Understanding Antisocial Behaviors: The Roles of Sensation Seeking and Subtypes of Empathy

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Abstract
There is limited research on how subtypes of empathy predict subtypes of antisocial behaviors and the role of sensation seeking in antisocial behavior. Therefore the current study used an online survey with 17-25 years old N= 540 undergraduate students to investigate the relationship between three subtypes of empathy (emotional reactivity, cognitive empathy and social skills) and two subtypes of antisocial (physically aggressive and non-aggressive) behaviors, as well as the role of sensation seeking in moderating this relationship. The Demographic Variables Questionnaire, Brief Sensation Seeking Scale, Empathy Quotient and the Antisocial Behavior Measure were used. Spearman's rank correlational tests, regression and a 2 way ANOVA with interactions were used to analyze the data.

There was a negative correlation between the three subtypes of empathy and the two subtypes of antisocial behavior. Emotional reactivity emerged as the most significant predictor of antisocial behaviors regardless of the subtype. Sensation seeking also emerged as a significant predictor of both subtypes of antisocial behavior. A significant interaction emerged between sensation seeking and subtypes of empathy in predicting subtypes of antisocial behaviors. High sensation seeking with low emotional reactivity, and high sensation seeking with low social skills predicted physically aggressive behaviors whereas low sensation seeking with low social skills predicted non-aggressive behaviors. In addition, high sensation seeking with low cognitive empathy and low sensation seeking with high cognitive empathy predicted non-aggressive behaviors. The results indicate the need to consider sensation seeking as well as empathy when analyzing antisocial behaviors.

Keywords: antisocial behavior, empathy subtypes, emotional reactivity, cognitive empathy, social skills, sensation seeking

Introduction

Different subtypes and levels of empathy (e.g. Feilhauer & Cima, 2013; Jones, Happé, Gilbert, Burnett, & Viding, 2010) have been related to different types of antisocial behaviors. Empathy is a pro-social emotion consisting of understanding of others' state of mind (Eisenberg, 2010; Thompson & Gullone, 2008). The subtypes of empathy have been classified in the literature as affective empathy, emotional reactivity, cognitive empathy, motor empathy, and social skills (e.g. Bons et al., 2013; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004).

Affective empathy implies sharing of others' emotions such as experiencing the same emotions of distress as another person is feeling after the death of his/her loved one. Emotional reactivity refers to emotional reaction in response to other people's emotions such as enjoying caring for others and getting upset at others' distress. Cognitive empathy implies understanding of others' thoughts, for example knowing what one feels. Motor empathy implies the interpretations of others' motor movements such as varying facial expressions. Social skills imply understanding of social relations, for example dealing with relationships and judging the difference between rudeness and politeness (e.g. Bons et al., 2013; Lawrence et al., 2004).

The predictor variables in the current study were the subtypes of empathy which have been identified by exploratory (Lawrence et al., 2004) and subsequent confirmatory factor analyses (Berthoz, Wessa, Kedia, & Wicker, 2008; Gouveia, Milfont, Gouveia, Rique Neto, & Galvao, 2012; Muncer & Ling, 2006) of the Empathy Quotient (Baron-Cohen & Wheelwright, 2004) administered to the general population, students and a small number of people with autism.

The dependent variables in the current study were antisocial behavior subtypes according to the classification of conduct disorders (American-Psychiatric-Association, 2000; Rowe, Maughan, Worthman, Costello, & Angold, 2004) as physically aggressive (physical or verbal aggression towards human beings or animals) and non-aggressive behavior (involving aggression towards others' possessions such as stealing and damaging others' property i.e. vandalism) derived from an antisocial behaviour measure from the Edinburgh Study of Youth Transitions and Crime survey (Smith & McVie, 2003). Physically aggressive behaviour in this study refers to direct/actual aggression (e.g. hitting or punching someone) or indirect/threatened aggression (e.g. threatening to hurt somebody if they do not hand over something they are wearing) towards another person. In contrast, non-aggressive behaviors refer to actual/direct aggression (e.g. setting fire to someone's property) or threatened/indirect aggression (e.g. being rude in public place, verbally abusing someone by threatening to damage their personal belongings) against things, objects and people's possessions. Non-aggressive behaviour is a type of indirect harm directed towards other people through aggression towards their personal belongings, possessions and property.

