BIS). Fear scripts were therefore, used to examine differences between groups that may be fearless (i.e. bullies and bully-victims) or fearful (i.e. victims). They were selected so as to reflect threatening/fearful situations, independently of school bullying, in order to avoid possible confounding anger induction within the same category of scripts. For example, ñSuddenly the oil in the pan bursts into flames, the curtain catches fire while you are frantically trying to put it outò.

In addition, two positively valenced emotions were selected (joy and pleasant relaxation), even though notice is taken that joy is considered a high arousing emotion while pleasant relaxation, a low arousing one. Nevertheless, these emotions were selected in order to examine whether differences were associated with valence and/or arousal

effects. An example of joy scripts was, ñYou jump with joy as your dad, is giving you your Christmas gift, a brand new mobile phone of the latest technology!ò, and for pleasant relaxation scripts, ñYou had just finished your homework and you are relaxing on your living room sofa, watching your favorite TV programò.

Affective scripts were chosen to fall within the extreme emotional spaces for arousal and valence (see Table below) and that they were representative of their specific emotion category. With the exception of Anger scripts that were reworded to represent bullying incidents, the rest of the scripts were only slightly modified, where appropriate, to match the developmental stage of the current sample (see Appendix A for the selected scripts).

Arousal	**Valence**	
	Negative	Positive
High	Fear, Anger	Joy
Low		Pl. Relaxation

As mentioned before, the final set was selected among 32 standard imagery scripts (8 for each of the 4 emotions) previously used in English (van Oyen Witvliet & Vrana, 1995; Robinson & Vrana, 2000) and more recently, in Greek (Panayiotou, 2008). In the Panayiotou study, participants (164 Greek Cypriot undergraduates) rated 88 scripts (previously translated front and back) representing 8 emotions: anger, fear, joy, disgust, pleasant relaxation, sadness, grief, and neutral. Greek speaking and English speaking adult participants in the previous studies (e.g. Panayiotou, 2008; Robinson & Vrana, 2000; van Oyen Witvliet & Vrana, 1995), gave both fear and anger scripts ratings of negative valence and high arousal, and gave both joy and pleasant relaxation scripts ratings of positive valence; however, participants gave joy scripts higher arousal ratings compared to pleasant relaxation scripts.

Studies with childrenôs ratings of affective imagery scripts are very limited and in fact none in Greek, clearly pointing to the need of the present study.

It was hypothesized that ratings of children and adolescents would match those of adults (i.e. follow the apriori inferences shown at the above Table; van Oyen Witvliet & Vrana, 1995; Panayiotou, 2008). However, since to our knowledge, there are no previously reported childrenôs ratings of imagery scripts, especially for Greek speaking sample, the hypotheses are tentative.

Hypotheses of Study 2 were as follows:

1. Both fear and anger scripts would be rated as more negatively valenced than joy and pleasant relaxation scripts, but would not be significantly different between them.
2. Both fear and anger scripts would be rated as more arousing than joy and pleasant relaxation scripts, and that joy scripts would be rated as more arousing than pleasant relaxation scripts.
3. Both fear and anger scripts would receive lower dominance ratings compared to joy scripts and pleasant relaxation scripts, but there would be no significant differences between them.
4. Ratings of imagery vividness would not differ across emotions
5. Scripts of a particular emotion would receive higher ratings corresponding to that emotion (i.e. anger scripts will be rated higher on anger than on any other emotion; fear scripts would be rated higher on fear than on any other emotion; joy scripts would be rated higher on joy than on any other emotion; and pleasant relaxation scripts would be rated higher on pleasant relaxation than on any other emotion.

Method

Participants

Participants were sixty-one students (N = 61, 39 females, 22 males, *M*age: 12.2) randomly selected from two elementary (grades 5 and 6) and two junior-high (grades 1 and 2) schools in Nicosia (Table 9).

Materials

Participants were given a booklet with each page (see Appendix B) containing a script and the paper-and-pencil version of the Self-Assessment Manikin (SAM; Lang, 1980), including Likert scales for valence (1 = very unpleasant, 9 = very pleasant), arousal (1 = very relaxed, 9 = very tense) and dominance (1 = no control over the situation, 9 = full in control of the situation). Participants also rated each script on imagery vividness (1 = very vague, 7 = very clear), and also on the emotions of fear, joy, anger, sadness, disgust, surprise and relaxation (1 = not at all, 7 = very much).

Procedure

Children completed the task in groups during regular class time. The dimensions of valence, arousal, dominance and vividness of imagery were explained in a manner appropriate for children. They were asked to work quietly and to raise their hand if they had any questions. They were also told to take as long as necessary to rate each script, that

it was not a test and that they were no wrong or right answers; they were, in addition, informed that no teachers or parents would have access to their answers.

Results

Table 10 shows mean ratings for the final twelve selected scripts for each emotion category. As described above, the criterion for the final set of scripts was that they were the best representatives of their emotion category. Also, negative emotions were selected to be significantly different from positive emotions on valence.

Repeated-Measures ANOVAs examined emotion as a within-subjects variable with four levels (Fear, Joy, Anger, and Pleasant Relaxation) and ratings of the twelve scripts as dependent variables on the final 12 scripts. Greenhouse-Geisser corrected p values and partial eta squared are reported for repeated measures variables with multiple levels (emotion).

Results revealed that negative scripts (Fear and Anger) differed from positive scripts (Joy and Pleasant Relaxation) on valence ratings [$F (1, 60) = 1419.28$, $p < .0001$, $\eta^2 = .96$; all $p < .0001$], but not between them (Anger vs. Fear, $p = .46$; Pleasant Relaxation, vs. Joy, $p = .07$).

Negative scripts were rated significantly more arousing than positive scripts, [$F (1, 60) = 329.45$, $p < .0001$, $\eta^2 = .84$; all $p < .0001$]; Fear scripts were rated more arousing than Anger scripts ($p = .04$) and Joy scripts were rated more arousing than Pleasant Relaxation scripts ($p < .0001$).

Positive scripts were rated higher on dominance than negative scripts [$F (1, 50) = 75.78$, $p < .0001$, $\eta^2 = .60$; all $p < .0001$]; Anger scripts were rated higher in dominance compared to Fear scripts ($p < .0001$), but positive scripts did not differ between them ($p = .13$).

Additionally, there was no significant difference among any of the script categories [$F (1, 35) = .81$, $p = .41$, $\eta^2 = .02$ on vividness ratings.

Regarding ratings for the emotion of fear, there was a significant effect of emotion, $F (1, 56) = 203$, $p < .0001$, partial $\eta^2 = .78$. As expected, participants reported feeling more fear during Fear imagery compared to feeling anger, joy or relaxation (all comparisons, $p < .0001$). Participants also reported feeling more anger compared to feeling joy and pleasant relaxation during Fear imagery (both comparisons, $p<.0001$).

Participant ratings for the emotion of joy, showed that there was a significant effect of emotion, $F (1, 59) = 363.48$, $p < .0001$, partial $\eta^2 = .86$. As expected, participants reported feeling more joy during Joy imagery compared to feeling anger, fear or relaxation

(all comparisons, $p < .0001$). Subjects also felt more relaxation compared to fear and anger during Joy imagery (both comparisons, $p < .0001$).

Participant ratings for the emotion of anger, showed that there was a significant effect of emotion, $F(1, 57) = 135.25$, $p < .0001$, partial $\eta^2 = .70$. As expected, participants felt more anger during Anger imagery compared to feeling fear, joy or relaxation (all comparisons, $p < .0001$); they also felt more fear during Anger imagery compared to feeling joy or relaxation (both comparisons, $p < .0001$).

Ratings for the emotion of relaxation, showed that there was a significant effect of emotion, $F(1, 59) = 436.50$, $p < .0001$, partial $\eta^2 = .88$. Participants reported feeling more relaxation during Pleasant Relaxation imagery compared to feeling fear or anger (both $p < .0001$), but not compared to feeling joy ($p = 1.000$ *ns*). They also reported feeling more joy during Pleasant Relaxation imagery compared to feeling anger and fear (both comparisons, $p < .0001$).

Discussion

Results of this study supported expectations that childrenôs and adolescentôs ratings matched those of adultôs, as reported in previous studies in Cyprus and elsewhere (i.e. Panayiotou, 2008; van Oyen Witvliet & Vrana, 1995). Specifically, negative emotion scripts (i.e. anger and fear) received significantly lower ratings on valence and dominance and higher ratings on arousal compared to positive emotion scripts (i.e. joy and pleasant relaxation); in addition, joy scripts were rated more arousing than pleasant relaxation scripts. As expected, there were no significant differences with regards to ratings of vividness.

Furthermore, scripts in a particular emotion category were, as expected, rated higher on the corresponding emotion than on any other emotion. Even though, for example, fear and anger scripts were similar in that they were rated low on valence and high on arousal, they were nevertheless rated significantly different in terms of the emotion they represented. This was the case for every emotion category, that is, anger scripts were rated higher on anger, fear scripts were rated higher on fear, joy scripts were rated higher on joy and pleasant relaxation scripts were rated higher on relaxation, indicating the appropriateness of the selected scripts.

The fact that scripts were the best representatives of their emotion category was particularly important for anger scripts which were the ones having the most changes (with regards to the original scripts) compared to the rest of the emotion categories in order to reflect anger provocation in bullying incidents. Childrenôs higher ratings of anger in Anger

scripts (beyond the expected low valence/high arousal ratings) compared to ratings of any other emotion validate the modifications made in the specific category of scripts.

Overall, analyses with the selected set of scripts to be used in the experimental phase (study 3) showed that they were best representatives of their emotion category, that negative emotions were significantly different from positive emotions on valence, arousal and dominance while there were no differences on vividness.

Study 3

Psychophysiological Indices of School Bullying and School Victimization Experiences in Resting Baseline and Tone-cued Affective Imagery

Overview

Study 3 was the main study of this dissertation as its major aim was to experimentally investigate the physiological responding associated with school bullying and school victimization behavioral patterns during a resting state (i.e. pre-task baseline) as well as during tone-cued imagery situations designed to produce negative (i.e. fear and anger) and positive emotions (i.e. joy and pleasant relaxation) (i.e. van Oyen Witvliet & Vrana, 1995; Vrana, 1993; Panayiotou et al., 2007). A secondary aim of study 3 was to confirm associations between bullying/victimization and CP and ODP as previously reported in Cyprus and elsewhere (i.e. Arseneault et al., 2009; Coolidge et al., 2004; Juvonen et al., 2003; Kokkinos & Panayiotou, 2004). The reasoning behind the selection of the specific emotion categories was described in detail in study 2 and applies to the present study as well. In addition, results from study 1 overall demonstrated the expected links between bullying/victimization and proactive/reactive aggression, CU traits and BIS/BAS in the current sample of Greek-Cypriot children and adolescents. Additionally, through study 1 potential participants to the present experiment were selected (i.e. groups of bullies, victims, bully-victims and uninvolved).

Hypotheses of Study 3 were as follows[1]:

Physiological Responding During a Resting State:

1. High levels of bullying (i.e. bullies) and high levels of bullying and victimization combined (i.e. bully-victims) would negatively predict autonomic arousal (i.e. resting HR/SCR) during a resting state. It has been suggested that antisocial and aggressive behavior is associated with low resting HR (i.e. Ortiz & Raine, 2004; Lorber, 2004), a relation explained by the fearlessness and the sensation/stimulation seeking theories (i.e. Raine, 1993).

2. Based on past research (Unnever 2005, Schwartz 1997; 1998), which connects high levels of bullying and victimization combined (i.e. bully-victims) with high reactive aggression and based on findings demonstrating a positive association between autonomic reactivity (i.e. SCR/HR reactivity) and reactive aggression during anger provocation (Hubbard et al., 2002, Pitts, 1997), high levels of bullying and victimization combined (i.e. bully-victims) are expected to positively predict SCR/HR reactivity during perceived provocation (i.e. during Anger scripts).
3. Alternatively, based on a different set of previous findings which linked high levels of victimization (i.e. victims) to high reactive aggression (Salmivalli & Nieminen, 2002; Pellegrini et al., 1999), it was hypothesized that high levels of victimization would positively predict SCR/HR reactivity during perceived provocation (i.e. during Anger scripts).
4. High levels of bullying (i.e. bullies) and high levels of bullying and victimization combined (i.e. bully-victims), being previously linked to elevated CU traits would be negatively associated with affective modulated startle magnitude (i.e. during Fear imagery). It has been demonstrated that highly delinquent DBD adolescents and adult psychopaths (i.e. van Goozen et al. 2004, Patrick et al. 1993) exhibit reduced startle potentiation to fear stimuli.
5. High levels of victimization (i.e. victims), having been previously associated with elevated levels of anxiety (i.e. Craig, 1998; Storch & Masia-Warner, 2004), are expected to be positively associated with affective modulated startle magnitude (i.e. during Fear imagery). This hypothesis was based on past research findings suggesting that children with a parental history of anxiety disorder exhibited an increased magnitude of baseline and fear potentiated startle compared to those without a parental history of anxiety disorder (Grillon, Dierker & Merikangas, 1996) and also suggesting that high-fear adults exhibit greater valence modulation of startle than low-fear adults (Cook et al., 1991).

Method

Participants

Participants in the experiment were 52 children and adolescents (29 males, 23 females, *M*age = 13.0, age range: 10.0-16.0 years) belonging to one of the four groups:

bullies (n = 14; 11 boys, 3 girls); victims (n = 12; 2 boys, 10 girls); bully-victims (n = 12; 9 boys, 3 girls) and uninvolved (n = 14, 7 boys, 7 girls); groups were formed via the screening procedure described in study 1, however, children and adolescents (from each group[2]) whose parents declined to give permission to participate to the experiment were excluded. Because of computer error and due to the fact that 6 participants expressed discomfort and discontinued the experiment, some data were unavailable (see Table 11). Subjects were paid 15 euro for their participation to the experiment. Parents were conducted by phone and after being thanked for giving consent for their childôs participation in study 1, they were asked if they could allow their child to participate to the ñnext phase of the research, the experimental oneò. They were then informed that the procedure entailed, a) children sitting in a comfortable chair in our lab during which they would be asked to imagine different scenarios from everyday life, while hearing sounds through earphones, as well as completing short questionnaires, b) in order to examine their childôs reactions to various imagery, sensors would be attached to their hands and face, and that this is ordinary for this kind of research, as well as completely safe and painless, c) they would be asked to complete a questionnaire about their child and d) their child would receive a reimbursement for participation. Phone calls were made only by the author of this dissertation and the same information was given to all parents.

Stimulus Materials and Measures

Stimulus materials for the experiment were the 12 affective imagery scripts normed and selected in study 2 along with their rating forms.

Childrenôs internalizing and externalizing problems. Parents of participants in the experiment were asked to complete the Child Behavior Checklist (CBCL6/18; Achenbach, 1991) which is a widely used and well-validated other-report measure of childrenôs adjustment. It includes 118 items assessing internalizing and externalizing problems. This instrument was used because it captures the DSM-oriented scales of Conduct Problems (17 items), Oppositional Defiant Problems (5 items) and Anxiety Problems (6 items) in youth, found to be associated with both specific psychophysiological responding (i.e. Ortiz & Raine, 2004; Loerber, 2004; Hubbard et al. 2002) as well as bullying/victimization experiences (e.g. Kokkinos & Panayiotou, 2004; Olweus 1991). The CBCL has been successfully used in previous research with Greek-Cypriot children and adolescents (Demetriou, Kapsou, Panayiotou, & Kokkinos, 2008; Faidonos, 2011). Even though parents were asked to complete the whole instrument, only the 3 subscales mentioned above were used for the analyses in this study. Cronbachôs alpha for Conduct

Problems was .83, for Oppositional Defiant Problems was .82 and for Anxiety Problems was .70, indicating good psychometric properties.

Apparatus and Response Measurement

All psychophysiological data were recorded via the BIOPAC MP150 system (BIOPAC Systems, Inc., Goleta, CA), while timing of stimulus material presentation was achieved using e-prime 1.0 software (Schneider, Eschman & Zuccolotto, 2002). Physiological signals were sampled at 1000 Hz continuously throughout the experiment on line. Auditory stimuli, i.e. tones signaling the various phases of the experiment and the startle probe, were presented binaurally through SONY-MDR-7506 headphones. The startle stimulus was a 50-ms burst of 95-dB(A) white noise with instantaneous rise time; cuing tones were high (2150 Hz), medium (1898 Hz), and low (1735 Hz) in frequency, all 80 dB (A), 500ms in duration with a 25ms fade in and out period, generated using Audacity 1.2.6. The task computer was sending digital markers to the MP150 system to indicate imagery and relaxation onset and offset, and onset of the white noise probe in additional digital channels. Data were analyzed offline using AcqKnowledge 3.9.0 (BIOPAC Systems, Inc.).

Skin conductance recording. Electrodermal activity was measured using the MP150 system, a skin conductance level amplifier (GSR100C) and a transducer (TSD203) (all BIOPAC Systems, Inc.). The electrodes of the transducer were filled with skin conductance paste and attached to the distal phalanges of the index and middle fingers of the non-dominant hand. SCR was scored in microsiemens (εS).

Heart rate recording. HR activity was recorded via Lead I EKG by two Ag/AgCl disposable electrodes and placed to the right and left inner forearms. The ECG signal was filtered by a BIOPAC ECG100C bioamplifier [set to record HR between 40 and 140 beats per minute (BPM)] and was converted to BPM on line.

EMG recording. To measure the startle reflex, electromyographic activity at the orbicularis oculi muscle were recorded with 4-mm Ag/AgCl electrodes, filled with saline gel, placed under the right eye, according to the placement suggested by Fridlund and Cacioppo (1986). Similarly, 4-mm Ag/AgCl electrodes were placed at the right zygomaticus major (smile) and corrugator (frown) muscles. Raw EMG was amplified, filtered (band pass, 28 high frequency, 500 low frequency), integrated over 5 samples, and rectified.

Procedures

This experiment was based on the tone-cued affective imagery paradigm used in corresponding studies (van Oyen Witvliet & Vrana, 1995; Vrana, 1993; Panayiotou et al., 2007).

Upon arriving to the lab, informed written consent was obtained by the parents and oral consent by the child. In addition, children were informed of their right to discontinue the experiment at any time. The child was then escorted to the experimental room, where he/she was asked to sit in a reclining chair in a dimly lit and sound-attenuated room. At that time, parents were handed the CBCL questionnaire and were asked to complete it and return it when they would come back to pick up their child.

Standard surface electrodes were then attached to the child who was next instructed to remain seated, relax and restrict their movements for a few minutes ñso that experimenters can check and verify that the equipment is properly workingò. They were also informed that experimenters were able to observe them via a camera placed in the room but that no recording was taking place. During this resting (no-task) time, HR and SCR were continuously measured for 5 minutes.

After the 5-minute resting period, earphones were placed on participants and training took place in order for them to be able to differentiate between the three tones signaling either a relaxation (medium tone) or an imagery period (high or low tones), throughout the experiment. Each script was randomly assigned to a tone (either high or low) that cued participants to start the imagery period, which lasted for 8 seconds. Then, a medium tone signalled a relaxation period, i.e. participants were instructed to ñclear their mindsò, relax and silently repeat the word óneô until the next (high or low) tone. These relaxation periods were of variable duration and served as control/neutral conditions. The high or low tone, on the other hand, signalled participants to imagine the specified sentence content and to continue this until the next (medium) tone. The tones were presented in a quasi-random order. Material presentation occurred in 6 blocks of two scripts. At the beginning of each block, participants were given two index cards, one with a positive emotion e.g. joy and one with a negative emotion e.g. anger. Participants were then instructed to read the sentences and describe them to the experimenter, in their own words; this insured that all of them comprehended the content of the scripts. Participants were then instructed to close their eyes and create a vivid personal image, (based on the script) as if it actually happened to him/her. Following that, they were asked to memorize the particular image and imagine it upon hearing the signalling tone (high or low). Each block was formed by 12 imagery trials (6 for each script in random order). Following each block,

participants rated each of the previous two scripts on the dimensions of valence, arousal, dominance and vividness of imagery as well as on seven different emotions they may have caused them to feel via the rating forms described in study 2. After that, the experimenter returned to the experimental room with a new pair of sentences. Before the experiment begun, a practice block was run, during which participants became familiarized to the procedure.

During imagery periods, startle probes occurred either at 3.5, 5, or 7 seconds after tone onset, for 2/3rds of the scripts, whereas during órelaxation, repeat oneô periods, they were distributed between 2 and 37 seconds to minimize predictability in a fully balanced design.

Data Reduction and Analysis

Data from the average 8sec prior to the tone-cued imagery were used as baseline to create change scores for HR, SCR, Zygomatic activity and Corrugator activity.

EMG was scored off-line within a 120 ms window after the onset of the startle probe for peak magnitude (difference in εV between the mean of a 25ms baseline prior to each probe from the post-probe maximum; see Cinciripini et al., 2006). Startle magnitude scores were converted into z- scores and then into t- scores using the mean of each trialôs ñrepeat oneò-relaxation period.

One way ANOVAs were performed to identify participant behavioral and personality characteristics based on their group status (e.g. Bullies, Victims, Bully-Victims, Uninvolved).

Repeated-Measures ANOVAs examined emotion as a within-subjects variable with four levels (Fear, Joy, Anger, Pleasant Relaxation) and all physiological measures and post-trial imagery ratings as dependent variables. Greenhouse-Geisser corrected p values and partial eta squared are reported for repeated measures variables with multiple levels (emotion).

One way ANOVAs were performed in order to examine group differences (e.g. Bullies, Victims, Bully-Victims, Uninvolved) in terms of psychophysiological responding, with the dependent variables being resting HR, resting SCR, HR reactivity and SCR reactivity (during Anger scripts) and potentiated startle magnitude response (during Fear scripts). However, even though overall the expected pattern of results was found in the group means (Table 11), results did not reach significance potentially due to small group sizes. In order to improve statistical power, bullying, victimization and bullying x victimization interaction were treated as continuous variables, after being mean centered. Hence, hierarchical linear regressions were performed with bullying, victimization and

bullying x victimization interaction being the independent and physiological measures being the dependent variables. To probe the interaction effects the procedures described by Aiken and West (1991) were used.

Additionally, correlation analyses were performed for post-trial imagery ratings and for behavioral and personality characteristics.

Results

Sample Characteristics

A one way analysis of variance (ANOVA) was computed in order a) to identify the differences in behavioral and personality characteristics between the sub-groups of peer violence (i.e. bullies, victims, bully-victims, uninvolved) in the present experimental sample and b) to repeat the same analysis conducted in study 1 so that comparisons can be made between the initial sub-groups (formed in study 1) and the ones formed after children without parental permission had been excluded (present study).

For a), results of this analysis show that there are significant differences in all measures: Proactive Aggression, $F(3, 48) = 12.46$, $p < .0001$; Reactive Aggression, $F(3,48) = 13.97$, $p<.0001$; Behavior Inhibition, $F(3, 48) = 4.96$, $p = .004$; Behavior Activation, $F(3,48) = 2.71$, $p = .05$; Callousness, $F(3,48) = 5.88$, $p = .002$ and Uncaring, $F(3,48) = 3.02$, $p = .03$.

Post-hoc comparisons using Bonferroni test (Table 11) indicated that bullies had higher reactive aggression than victims and uninvolved ($p = .002$, $p < .0001$, respectively), higher proactive aggression than victims and uninvolved (both ps $< .0001$) and higher callousness than victims and uninvolved ($p = .04$, $p = .03$, respectively). Bully-victims had higher reactive aggression than uninvolved ($p < .0001$), higher proactive aggression than victims and uninvolved ($p = .04$, $p = .01$, respectively) and higher callousness than victims and uninvolved ($p = .02$, $p = .01$, respectively). Victims had higher scores of behavior inhibition than bullies, bully-victims and uninvolved ($p = .004$, $p = .03$, $p = .05$, respectively).