Different levels and types of empathy of empathy predicted subtypes of antisocial behaviors depending on factors such as how the subtypes of empathy and subtypes of antisocial behaviors have been defined, the kind of research designs used and the nature of the participants (e.g. van Heerebeek, 2010; van Langen, Wissink, van Vugt, Van der Stouwe, & Stams, 2014). No previous study has used emotional reactivity, cognitive empathy and social skills as subtypes of empathy to predict physically

aggressive and non-aggressive behaviors (Smith & McVie, 2003). Moreover the nature of relationship between subtypes of empathy and subtypes of antisocial behaviors in a student sample was expected to reveal the functioning of empathy in various antisocial behaviors. As there were diverse results in the literature (e.g. Ang & Goh, 2010; Lonigro, Laghi, Baiocco, & Baumgartner, 2013; Mayberry & Espelage, 2007) regarding the correlation between subtypes of empathy and subtypes of antisocial behaviors, the direction and significance of relationship between these variables needed to be determined.

As most of the studies (e.g. Kokkinos, Antoniadou, & Markos, 2014; Taubner, White, Zimmermann, Fonagy, & Nolte, 2013; Ttofi, Bowes, Farrington, & Lösel, 2014) showed a negative relationship between subtypes of empathy and subtypes of antisocial behaviors, it was assumed that there would be inverse relationship between these variables. However, the comparison of affective and cognitive empathy in relation to physically aggressive and non-aggressive behaviors in various studies (e.g. Jolliffe & Farrington, 2004; Lunsford, 2014; van Langen et al., 2014; Yeo, Ang, Loh, Fu, & Karre, 2011) suggested that affective empathy/emotional reactivity was more likely to be related to physically aggressive behaviors and cognitive empathy/social skills was more likely to be related to non-aggressive behaviors. Therefore, it was assumed that emotional reactivity may predict physically aggressive behavior while cognitive empathy and social skills (socio-cognitive skills) may predict non-aggressive behaviors.

Furthermore, emotional reactivity, cognitive empathy and social skills as subtypes of empathy were negatively correlated to sensation seeking personality traits (Kokkinos et al., 2014). Sensation seeking was positively associated with subtypes of antisocial behaviors (e.g. Nower, Derevensky, & Gupta, 2004). Some researchers (e.g. Dahlen, Martin, Ragan, & Kuhlman, 2004, 2005; Smart & Victoria, 2003) found a positive relationship between sensation seeking and physically aggressive behaviors and others (e.g. Ball, Carroll, & Rounsaville, 1994; Xu, Raine, Yu, & Krieg, 2014) found a positive relationship between sensation seeking and non-aggressive behaviors. Nevertheless, sensation seeking is a typical marker of adolescence as physiological changes occur at this stage (Shulman, Harden, Chein, & Steinberg, 2014).

While empathy is an other-directed emotion whereby an individual seeks to understand and experience the emotions of others (e.g. Beadle, 2009; Romero-Canyas & Downey, 2013), sensation seeking is a self-directed emotion (e.g. Charnigo et al., 2012; Janson, 1993). Therefore empathy and sensation seeking tendencies may be two opposing emotional forces. However, research did not show how subtypes of empathy interacted with sensation seeking in predicting subtypes of antisocial behaviors. Given that sensation seeking involved pleasure seeking emotions and empathy involved understanding and feeling others emotions, it was important to consider the interplay of contradictory emotions in relation to subtypes of antisocial behaviors.

Sensation seeking was related to both the subtypes of empathy and subtypes of antisocial behaviors. Therefore sensation seeking was considered, in addition to subtypes of empathy, as a predictor variable in a regression model to observe the effects of sensation seeking in predicting subtypes of antisocial behaviors. This was expected to demonstrate whether sensation seeking was more significant than subtypes of empathy in predicting physically aggressive and non-aggressive behaviors,

but also expected to show if the relationship between subtypes of empathy and subtypes of antisocial behaviors changed with the addition of sensation seeking traits in a regression model. Furthermore, if sensation seeking was revealed as a significant predictor or the relationship between subtypes of empathy and subtypes of antisocial behaviors changed due to addition of sensation seeking traits to the regression model, it was worth examining the role of sensation seeking as a moderator between subtypes of empathy and subtypes of antisocial behaviors in order to understand how self pleasing emotions interacted with understanding of others' emotion in predicting subtypes of antisocial behaviors.

Moreover, testing sensation seeking as a moderator was expected to highlight the significance of sensation seeking traits in predicting antisocial behavior even in the presence of empathy. In this context, research (McTernan, Love, & Rettinger, 2014) demonstrated that cognitive empathy and sensation seeking personality traits were differentially related to the subtypes of antisocial behaviors. Although poor cognitive empathy was linked to the non-aggressive behavior while sensation seeking and poor emotional reactivity/affective empathy were related to physically aggressive behaviors (e.g. McTernan et al., 2014; Pursoo, 2013), there was no research which examined the extent to which subtypes of empathy existed in the presence of low sensation seeking versus high sensation seeking traits.