For b), looking at the results from study 3, it appears that sub-group characteristics in the present study match those of study 1.

In addition, a one way ANOVA was conducted in order to further examine sub-group differences, in the experimental sample, with regards to parent reported DSM-oriented scales of CBCL (Anxiety Problems, Oppositional Defiant Problems and Conduct Problems). The results of this analysis showed that there was a significant difference for Conduct Problems, $F(3, 45) = 2.66$, $p = .05$ and a marginally significant difference for Oppositional Defiant Problems $F(3, 46) = 2.53$, $p = .06$. Post-hoc comparisons using the

Bonferroni test (Table 11) indicated that bullies had significantly higher levels of reported Conduct Problems than uninvolved children ($p = .05$).

Preliminary analyses-emotion induction effects

In order to check the effectiveness of manipulations in the experimental procedure (i.e. differences between emotion categories), repeated measures ANOVA (with Greenhouse-Geisser correction) were performed with emotion being the within subjects variable and physiological measures being the dependent variables. Table 12 shows participant mean psychophysiological responses in each emotion.

Startle eyeblink reflex response. With respect to startle eyeblink reflex response (Table 12), results indicated a main effect of emotion, $F (1, 39) = 4.28$, $p = .014$, partial $\eta^2 = .10$; Joy imagery elicited significantly larger startle responses than Anger ($p = .006$) and Pleasant Relaxation imagery ($p = .01$). Planned comparisons analysis between high arousal emotions (i.e. Fear, Anger and Joy) and low arousing emotion (i.e. Pleasant Relaxation) showed that eyeblink response during high arousal emotions were larger compared to low arousal emotion $t (39) = - 2.27$, $p = .02$. Planned comparisons analysis between positive (i.e. Joy and Pleasant Relaxation) and negative emotions (i.e. Anger and Fear) did not reveal significant results.

Overall, mean startle response magnitudes indicated that Joy elicited the largest startle eyeblinks, followed by Fear, then Anger and finally, by Pleasant Relaxation (which elicited the smallest startle response) (Figure 2).

Corrugator activity. In terms of corrugator activity (Table 12), results revealed an effect of emotion, $F (1, 48) = 9.43$, $p < .0001$, partial $\eta^2 = .16$. Participants (Figure 3) had greater corrugator response during Fear imagery compared to Joy ($p < .0001$) and Pleasant Relaxation ($p = .005$) imagery. Anger imagery also elicited greater corrugator response than Joy ($p = .01$) and Pleasant Relaxation imagery ($p = .02$). Planned comparisons analysis between positive (i.e. Joy and Pleasant Relaxation) and negative emotions (i.e. Anger and Fear) revealed that corrugator response was larger during negative emotions compared to positive emotions, $t (48) = 4.22$, $p < .0001$.

Zygomaticus activity. With respect to zygomaticus activity (Table 12), results were in the expected direction (e.g. Joy imagery elicited the largest and Fear imagery elicited the smallest zygomaticus activity), however, differences did not reach significance, $F (1, 46) = 2.19$, $p = .11$, partial $\eta^2 = .04$. Planned comparisons analysis between positive (i.e. Joy and Pleasant Relaxation) and negative valence (i.e. Anger and Fear) did not reveal significant results.

HR Reactivity. Results did not reveal a significant effect of emotion on HR reactivity [F (2.34, 112.64) = 1.19, p = .32, η^2 = .02]. Overall (Table 12), mean values indicated that Anger imagery elicited the highest HR reactivity, followed by Fear, Joy and finally, Pleasant Relaxation. Planned comparisons analysis between the high arousal emotions (i.e. Fear, Anger and Joy) and low arousing emotion (i.e. Pleasant Relaxation) approached significance t (48) = 1.87, p = .06, with high arousal emotions resulting in higher HR reactivity.

SCR reactivity. Results did not reveal a significant effect of emotion on SCR reactivity [F (2.72, 128.16) = .39, p = .73, η^2 = .008]. Overall (Table 12), mean values indicated that Fear imagery elicited the highest SCR reactivity, followed by Joy, Relax and finally, Anger. Planned comparisons analysis between high arousal emotions (i.e. Fear, Anger and Joy) and low arousal emotion (i.e. Pleasant Relaxation) did not reveal any significant differences.

Main Analyses

Prediction of autonomic (baseline) arousal by bullying/victimization. Hierarchical linear regressions were performed to investigate the unique and interactive effects of bullying and victimization on resting HR and resting SCR. Step 1 included bullying and victimization. Step 2 included the 2-way interaction product term between bullying and victimization.

Resting HR. Table 13 shows the results of the hierarchical linear regression analysis with resting HR being the dependent variable. The first step of the regression analysis explained 12% of the variance. Bullying (β = - .35, p = .01) but not victimization was *negatively* associated with resting HR. Step 2 suggested that the bullying x victimization interaction predicting resting HR was significant (β = - .27, p = .04; ΔR^2 = .07). Breaking down this interaction shows (Figure 4) that bullying was not significantly associated with resting HR for children and adolescents with low victimization (i.e. bullies) (β = - .13, p = .44), but was significantly associated with resting HR for those with high victimization (i.e. bully-victims) (β = -.66, p = .002).

Resting SCR. Table 14 shows the results of the hierarchical linear regression analysis with resting SCR as the dependent variable. It is demonstrated that bullying (β = -.26, p = .07) and bullying x victimization interaction (β = -.23, p = .10) were *marginally negatively* associated with resting SCR. The percentage of the variance explained by these marginal predictors was 10 percent.

Prediction of autonomic reactivity (during anger imagery) by bullying/victimization. In order to examine associations between autonomic reactivity

during perceived anger provocation and bullying/victimization, two distinct hierarchical linear regressions were performed as follows: In the first analysis, mean SCR reactivity during anger imagery was the dependent variable and in the second analysis, mean HR reactivity during anger imagery was the dependent variable. In both analyses, victimization and bullying were entered in step1 and bullying x victimization interaction was entered in step 2.

SCR reactivity. Table 15 shows the results of the hierarchical linear regression analysis with SCR reactivity during Anger imagery as the dependent variable. It was shown that bullying, victimization and bullying x victimization interaction were not associated with SCR during Anger imagery.

HR reactivity. Table 16 shows the results of the hierarchical linear regression analysis with HR reactivity during Anger imagery as the dependent variable. It was demonstrated that victimization but not bullying was *marginally negatively* associated with HR reactivity (ϐ = -.25, p = .08). The percentage of the variance explained by this marginal predictor was 8 percent; bullying x victimization interaction was not associated with HR reactivity.

Prediction of affective eyeblink modulation (during fear imagery) by bullying/victimization. In order to examine associations between fear potentiated startle magnitude (i.e. during Fear imagery) and bullying/victimization, a hierarchical linear regression was performed with the dependent variable being startle response magnitude during fear imagery and bullying and victimization entered in step1 and the bullying x victimization interaction entered in step 2.

Startle reflex magnitude during Fear imagery. Results of the analysis indicated that bullying, victimization and bullying x victimization interaction were not significantly associated with startle magnitude response during Fear imagery.

In order to further clarify the effects of bullying on the startle response elicited by Fear imagery, a *Fear Startle Index* was created by subtracting mean startle magnitude elicited by Pleasant Relaxation (regarded as baseline) from mean startle response elicited by Fear imagery (i.e. Miller, Patrick & Levenston, 2002). In Miller et al., this index was calculated by subtracting magnitude for pleasant from magnitude for aversive imagery scenes. Here, the Fear Startle Index was also used to indicate startle reflex potentiation in relation to what would be considered a baseline emotion, which was Pleasant Relaxation since no Neutral imagery was used in the present design and because this emotion elicited the lowest startle magnitude response. Then, the above analysis was repeated, this time the

dependent variable being Fear Startle Index, with Step 1 including bullying and victimization and Step 2 including the bullying x victimization interaction.

Fear startle index. Table 17 shows the results of the analysis with Fear Startle Index being the dependent variable. Step 1 demonstrated a trend towards significance for victimization (ϐ = .23, p = .15), but not bullying, in positively predicting Fear Startle Index. Step 2 suggested that bullying x victimization interaction predicting Fear Startle Index was significant (ϐ = -.34, p = .03). The total percentage of variance explained by these predictors was 18 percent. The association of bullying x victimization interaction with Fear Startle Index when broken down shows (Figure 5) that high bullying was *negatively* associated with Fear Startle Index for children and adolescents with high victimization (i.e. bully-victims) (ϐ = -.56, p = .02) but not for those with low victimization (i.e. bullies) (ϐ = .10, p = .63).

Post-trial Imagery Ratings

As for the post-trial subjective ratings of emotional dimensions (valence, arousal, dominance, vividness and emotion) repeated-measures ANOVA analyses were conducted to test for emotion effects. Table 18 shows participant post trial imagery ratings in each emotion and Table 19 shows participant post trial imagery ratings as a function of bullying involvement.

Participant ratings on Valence, analysis revealed a significant effect of emotion, F (1, 42) = 317.14, p< .0001, partial ɖ^2 = .88. As expected, participants rated both Fear and Anger scripts more negatively valenced than both Joy (p < .0001) and Pleasant Relaxation (p < .0001) scripts; There was no difference between emotions of the same valence (Anger vs. Fear, p = 1.0 *ns*; Joy vs. Pleasant Relaxation, p = .87 *ns*)

Regarding Arousal ratings, there was a significant effect of emotion, F (1, 42) = 171, p< .0001, partial ɖ^2 = .80. Participants rated both Fear and Anger as more arousing than both Joy and Pleasant Relaxation (both p< .0001) but not different between them (Anger vs Fear, p = 1.0). Participants also rated Joy as more arousing than Pleasant Relaxation (p< .0001).

As for subjective ratings of Dominance, results showed that there was a significant effect of emotion F (1, 42) = 111.44, p < .0001, partial ɖ^2 = .73. As expected, participants reported feeling less dominant during Fear compared to all other emotions (Anger, p=.002; Joy, p <.0001; Pleasant Relaxation, p <.0001). Participants also reported feeling less dominant during Anger compared to Joy (p <.0001) and Pleasant Relaxation (p <.0001).

For participant Vividness of imagery ratings, there was no significant effect of emotion, F (1, 42) = 1.23, p= .29, partial η^2 = .03, indicating that participants rated imagery vividness similarly for each emotion.

Regarding ratings for the emotion of anger, there was a significant effect of emotion, F (1, 45) = 50.65, p< .0001, partial η^2 = .53. As expected, participants reported feeling more anger compared to all other emotions during Anger imagery (all comparisons, p < .0001).

Participant ratings for the emotion of joy, showed that there was a significant effect of emotion, F (1, 42) = 321.75p < .0001, partial η^2 = .88. As expected, participants reported feeling more joy compared to all other emotions during Joy imagery (all comparisons, p < .0001).

As for the emotion of fear, there was a significant effect of emotion, F (1, 44) = 51.16, p < .0001, partial η^2 = .53. As expected, participants reported more fear compared to all other emotions during Fear imagery (all comparisons, p < .0001).

Ratings for the emotion of relaxation, showed that there was a significant effect of emotion, F (1, 43) = 398.07, p < .0001, partial η^2 = .90. As expected, participants reported more relaxation compared to all other emotions during Relaxation imagery (all comparisons, p < .0001).

Correlations for Post-Trial Imagery Ratings and Personality and Behavioral Characteristics

A Pearsonôs r bivariate correlation analysis indicated that valence ratings of Anger scripts were negatively correlated with victimization (r = -.30, p = .04, i.e. the higher the victimization the more negative anger scripts were perceived); Arousal ratings of Anger scripts were positively correlated with victimization (r = .42, p = .007, i.e. the higher the victimization the more arousing anger scripts were perceived) and BIS (r = .40, p = .007, the higher the BIS scores the more arousing anger scripts were perceived) and negatively correlated with total CU traits, callousness and uncaring characteristics (r = -.40, p = .007; r = -.33, p = .02; r = - .35, p = .01, respectively, i.e. the higher these characteristics the less arousing anger scripts were perceived); Dominance ratings of Anger scripts were negatively correlated with victimization (r = -.30, p = .04, i.e. the higher victimization the less dominant participants felt during anger scripts); Valence ratings of Fear scripts were negatively correlated with victimization (r = - .34, p = .02, i.e. the higher the victimization the more negative fear scripts were perceived) and marginally negatively correlated with BIS (r = - .25, p = .09); Arousal ratings of Fear scripts were positively correlated with victimization and BIS (r = .32, p = .03 and r = .30, p = .04, respectively, i.e. the higher the

victimization and BIS the more arousing fear scripts were perceived); finally, valence ratings of Joy scripts were negatively correlated with total CU traits (r = - .32, p = .03, i.e. the higher the CU traits the less positive Joy scripts were perceived).

Additionally, a correlation analysis was conducted among CBCL measures (DSM-oriented scales) and behavioral and personality characteristics (Table 20).

Exploratory Analyses

Joy Startle Index & Anger Startle Index. For exploratory purposes, two more startle indexes were created, a óJoy Startle Indexô and an óAnger Startle Indexô, following the same procedure as above (subtracting mean startle magnitudes of each of the two emotions from pleasant relaxation mean startle magnitude regarded as baseline). Two separate multiple regressions were then performed, with óJoy startle indexô and óAnger startle indexô as the dependent variables and bullying, victimization and bullying-victimization interaction as the predictor variables. Results were not significant either for óJoy startle indexô, F (3, 36) = 1.25, p = .30, or for óAnger startle indexô, F (3, 36) = .21, p = .88. These non significant findings for anger and joy imagery give further support to the significant findings regarding associations between Fear Startle Index and bullying/victimization experiences.

Gender effects. Exploratory independent samples t-tests were conducted in order to compare corrugator (during fear imagery) and zygomaticus (during joy imagery) responses between males and females. Results (Figure 6) revealed that females had larger corrugator responses than males during fear imagery [t (48, 30.44) = 2.7, p = .01]. No significant gender differences were found for zygomaticus response, even though mean results suggested that females exhibited larger Zygomaticus activity than males during joy imagery (females M = .68, males M = .07.)

Age effects. Exploratory linear regressions were conducted in order to examine the association between age and resting HR and resting SCL. Results, revealed a negative association between age and both resting HR [ß = -.45, p = .001, overall variance accounted for 20% (adjusted R^2 = .19)] and resting SCL [ß = -.39, p = .006, overall variance accounted for 15% (adjusted R^2 = .13)].

Vividness effects. Furthermore, in order to examine any effects of participantôs age on imagery vividness (i.e. post-trial imagery ratings), linear regressions were performed with vividness ratings as the dependent variable and age as the independent variable. None of the results were significant, demonstrating that age was not a predictor of imagery vividness [Anger, F (1, 41) = .23, p = .63; Fear, F (1, 42) = .21, p = .64; Joy, F (1, 40) =

.50, p = .48; Pleasant Relaxation, F (1, 40) = .005, p = .94]. This effect indicated that the imagery task was probably equally manageable by participants of all ages.

Discussion

Results of Study 3 showed that high levels of bullying were associated with low resting HR but this was the case for children and adolescents with high victimization (i.e. bully-victims) compared to those with low victimization (i.e. bullies), partially confirming the first hypothesis expecting that bullying as well as bullying-victimization combined would be associated with low autonomic arousal. This finding is further supported by differences in mean resting HR among groups (Table 11) showing that bully-victims had the lowest resting HR followed by bullies, uninvolved, and finally, victims (which had the highest resting HR). Current results are in line with prior work suggesting a link between low resting HR and antisocial/aggressive behavior (i.e. Ortiz and Raine, 2004; Lorber, 2004) and more recently, between low resting HR and elevated levels of both physical and relational aggression (e.g. Gower & Crick, 2011).

Furthermore, results demonstrated that high bullying was negatively associated with Fear Startle Index (defined as the change in eyeblink magnitude during fear scripts with respect to a baseline emotion-pleasant relaxation), for children and adolescents with high victimization (i.e. bully-victims) but not for those with low victimization (i.e. bullies). This partially confirms the hypothesis stating that high levels of bullying and high levels of bullying and victimization behavior combined may be associated with decreased affective startle reflex modulation during Fear imagery and it is in line with previous findings (i.e. van Goosen, 2004; Patrick et al., 1993) suggesting that extremely delinquent and aggressive youth and psychopathic adults exhibit inhibited affective startle magnitude (during unpleasant pictures) due to fear processing deficits. These findings are in accordance with the negative association demonstrated between resting HR and co-occurrence bullying and victimization experiences. Overall, these findings can be explained by the fearlessness theory suggesting that fear processing deficits may be responsible for highly antisocial and aggressive behavior (Raine, 1993).

Secondly, even though results only approached statistical significance (p = .07), as expected, high victimization experience (i.e. victims) was positively associated with Fear Startle Index. This marginally significant positive association between victimization and affective startle reflex magnitude during Fear imagery is further supported by the fact that as a group, victims exhibited the highest startle magnitude during Fear scripts compared to the other groups (Table 11), although this difference did not reach statistical significance. Not surprisingly, according to their parents victims had also the highest anxiety levels

compared to the other groups (Table 11), even though differences did not reach significance. Taken together, these findings are in line with previous studies suggesting that anxiety and fear, increase baseline as well as fear potentiated startle in children (see Grillon, Dierker & Merikangas, 1996) whereas absence of fear apparently decreases it.

Contrary to expectations, neither high victimization (i.e. victims) or high bullying and victimization combined (i.e. bully-victims) was significantly associated with elevated autonomic arousal (i.e. SCR reactivity) during provocation (anger imagery); however, even though group mean differences also did not reach significant levels, it was found that bully-victims exhibited the highest SCR increase during anger scripts, followed by victims, bullies and finally, by uninvolved children and adolescents (Table 11). One explanation for the lack of a significant association between victimization and bullying-victimization combined with increased autonomic arousal may lie in the difference in the methods used to provoke anger. In Hubbard et al., (2002) study where reactively aggressive children demonstrated high autonomic arousal upon provocation, children actually participated in a board game against another child (confederate) who cheated resulting in subjects losing the game and consequently, a winning prize. The provocative experiences induced in that study were apparently more ñactivity basedò, ñdirect and confrontativeò and thus, more emotionally arousing compared to the ñless activity basedò, ñindirect ò experiences induced in the present study (i.e. of imagining anger scenes). In other words, frustrated participants in the previous study could direct their aggression towards a real person while in the present study they did not have that option. Even though in the present study victims and bully-victims (Table 19) rated anger scripts as highly negative, arousing and anger-inducing, the procedure being used may not have resulted in ñintenseò anger experiences and hence, fell short of resulting in raising autonomic arousal. Furthermore, the hypotheses in the present study were made based on previous findings demonstrating that high levels of reactive (but not proactive aggression) are associated with autonomic reactivity to provocation (i.e. Hubbard et al., 2002; Pitts, 1997). Therefore, the hypothesis that victimization (i.e. victims) or alternatively, bullying-victimization combined (i.e. bully-victims) would be associated with autonomic reactivity during provocation was expected to hold assuming that either or both of these groups had high levels of reactive aggression. However, this was not the case for victims in the present study as they did not have high reactive aggression. Secondly, as for the absence of a significant association between bullying-victimization combined (i.e. bully-victims) with autonomic reactivity to provocation, this may be due to the fact that in the present study bully-victims exhibited both high reactive and proactive aggression. As mentioned before, previous studies (i.e.

Hubbard et al., 2002; Pitts, 1997) found that reactive aggression only and not reactive and proactive aggression combined was associated with autonomic reactivity and the reason may be in that proactive aggression is associated with physiological under-arousal while reactive aggression with physiological over-arousal (Scarpa & Raine, 2002) creating a reciprocal suppression effect. For the unexpected marginally significant (p = .08) negative association between victimization and HR reactivity during anger scripts, two explanations may be given: a) high interest to the scripts and b) a defensive response to the scripts. For a) according to Hubbard et al., ñchildrenôs heart rates tend to increase when they are emotionally aroused, but they tend to decrease when they are oriented toward or attending to something in their environmentò (p. 1115). Therefore, it is a possibility that as victimization increased heart rate reactivity decreased because anger scripts reflecting bullying scenes were found very interesting and engaging (by definition children with high victimization experience the same or similar incidences in real life). Alternatively, the deceleration of HR in participants with high victimization during Anger scripts (where in fact they were asked to imagine themselves being bullied and which indeed rated high in fear -Table 19) may be explained in terms of a defensive ñimmobilityò reaction (to a fearful/dangerous situation) in which the organism ñfreezesò but remains vigilant to respond to aversive stimulation (Lang, Cuthbert and Bradley, 1998). According to these theorists immediately after the encounter (post-encounter) of an aversive stimuli HR decreases, SCR increases, while startle reflex becomes inhibited. If danger is perceived imminent (depending on the arousal of the aversive stimuli) then an overt defensive reaction is observed (fight/flight response) where HR accelerates, SCR continues to increase and startle potentiation begins. Here, it is proposed that victims did not react as in a fight/flight response because there was no real life danger or threat but exhibited only the initial post-encounter defensive response. However, group mean differences reveal that bullies, victims and bully-victims exhibited (almost identical) low HR reactivity to Anger scripts compared to the uninvolved group. This finding gives more support to the ñhigh interestò than the ñdefensive responseò explanation of the marginal negative association between victimization and HR reactivity.

Preliminary analyses with regards to emotion induction effects showed that Joy imagery elicited higher startle reflex magnitude compared to Anger and Pleasant Relaxation imagery. This is a rather unexpected finding since it has not been previously reported in children and adolescent literature. For example, as previously described in this paper, Cook et al., (1995) reported almost identical startle magnitude during affective imagery and Waters et al., (2005) did not find significant differences in startle reflex

magnitude during affective picture viewing in children. However, adult imagery studies showed that startle increases as a function of arousal for pleasant scripts (i.e. vanOyen Witvliet & Vrana). Similarly, Miller et al., (2002) found greater startle reactivity for personal pleasant imagery scenes rated higher in arousal and vividness than standard pleasant imagery scenes. Miller et al., hypothesized that during the viewing of pleasurable arousing scenes greater perceptual engagement results in inhibited startle whereas in the case of pleasurable highly interesting imagery, highly engaging *non-perceptual* mental processing interrupted by an acoustic probe results in increased startle magnitude. This hypothesis perhaps applies to the present findings suggesting that joy imagery resulted in increased startle magnitude compared to pleasant relaxation imagery; that is, joy scripts including ñYou jump with joy as your dad, is giving you your Christmas gift, a brand new mobile phone of the latest technology!ò probably captured childrenôs and adolescentsô attention (they were also rated as more arousing than pleasant relaxation scripts) resulting in increased engagement of mental processing and consequently, enhanced startle magnitude upon interruption by the loud noise probe.

With regards to participantôs post-trial imagery ratings, analyses showed that, similarly to findings discussed in study 2, the selected scripts were the best representatives of their emotion category, that negative emotions were significantly different from positive emotions on valence, arousal and dominance while there were no differences on vividness. Furthermore, as correlation analysis suggested, when participants were asked to imagine being bullied i.e. during anger scripts, those with high victimization (i.e. victims) found scripts to be highly arousing and highly negative, probably due to the fact that they unfortunately were imagining scenes very familiar to them that produced negative emotions such as anger and fear. Interestingly, on the contrary, as correlation analysis suggested individuals with high CU traits (i.e. bullies) found anger scripts less arousing and less negative, probably due to the fact that ñexperiencingò the stressful situation of being bullied by others is unfamiliar to them and also may be because they could not feel how stressful bullying may be for others (due to high fearlessness and low empathy; i.e. Jolliffe & Farrington, 2006).

Further findings stemming from exploratory analyses suggested that females compared to males had larger corrugator responses during Fear scripts. This in accordance to previous research (i.e. Bradley, Codispoti, Sabatinelli & Lang, 2001) measuring corrugator reactivity to pictures, concluding that ñwomen are generally more emotionally expressive when processing aversive cuesò (p. 313). With regards to age, exploratory regression analysis results indicated a significant negative association between resting HR

and resting SCR; that is as age increased, baseline autonomic arousal decreased for children and adolescents in the present sample (10-14 age range). This was in line with the work of Schneider et al., (2002), that found that as age increased, basal HR decreased in a sample of 7-13-year-olds.

Footnotes

[1]Hypotheses were initially described in terms of differences in psychophysiological responding among bullies, victims, bully-victims and uninvolved children. However, they were modified to the present status due to the fact that small group sizes did not allow for significant results to emerge during analyses, even though overall the expected pattern of results was found in the group means (Table 11). Further details are provided in the results section.

[2] Due to the fact that the uninvolved group was very large compared to the other three groups, a random selection took place until the number of *possible* participants was the same as the victimsô group which was the largest of the three. The percentage of those who responded positively per group was as follows: 48.2 % of the bulliesô group; 34.28% of the victimsô group; 36.36 % of the bully-victimsô group, and 40% of the uninvolved group.

CHAPTER 4: GENERAL DISCUSSION

The studies described here addressed several research questions, with the main one (in *Study 3*) being to examine the associations of school bullying and victimization experiences (uniquely and combined) with autonomic baseline arousal, autonomic reactivity during anger imagery (provocation) and affective eyeblink magnitude during fear imagery. Taken together, results provide evidence that high bullying behavior co-occurring with high victimization behavior (i.e. bully-victims) predicts low resting HR and decreased affective eyeblink startle response (during fear imagery). Unsurprisingly, bully-victims in the present sample also had higher both reactive and proactive aggression and callousness characteristics than victims and uninvolved children. These findings are in line with past research suggesting low resting HR in children and adolescents exhibiting antisocial/aggressive behavior (Ortiz & Raine, 2004). They are also in accordance with previous studies showing that high delinquent compared to low delinquent DBD adolescents (van Goosen et al., 2008) and psychopathic as opposed to non-psychopathic antisocial adults (Patrick et al., 1993) fail to demonstrate normal (adult) affective startle increase during viewing of unpleasant than neutral pictures. An explanation of these findings can be given by fearlessness and sensation-seeking theories (i.e. Raine, 1993) suggesting that antisocial and aggressive youth act delinquently and violently due to low levels of fear (i.e. fear processing deficits) as well as to a need to raise their (low) arousal levels through thrilling endeavors. The negative association found between co-occurrence of high bullying and high victimization experiences with affective eyeblink response during fear imagery give further support to the fearlessness hypothesis, as these individuals appear to have low sensitivity to fear. Additionally, lack of fear among individuals with co-occurrence of bullying and victimization experiences may also, to an extent, justify previous research findings (Brunstein et.al. 2007; Kokkinos & Panayiotou, 2004; Salmivalli & Nieminen, 2002) characterizing the bully-victims group as the most ñdisturbedò and aggressive and showing the greatest psychopathology compared to bullies and victims. That is, having a psychopathic profile included not only proactive and reactive aggression and callousness characteristics but also fear processing deficits. Fearlessness was associated with bullying and victimization experiences combined but not with bullying experiences alone. Interestingly, both bullies and bully-victims had higher CU traits and higher proactive and reactive aggression than victims and uninvolved, though bullies not bully-victims had higher conduct problems compared to the uninvolved group. Bully-victims have been previously considered as disruptive and impulsive and having poorer

social and problem solving skills (Stassen Bergen, 2007); they have been found to exhibit lower levels of self-control compared with bullies (Haynie et al., 2001). It seems that what drove the effects of the bully-victim profile here on physiology was the combination of personality traits, and especially CU traits and aggression and not the actual antisocial behaviors.

Furthermore, even though results only approached significant levels high victimization experience (i.e. victims) was found to be positively associated with affective startle reflex magnitude during Fear imagery. These findings are in line with prior work demonstrating that children at-risk for anxiety disorders exhibit increased fear potentiated startle reflex response compared to those not at-risk (Grillon, et al., 1996). According to Craig (1998), ñanxious children are at risk for victimization and repeated victimization may heighten already high levels of social anxietyò (p. 129). The current study results give support to the notion that victims of bullying are more anxious and fearful than bullies, bully-victims and uninvolved children and they can be viewed in terms of an ñover-reactiveò defensive response to an aversive noise probe during a negative emotional state (elicited by mental processing of fearful scenes). Additionally, according to Lang, Davis and Ohman (2000), ña general startle sensitivity may characterize patients with ónegative effectô, a temperamental disposition associated with persistent anxiety and depressionò (p. 147). Even though, children that are being targets of bullying in the current study are not patients exhibiting persistent anxiety and depression, victimization has been previously associated with depression and suicidal ideation (van der Wal et al., 2003; Kaltiala-Heino et al., 1999) and in the current study, victims had the highest parent ï reported anxiety scores compared to the rest of the groups (though not statistically significant). Furthermore, in the current study victims were found to have significantly higher BIS scores compared to the other groups; as previously mentioned in this paper, BIS is considered responsible for producing negative feelings such as anxiety, arousal and fear (Gray, 1987a, 1987b). Therefore, an anxious temperament, along with a mildly stressful lab environment may have advanced an ñover-reactiveò defensive reaction during an aversive emotional state (imagining fear scenes) in children experiencing high victimization at school (i.e. victims).

Study 1 showed that overall, both bullies and bully-victims had higher CU traits (callousness and uncaring characteristics), higher proactive and higher reactive aggression than victims and uninvolved children partially replicating previous research findings (Salmivalli & Nieminen 2002; Pellegrini et al., 1999; Unnever, 2005; Schwartz, 1997, 1998). Furthermore, BAS was found to be strongly associated with bullying and BIS was

found to be strongly associated with victimization. To our knowledge, this is the first time that Grayôs (1987a, 1987b) BIS system is found to be associated with being victimized at school and BAS system found to be linked to bullying others at school, adding to previous findings connecting BIS with anxiety, depression and internalizing symptoms (i.e. Kimbrel et al., 2007; Muris et al., 2005; Vervoort et al., 2010) and BAS system with decreased empathy, poor socialization, primary and secondary psychopathy, elevated CU traits and conduct disorder (i.e. Loney et al., 2003; Frick et al., 2003; Raine, 1993; Essau et al., 2006; Fowles, 2000; Quay, 1993; Knyazev & Wilson, 2004). This finding suggests that personality traits such as high BIS or high BAS represent risk factors predicting bullying or victimization experiences at school, respectively.

Results from *study 2* demonstrated that the twelve selected standard scripts were the best representatives of their emotion category and therefore, were valid and reliable stimuli for the imagery experiment in *study 3*. Childrenôs and adolescentôs ratings showed that negative emotions were significantly different from positive emotions on valence, arousal and dominance while there were no differences on vividness. Childrenôs ratings as expected, matched those of adultôs, previously reported in studies in Cyprus and elsewhere (i.e. Panayiotou, 2008; van Oyen Witvliet & Vrana, 1995). This is, to our knowledge the first study reporting Greek speaking childrenôs and adolescentôs affective imagery ratings. However, since there are no other studies to compare these results and since the sample was consisted of only 61 participants, results are tentative and should not be considered conclusive.

Application of Results

Consistent with previous research, groups involved in bullying (i.e. bullies and bully-victims) exhibit both high reactive and proactive aggression as well as high callousness characteristics. Especially the latter finding that youth at risk for bullying their classmates at school exhibit elevated psychopathic traits, is from a practitionerôs point of view an alarming one considering that these traits in adolescence have been connected to adult psychopathy (Essau et al., 2006); but at the same time, it gives schools additional motivation to take action to prevent and to minimize bullying behavior.

Schools can provide systematic training to school personnel and to parents so that they can spot signs of bullying and victimization behavior early on, before they become chronic behaviors. Anti-bullying policies can also be established at a school-wide level, including firm disciplinary methods, improving playground supervision and promoting collaboration and positive school environment. At an individual and family level, counseling and/or psychotherapy may be offered.

Furthermore, the present study demonstrated that bully-victims, a small but particularly ñdisturbedò group appears to exhibit lack of fear in situations that others may find stressful. These individuals may therefore be unable to benefit from school interventions designed to promote socializing through punishment (i.e. expelling students for bullying others). It is suggested that schools should attempt to raise their arousal levels and address their need for excitement. They could, for example, provide challenging activities and adult-supervised extreme sports.

In addition, victims of bullying should also get support in that they should feel secure and content at school as well as have the opportunity, in collaboration with parents and school professionals, to receive counseling and psychotherapy if needed.

Limitations

Small group size was a limitation of this dissertation study. Even though the original sample used for screening in study 1 was quite large (N = 907) yielding to a selected sample of 95 potential participants to the experiment of study 3 (i.e. bullies, victims and bully-victims), only 40 % of parents gave permission to their children to take part in the experiment. This resulted in small group sizes and made it difficult to draw conclusions with regards to differences in psychophysiological responding between the groups. This difficulty, however, was addressed by treating bullying and victimization as continuous variables and examining associations between these variables and psychophysiological responding, in addition to investigating potential differences between groups involved in bullying and victimization.

Another limitation was that data drawn from Study 1 relied on self-reporting. Even though children and adolescents were asked to avoid writing their name on any questionnaire, it is a possibility that children and adolescents may have responded in a more socially accepted way especially in the cases where they had to report their potential aggressive behaviors. Therefore, future studies should consider a multiinformant approach to ensure that responses are more reliable (i.e. peer-reported and parent-reported).

Also, it was a limitation that bullying and victimization status were not reassessed in the lab for those participating to the experiment. A second evaluation of bullying and victimization could have been useful in confirming participantsô involvement in these experiences.

Additionally, another limitation was the imbalance of bullying groups regarding gender. For example, the bullies and bully-victims groups were highly represented by boys than girls, while the victims group was highly represented by girls than boys. Therefore,

even though with regards to gender, groups were formed as may have been expected to, it is unclear how gender may have influenced current results.

Finally, longitudinal designs may be more appropriate in investigating associations between autonomic arousal and bullying/victimization problems or any other behavioral difficulties. Given that in the current study age was reportedly associated with resting HR and resting SCR, the present cross-sectional design appears to be a limitation.

Conclusion

More generally, this investigation suggests that bullying and victimization behaviors may be important indicators of physiological responding, especially resting HR and affective startle eyeblink response, and vice verse, that is, physiological measures appear important in an attempt to obtain a clearer picture of bullying and victimization behaviors at school. More significantly, present findings confirmed expectations of a link between bullying and psychophysiological ñunder-respondingò in baseline and aversive states as well as between victimization and psychophysiological ñover-respondingò in negative situations. Previous research demonstrated negative associations between psychophysiological responding and antisocial/aggressive behavior as well as psychopathic characteristics; prior work has also connected bullying and victimization experiences with this kind of behavior and these types of characteristics. However, the current study was substantial in that it filled the gap in the literature by experimentally demonstrating specific links between psychophysiological responding and bullying and victimization experiences at school. As results in the present study are preliminary, future research is needed to attempt to replicate and add on to these intriguing findings.

TABLES

Study 1

Table 1

Number of participants as a function of gender and school grade level

	Grade			
Gender	5th	6th	1st	2nd
Females	115	67	163	157
Males	109	57	128	111
Total	224	124	291	268

Note. Grades 5 and 6 correspond to elementary and grades 1 and 2 to junior high school

Table 2

Sample Demographic Characteristics as a Function of Paternal and Maternal Occupation

Occupation	Fathers (%)	Mothers (%)
Senior public officials-Managers in private sector (with high academic qualifications)	3	1
Employed in public or private sector (with a university degree at least)	27.5	34.4
Employed in public or private sector (without a university degree)	33.8	34.1
Skilled laborer-Technician	10.4	.3
Unskilled laborer	18	5.4
Unemployed /Unemployed or Housewife	2.9	20.9
Other	.8	.8

Table 3

Sample Demographic Characteristics as a Function of Paternal and Maternal Education

Education	Fathers (%)	Mothers (%)
University degree (at least)	28.1	31.4
College degree	6.1	9.6
High School/Technical School	33.2	29.8
Junior High School	8	6.6
Elementary School	5.7	4.2

Table 4

Sample Demographic Characteristics as a Function of Maternal and Paternal Nationality

Nationality	Mother (%)	Father (%)
Greek-Cypriot	82.4	87.1
Greek	4.4	4.2
European	8.5	4.6
Non-European	4.1	3.4

Table 5

Psychometric Properties of Main Measures

Scale	N	M	SD	Cronbach alpha	% of Variance Explained	Rotation Method
Bullying	907	1.21	.42	.82	31.12	Oblimin with Kaiser Normalization
Victimization	907	1.32	.52	.79	13.52	
Reactive Aggression	907	.57	.78	.84	8.56	Oblimin with Kaiser Normalization
Proactive Aggression	907	.14	.41	.86	33.26	
BIS	907	1.42	.55	.70	17.33	Varimax
BAS	907	1.43	.59	.85	21.53	
Total CU traits	907	.82	.43	.82	23.26	Oblimin with Kaiser Normalization
Uncaring	907	.82	.65	.82	23.26	
Callousness	907	.56	.47	.70	12.18	
Unemotional	907	1.44	.62	.52	6.38	

Table 6

Rotated (Varimax) Factor Loadings for Principal Components Factor Analysis for BIS/BAS Scales

Scale	Factor loadings per item
BIS	
I usually get very tense when I think something unpleasant is going to happen (1)	.45
I worry about making mistakes (3)	.62
I am hurt when people scold me or tell me that I do something wrong (5)	.66
I feel pretty upset when I think that someone is angry with me (7)	.67
I feel worried when I think I have done poorly at something (13)	.72
I am very fearful compared to my friends (17)	.22
BAS	
I feel excited and full of energy when I get something that I want (2)	.56
When I am doing well at something, I like to keep doing this (8)	.46
I get thrilled when good things happen to me (12)	.20
I get very excited when I would win a contest (16)	.43
I get really excited when I see an opportunity to get something I like (20)	.59
When I want something, I usually go all the way to get it (4)	.73
I do everything to get the things that I want (9)	.72
When I see an opportunity to get something that I want, I go for it right away (14)	.59
Nobody can stop me when I want something (18)	.67
I often do things for no other reason than that they might be fun (6)	.57
I crave for excitement and new sensations (10)	.47
I am always willing to try something new, when I think it will be fun (15)	.45
I often do things on the spur of the moment (19)	.48

Note BIS = behavioral inhibition system, BAS = behavioral activation system

Table 7

Hierarchical Multiple Regression Analyses Predicting Bullying and Victimization from Demographics and Behavioral and Personality Characteristics

Dependent Measures	Bullying		Victimization	
	ΔR²	β	ΔR²	β
Predictors				
Step1	.05*		.03*	
Gender		.20**		.07*
Grade level		.02		-.07*
Paternal Profession		-.07		-.06
Maternal Profession		-.01		-.01
Paternal Education		.00		.00
Maternal Education		.05		.01
Paternal Nationality		-.00		.12**
Step2	.15*		.16*	
Victimization		.40**		
Bullying				.40**
Step3	.16*		.00	
Reactive Aggression		-.52**		.16*
Proactive Aggression		.80**		-.13
Step4	.02*		.05*	
BIS		-.02		.26**
BAS		.14**		-.04
Step5	.05*		.01	
Callousness		.25**		.06
Uncaring		.00		-.00
Total R^2	.43		.25	

*Note. *p = .01, **p = .001, N= 907*

Table 8

Correlations Among Main Variables

	1	2	3	4	5	6	7	8
1. Bullying								
2. Victimization	.40**							
3. Reactive Aggression	.26**	.15**						
4. Proactive Aggression	.42**	.19**	.88**					
5. BIS	.07*	.23**	.17**	.07*				
6. BAS	.17**	.11**	.23**	.16**	.43**			
7. Total CU traits	.32**	.11**	.10**	.22**	-.36**	-.10**		
8. Callousness	.43**	.21**	.16**	.28**	-.12**	.14**	.73**	
9. Uncaring	.18**	.03	.05	.15**	-.40**	-.20**	.86**	.38**

*Note **p< .01, *p< .05, N = 907*

Study 2

Table 9

Number Of Participants As A Function Of Gender And School Grade Level

	Grade				
Gender	5th	6th	1st	2nd	Total
Female	9	16	10	4	39
Male	5	6	1	10	22
Total	14	22	11	14	61

Note. Grades 5 and 6 correspond to elementary and grades 1 and 2 to junior high school

Table 10

Mean Ratings For The Final Selected Scripts, Per Emotion Category

Scripts	Anger			Fear			Joy			Pl. Relaxation		
Dimension	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Valence	61	1.79	0.82	61	1.62	1.15	61	8.22	0.84	61	8.47	0.62
Arousal	61	7.57	1.22	61	7.92	1.36	61	4.80	2.05	61	1.68	1.05
Dominance	56	4.41	2.04	59	3.30	2.12	60	6.95	1.39	59	7.59	1.53
Vividness	47	5.82	1.29	51	6.17	1.34	51	6.16	1.15	56	6.24	1.03
Anger	59	5.66	1.25	57	3.69	1.52	60	1.16	0.48	60	1.17	0.52
Fear	58	3.05	1.67	60	5.77	1.45	60	1.11	0.42	60	1.13	0.35
Joy	58	1.34	0.81	59	1.19	0.55	61	6.63	0.77	61	5.87	1.24
Relax	58	1.59	1.24	59	1.34	0.93	60	4.39	1.92	61	5.96	1.53

Note. Means indicate the average of the three scripts per emotion.

Due to missing data in some analyses, group sizes differ across variables.

Likert scales for valence (1 = very unpleasant, 9 = very pleasant), arousal (1 = very relaxed, 9 = very tense), dominance (1 = no control over the situation, 9 = full in control of the situation), vividness (1 = very vague, 7 = very clear), emotion felt (1 = not at all, 7 = very much)

Table 11

Multiple Comparisons (Bonferroni Post ï Hoc Analysis) With Means Of Each Group On The Dependent Variables.

Physiological Responding and Personality /Behavioral Characteristics	Bullies			Victims			Bully-Victims			Uninvolved		
	n	M	S.D.	n	M	S.D.	n	M	S. D.	n	M	S. D.
Resting HR	14	82.44	9.30	12	89.00	10.53	12	77.35	9.52	13	86.60	11.18
Resting SCR	14	10.45	4.35	12	10.00	3.32	12	7.25	3.85	11	10.63	4.46
HR Reactivity (anger)	13	-.30	2.00	12	-.30	2.00	12	-.32	1.27	13	1.22	2.77
SCR Reactivity (anger)	13	-.24	1.10	12	-.14	.52	12	-.06	.35	12	-.29	.70
Fear Startle Index	9	-.93	4.80	8	3.47	4.32	11	1.36	4.40	12	.80	4.31
Reactive	14	1.27	.46	12	.70	.42	12	1.07	.32	14	.42	.26
Proactive	14	.78	.51	12	.13	.23	12	.52	.37	14	.07	.15
Callousness	14	1.08	.62	12	.47	.42	12	1.15	.71	14	.46	.42
Uncaring	14	1.58	.86	12	.67	.75	12	1.12	.81	14	.88	.82
BIS	14	.97	.50	12	1.90	.81	12	1.14	.67	14	1.20	.54
BAS	14	1,67	,67	12	1,33	,67	12	1,62	,48	14	1,14	,36
Conduct Problems	14	.24	.28	10	.10	.16	11	.15	.14	14	.05	.06
Oppos. Defiant Problems	14	.64	.54	11	.32	.40	11	.60	.60	14	.22	.23
Anxiety Problems	14	.48	.38	10	.53	.40	10	.26	.28	13	.24	.35

Note. Due to missing data in some analyses, group sizes differ across variables

Table 12

Participantsô mean Psychophysiological Responses in each Emotion

	Anger			Fear			Joy			Pl. Relaxation		
Psychophysiological Measure	n	M	S.D.	n	M	S.D.	n	M	S.D.	n	M	S.D.
Heart Rate Reactivity	50	.09	2.14	50	-.08	2.42	49	-.09	2.53	50	-.76	2.57
Skin Conductance Response	49	-.18	.71	49	-.04	.80	48	-.10	.52	49	-.12	.63
Corrugator Response	50	.80	1.95	50	.76	1.44	49	-.55	1.20	50	-.41	1.40
Zygomatic Response	49	-.21	1.28	49	-.39	1.24	47	.33	1.49	49	-.31	1.30
Startle Magnitude Response	40	46.94	6.74	40	47.35	7.68	40	49.20	5.03	40	46.25	8.08

Note. All values except, startle magnitude response, express change 8sec prior to the tone-cued imagery. Startle response scores indicate the difference between maximum values minus the mean. Heart rate reactivity is measured in beats per min; Skin Conductance Response is measured in microsiemens; Corrugator Response and Zygomatic Response are measured in microvolts. Due to missing data in some analyses, group sizes differ across variables

Table 13

Hierarchical Multiple Regression Analysis Predicting Resting HR from Bullying, Victimization and Bullying-Victimization Interaction

Dependent Measure		
Resting HR	cpR^2	ß
Predictors		
Step1	.12*	
Bullying		-.34**
Victimization		.00
Step 2	.07*	
Bullying x Victimization interaction		-.27*
Total R^2	.19	

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

Table 14

Hierarchical Multiple Regression Analysis Predicting Resting SCR from Bullying , Victimization and Bullying-Victimization Interaction

Dependent Measure		
Resting SCR	cpR^2	ß
Predictors		
Step1	.06	
Bullying		-.23
Victimization		.14
Step 2	.05	
Bullying x Victimization interaction		-.23
Total R^2	.11	

Table 15

Hierarchical Multiple Regression Analysis Predicting SCR reactivity (Anger imagery) from Bullying, Victimization and Bullying-Victimization Interaction

Dependent Measure SCR Reactivity	ΔR²	β
Predictors		
Step1	.02	
Bullying		.10
Victimization		.11
Step 2	.02	
Bullying x Victimization interaction		-.07
Total R^2	.04	

Table 16

Hierarchical Multiple Regression Analysis Predicting HR reactivity (Anger imagery) from Bullying, Victimization and Bullying-Victimization Interaction

Dependent Measure HR Reactivity	ΔR²	β
Predictors		
Step1	.08	
Bullying		-.15
Victimization		-.24[t]
Step 2	.01	
Bullying x Victimization interaction		.12
Total R^2	.09	

Note [t] *p = .08*

Table 17

Hierarchical Multiple Regression Analysis Predicting Fear Startle Index from Bullying, Victimization and Bullying-Victimization Interaction

Dependent Measure Fear Startle Index	qpR^2	ϐ
Predictors		
Step1	.07	
Bullying		-.16
Victimization		.23
Step 2	.11*	
Bullying x Victimization interaction		-.34*
Total R^2	.18	

*Note *p < .05.*

Table 18

Participantsô Post-Trial Imagery Ratings for each Emotion

	Anger			Fear			Joy			Pl. Relaxation		
Dimension	n	M	S.D.	n	M	S.D.	n	M	S.D.	n	M	S.D.
Valence	45	2.22	1.73	44	2.12	1.68	44	8.51	.80	43	8.31	.98
Arousal	45	7.44	1.57	44	7.59	1.44	44	5.13	2.24	43	1.47	.88
Dominance	45	3.93	1.87	43	3.17	1.72	43	7.20	1.30	43	7.72	1.20
Vividness	44	5.91	1.13	45	5.66	1.21	43	5.84	1.20	43	5.83	1.35
Fear	46	2.94	1.48	45	5.40	1.44	45	1.19	.37	44	1.05	.17
Joy	46	1.31	.98	45	1.24	.94	45	6.51	.72	44	5.90	1.05
Anger	46	5.82	1.54	45	2.57	1.21	45	1.04	.16	44	1.01	.07
Sadness	46	3.94	1.83	45	3.41	1.72	45	1.01	.06	44	1.03	.09
Disgust	46	2.44	1.64	45	3.09	1.12	45	1.01	.09	44	1.02	.11
Surprise	46	2.96	1.99	45	3.27	1.91	44	5.51	1.33	44	2.58	1.76
Relaxation	46	1.39	1.10	45	1.37	1.17	44	4.04	1.77	44	6.46	.81

Note. Means indicate the average of the three scripts per emotion.

Due to missing data in some analyses, group sizes differ across variables.

Likert scales for valence (1 = very unpleasant, 9 = very pleasant), arousal (1 = very relaxed, 9 = very tense), dominance (1 = no control over the situation, 9 = full in control of the situation), vividness (1 = very vague, 7 = very clear), emotion felt (1 = not at all, 7 = very much)

Table 19

Participantsô Post-Trial Imagery Ratings as a function of Bullying Involvement

	Bullies			Victims			Bully-Victims			Uninvolved		
	n	M	S.D.	n	M	S.D.	n	M	S. D.	n	M	S. D.
Fear Valence	12	3.05	2.43	10	1.56	.80	11	1.40	.39	11	1.36	1.70
Joy Valence	12	8.22	1.20	10	8.70	.50	11	8.60	.53	11	8.57	.76
Anger Valence	12	2.86	2.34	11	1.60	.70	11	1.81	1.35	11	2.57	1.90
Pleasant Re. Valence	12	8.00	1.43	10	8.40	.71	11	8.51	.60	10	8.4	.92
Fear Arousal	12	7.02	2.00	10	7.93	1.30	11	8.15	.67	11	7,33	1.35
Joy Arousal	12	4.55	2.66	10	5.56	1.60	11	4.81	2.00	11	5.70	2.57
Anger Arousal	12	6.55	1.70	11	8.40	.74	11	7.75	1.52	11	7.15	1.66
Pleasant Re. Arousal	12	1.27	.58	10	1.60	1.00	11	1.50	.90	10	1.56	1.11
Fear Dominance	11	3.40	2.00	10	2.16	1.20	11	3.15	1.35	11	3.87	1.90
Joy Dominance	12	7.52	1.10	10	5.56	1.75	10	6.10	.54	12	5.80	1.06
Anger Dominance	12	3.94	2.00	11	2.75	1.10	11	4.00	1.96	11	5.03	1.75
Pleasant Re. Dominance	12	7.91	.93	10	7.93	1.07	11	7.63	1.50	10	7.40	1.33
Fear Vividness	12	5.75	1.30	10	5.36	1.66	11	5.87	.63	12	5.63	1.20
Joy Vividness	11	5.90	1.28	10	5.56	1.75	10	6.10	.54	12	5.80	1.06
Anger Vividness	11	6.15	.92	11	5.70	1.63	10	5.95	.80	12	6.02	1.07
Pleasant Re. Vividness	12	5.94	1.36	10	5.33	1.95	10	6.06	.50	11	5.96	1.26
Fear (fear)	12	4.90	1.87	10	6.03	.94	11	5.78	1.20	12	5.02	1.40
Joy (joy)	12	6.33	1.04	10	6.66	.52	11	6.57	.36	12	6.5	.72
Anger (anger)	12	5.25	2.20	11	6.21	1.00	11	6.21	1.20	12	5.70	1.45
Anger (fear)	12	2.60	1.53	11	3.54	1.47	11	3.12	1.73	12	2.60	1.13
Pleasant Relaxation (relaxation)	12	6.40	1.03	10	6.5	1.00	11	6.57	.51	11	6.42	.71

Table 20

Correlations among CBCL measures (DSM scales), behavioral and personality measures

	1	2	3	4	5	6	7	8	9	10
1. Bullying										
2. Victimization	-.026									
3. Conduct Problems	.10	.02								
4. Oppositional Defiant Problems	.07	.11	.81**							
5. Anxiety Problems	-.04	.07	.35*	.33*						
6. Proactive Aggression	.70**	-.13	.12	.22	-.01					
7. Reactive Aggression	.66**	.00	.12	.11	.06	.71**				
8. BAS	.31*	.04	-.06	-.03	.17	.51**	.60**			
9. BIS	-.25	.37**	-.21	-.19	.11	-.07	.05	.41**		
10. Callousness	.48**	-.11	-.10	.04	-.01	.60**	.50**	.30*	-.38**	
11. Uncaring	.25	-.30*	.11	.22	.04	.41**	.24	-.06	-.60**	.53**

*Note **p < .01, *p< .05*

FIGURES

Study 1

Figure 1

Group mean difference values representing behavioral and personality characteristics.

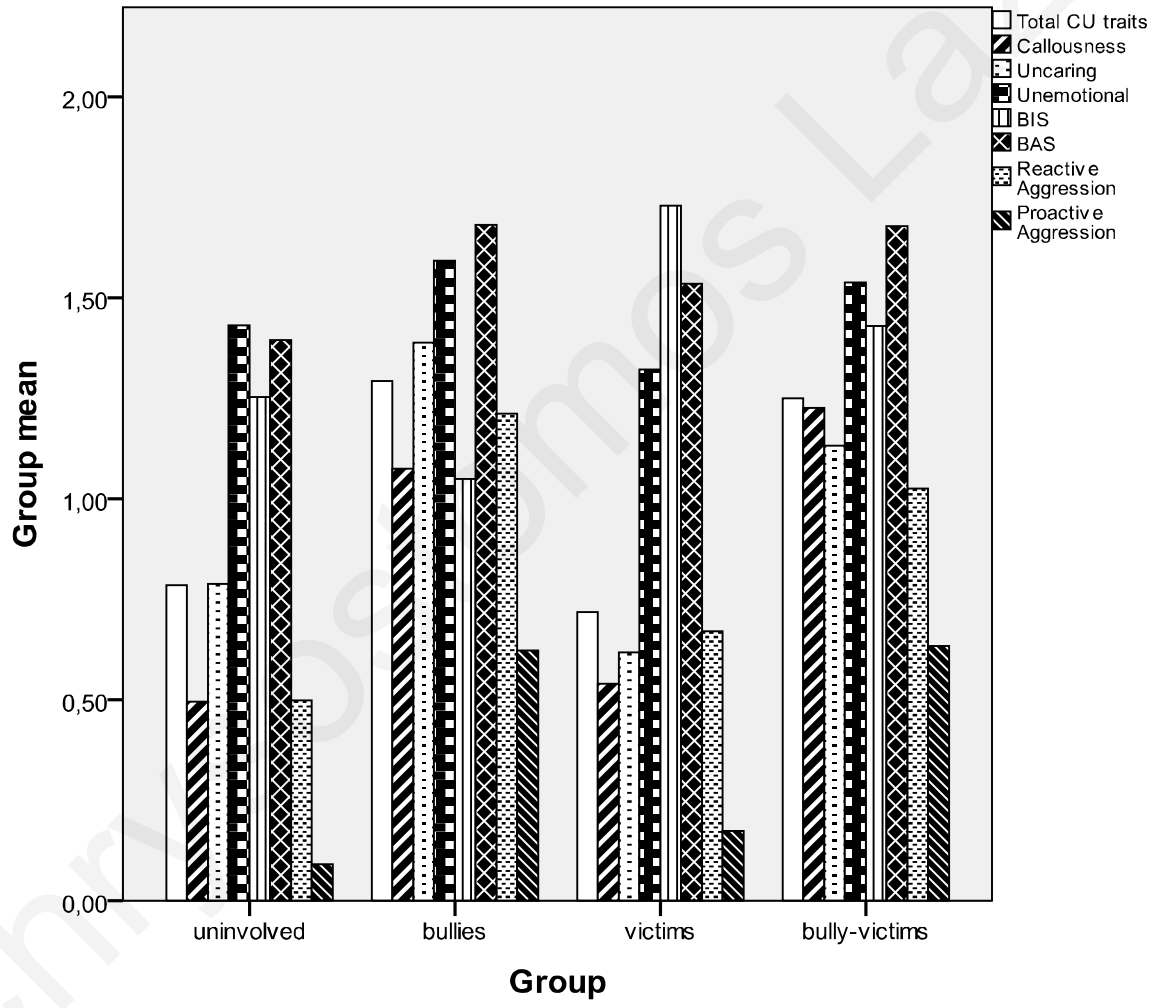


Figure 2

Mean difference values (T- scores) representing startle magnitude response in each emotion category. Significant differences were found between joy and anger imagery and between joy and pleasant relaxation imagery. Standard errors are represented in the figure by the error bars attached to each column

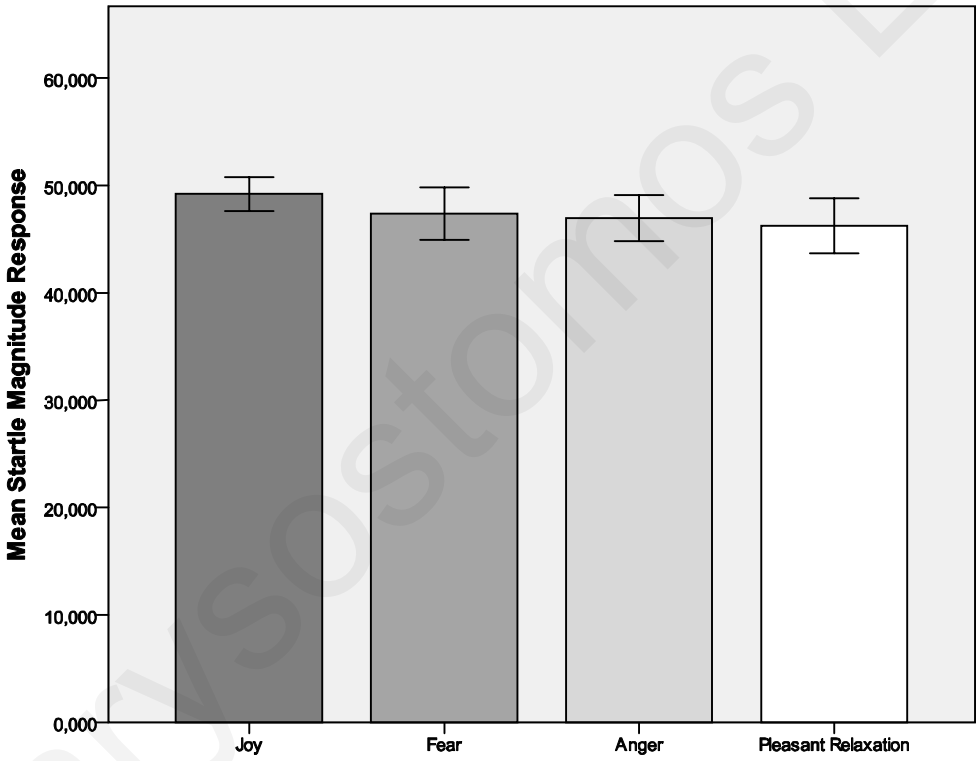


Figure 3

Mean difference values (T- scores) representing corrugator response in each emotion category. Significant differences were found between fear and joy imagery and fear and pleasant relaxation imagery and between anger and joy imagery and between anger and pleasant relaxation imagery. Standard errors are represented in the figure by the error bars attached to each column

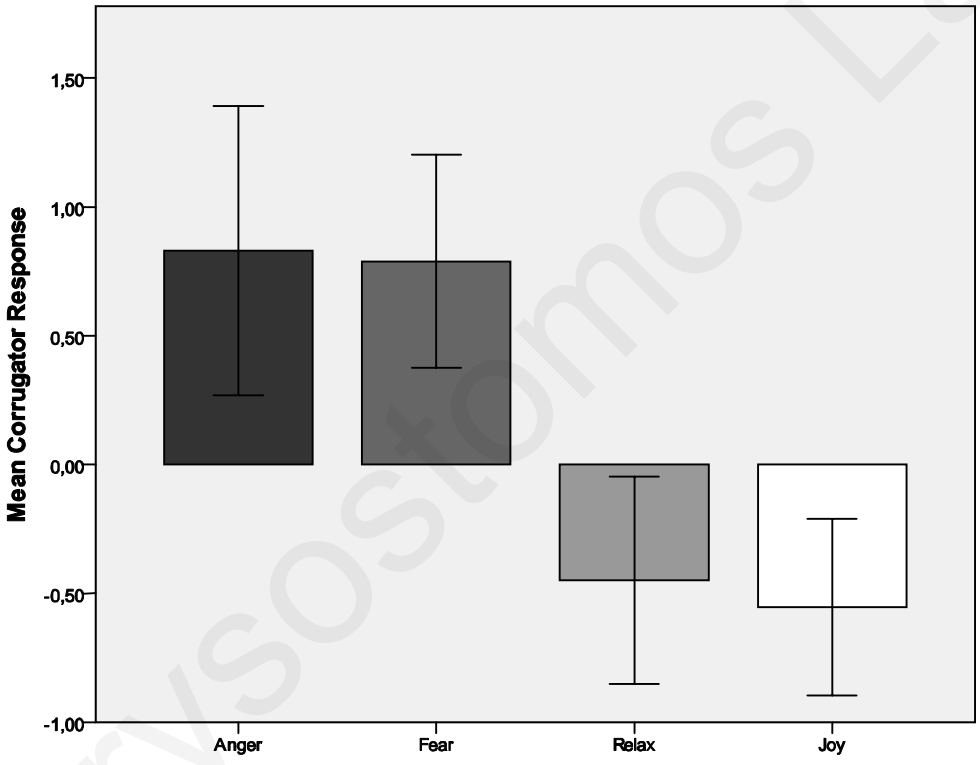


Figure 4

Regression analysis with resting HR (bpm) as the dependent variable and bullying x victimization interaction as the predictor variable. High bullying was negatively associated with resting HR for participants with high victimization (i.e. bully-victims).

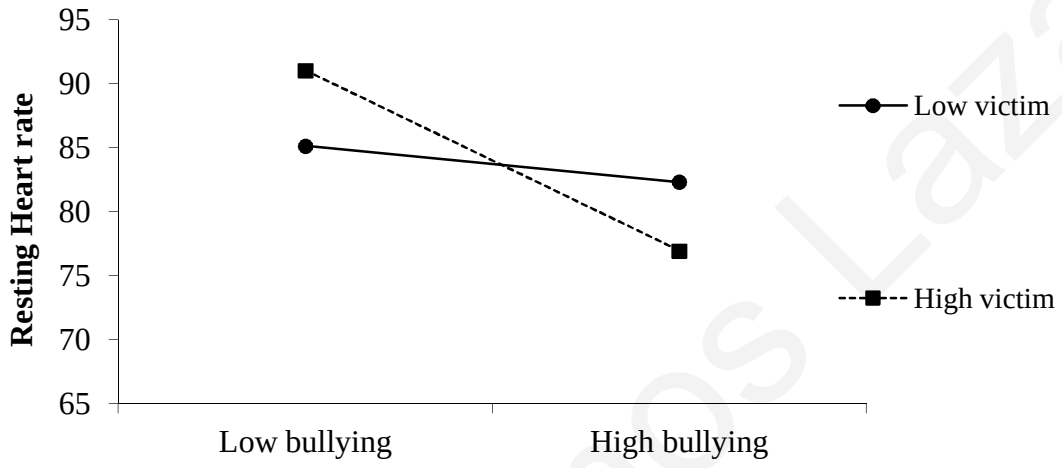
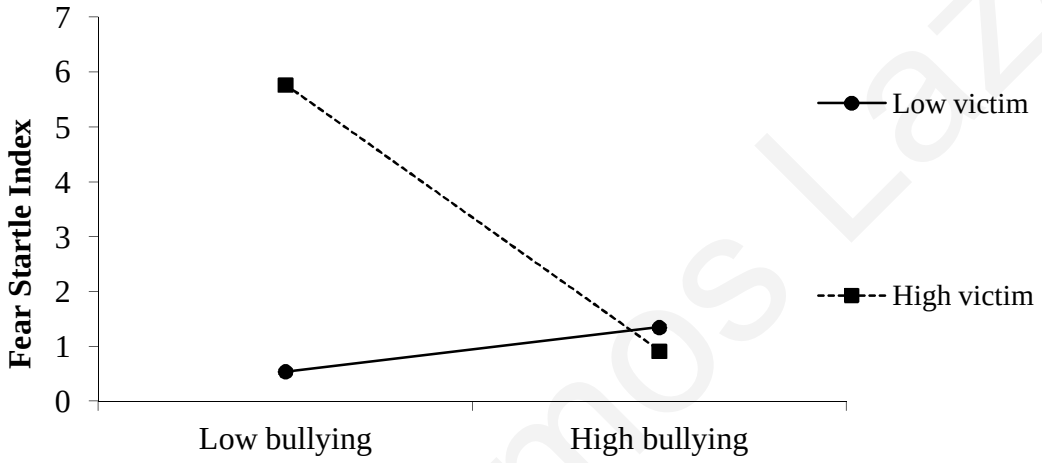


Figure 5

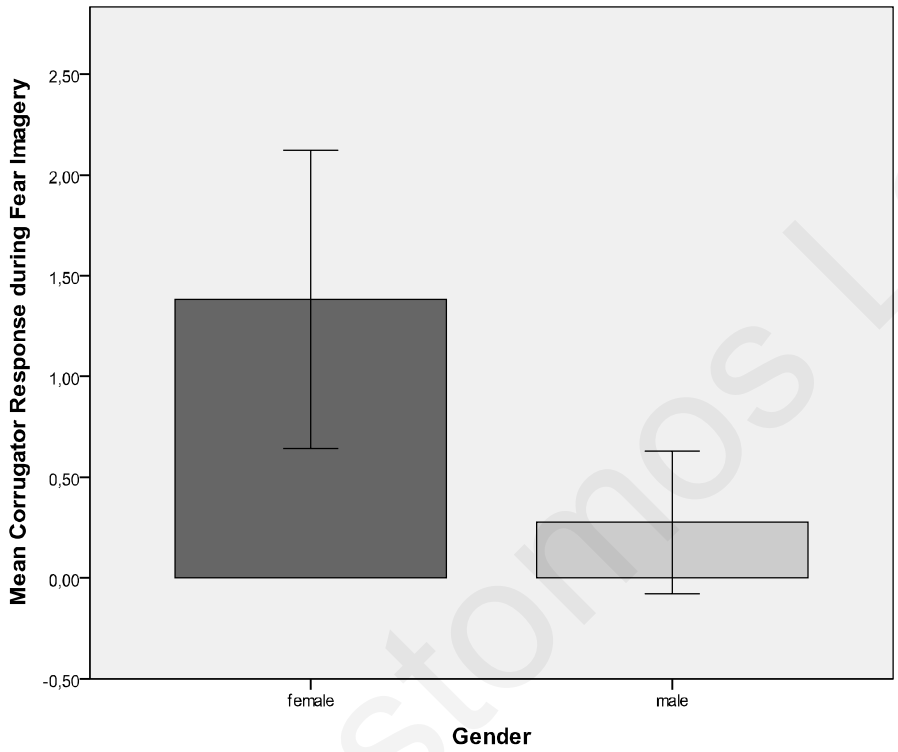
Regression analysis with Fear Startle Index (T-score) as the dependent variable and bullying x victimization interaction as the predictor variable. High bullying was *negatively* associated with Fear Startle Index for participants with high victimization (i.e. bully-victims). High victimization was *marginally* positively associated with Fear Startle Index for participants with low bullying (i.e. victims).



Note. Fear Startle Index = Fear startle magnitude minus Pleasant Relaxation magnitude

Figure 6

Mean difference values (T- scores) representing corrugator response during fear imagery in each gender. Girls had greater corrugator response than boys. Standard errors are represented in the figure by the error bars attached to each column



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APPENDIX A: List of the Affective Imagery Scripts Used in the Experiment

Anger Scripts

- While returning home from school, some guys on the bikes pass by your side with power, throwing down the bag with your books.
- In front of the whole class, the teacher accuses you of copying during the exam and when you try to defend yourself, he/she is telling you to shut up.
- While you are getting ready to sit in your seat, a child suddenly pulls your chair so that you fall on the floor and the whole class starts laughing with you.

Fear Scripts

- Alone in bed, you start feeling something walking quickly onto your bare feet and trembling you see a big black spider walking over you.
- Suddenly the oil in the pan bursts into flames, the curtain catches fire while you are frantically trying to put it out.
- Alone in the alley, your heart starts beating fast, your stomach tightens while a group of older children are surrounding you laughing menacingly.

Joy Scripts

- With your body taut from overexertion, you kick / throw the ball to the net and shouting you run towards your teammates.
- You jump with joy as your dad, is giving you your Christmas gift, a brand new mobile phone of the latest technology!
- Watching the player of your team score in the last minute of the game, you are flying from your seat cheering, since you had just won the championship.

Pleasant Relaxation Scripts

- You had just finished your homework and you are relaxing on your living room sofa, watching your favorite TV program.
- You are at your familyôs cottage, on a Sunday afternoon, feeling warm and snugly while you are watching the fire lit in the fireplace.
- After a hot shower, you are in your pajamas lying on your bed, listening to the gentle voice of your mother, as she is reading your favorite book before you fall asleep.

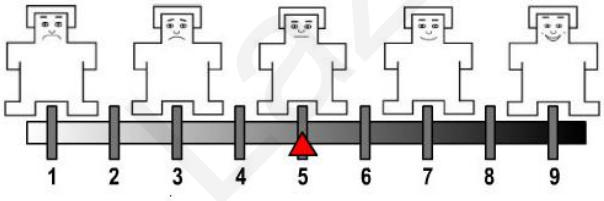
APPENDIX B: Affective Imagery Rating Form Sample

Schoolé é é é .
Gradeé é é é ..
Genderé é é é .
Birthdateé é é é

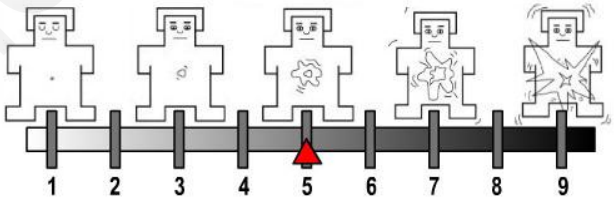
With your body taut from overexertion, you kick / throw the ball to the net and shouting you run towards your teammates.

Close your eyes and imagine as real as you can that you are experiencing the situation described below. How does it make you feel?

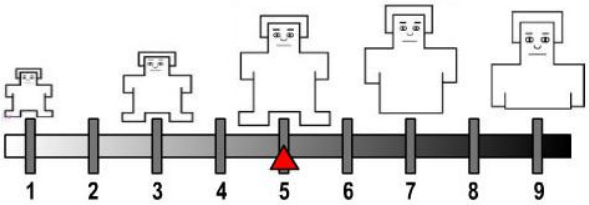
very unpleasanté é é ..é ...é é é very pleasant



very relaxedé é é é é .é é é é é very tense.



No control é é é é é é é é é é full in control



How clearly can you imagine the script?

1 2 3 4 5 6 7

Very vague very clearly

How does the script make you feel?

	1	2	3	4	5	6	7	
Fear	not at all							very much
	1	2	3	4	5	6	7	
Joy	not at all							very much
	1	2	3	4	5	6	7	
Anger	not at all							very much
	1	2	3	4	5	6	7	
Sad	not at all							very much
	1	2	3	4	5	6	7	
Disgust	not at all							very much
	1	2	3	4	5	6	7	
Surprise	not at all							very much
	1	2	3	4	5	6	7	
Relax	not at all							very much