Aims of this study

The first aim of the current study was to examine if the subtypes of empathy i.e. emotional reactivity, cognitive empathy and social skills were inversely related to physically aggressive and non-aggressive behaviors while controlling for age, student status (e.g. home or overseas), and faculty (area of study) amongst university students. The second aim was to find out if emotional reactivity predicted physically aggressive behaviors while cognitive empathy and social skills predicted non-aggressive antisocial behaviors. The third aim was to examine how sensation seeking made a difference to a regression model with subtypes of empathy as predictors of subtypes of antisocial behaviors. The fourth aim was to examine if sensation seeking traits (Zuckerman, Eysenck, & Eysenck, 1978) interacted with emotional reactivity (Lawrence et al., 2004) in predicting physically aggressive behaviors and if sensation seeking interacted with cognitive empathy and social skills in predicting non-aggressive antisocial behaviors (American-Psychiatric-Association, 2000; Rowe et al., 2004).

The following were the hypotheses. $\mathbf{H_1}$ The subtypes of empathy i.e. cognitive empathy, emotional reactivity and social skills would be inversely related to subtypes of antisocial behaviors i.e. physically aggressive and non-aggressive behaviors; $\mathbf{H_2}$ Emotional reactivity would predict physically aggressive behaviors while cognitive empathy and social skills would predict non-aggressive behaviors in the regression model including only subtypes of empathy; $\mathbf{H_3}$ The addition of sensation seeking to subtypes of empathy in the regression model would change the relationship between subtypes of empathy and subtypes of antisocial behavior; $\mathbf{H_4}$ Sensation seeking would moderate the relationship between subtypes of empathy and subtypes of antisocial behaviors whereby sensation seeking would interact with emotional reactivity in physically aggressive behaviors and sensation seeking would interact with cognitive empathy and social skills in non-aggressive behaviors.

Method

Measures

a. Demographic Variables Questionnaire. The demographic variables consisted of gender, age student status, (i.e. Home, European Union (EU), and non-European status/nationality); and faculty (i.e. Arts and Humanities; Engineering; Medicine, Dentistry, and Health; Science; and Social science) to which the participant belonged at the University of Sheffield (see Participants).

b. Brief Sensation Seeking Scale (BSSS). The Brief Sensation Seeking Scale (BSSS) consisted of 8 items, which measured the construct sensation seeking on a scale of 1-5 where 1 stands for 'Strongly Disagree' and 5 stands for 'Strongly Agree'. It included 8 items such as, "I would like to try bungee jumping" and "I like wild parties" (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002).

c. The Cambridge Behavior Scale (EQ). The Cambridge behavior scale (Baron-Cohen & Wheelwright, 2004) known as the Empathy Quotient (EQ) had 40 items (for adults). The validity and reliability of this scale had been established (Lawrence et al., 2004). Empathy on the EQ was operationally defined in terms of the total score on the EQ. The score on each item could vary from 1-4 where 1 stood for 'Strongly Agree' and 4 stood for 'Strongly Disagree' on items such as "I find it hard to know what to do in a social situation"; "Seeing people cry doesn't really upset me" and reverse scoring for items such as "I am good at predicting how someone will feel"; "I really enjoy caring for other people".

The subscales of empathy were taken from the three factor structure presented in confirmatory factor analyses in previous studies with 5 items in each subscale (Gouveia et al., 2012; Muncer & Ling, 2006). The three subscales were Emotional reactivity (on items such as "Seeing people cry doesn't really upset me"), cognitive empathy (on items such as "I am good at predicting how someone will feel") and social skills (on items such as "I find it hard to know what to do in a social situation"). The emotional reactivity subscale consisted of item numbers 3, 16, 19, 33 & 39; the cognitive empathy subscale consisted of item numbers 14, 15, 29, 34, & 35; the social skills subscale consisted of item numbers 2, 4, 7, 8, & 21 (Baron-Cohen & Wheelwright, 2004; see Results for reliability coefficients).

d. The Antisocial Behavior Measure. This consisted of 22 items taken from the Edinburgh Study of Youth Transitions and Crime survey (Smith & McVie, 2003). The respondent had to indicate his/her involvement in certain antisocial behaviors such as "Hurt or injured animals or birds on purpose", and "Stolen something from a shop or store". Each item on the Antisocial Behavior Measure was scored on a scale of 1-5 where 1 stood for 'Never' and 5 stood for 'Very Often'.

A conceptual classification of antisocial behaviors was used to distinguish two subscales, which were physically aggressive and non-aggressive behaviors. Reliability analysis was used to confirm this conceptual classification. The physically aggressive behavior subscale consisted of 7 items (item numbers 9, 10, 11, 14, 17, 18, & 19) pertaining to actual or threatened aggression aimed at living things while the non-aggressive behavior subscale consisted of 10 items (item numbers 2, 3, 4, 5, 6, 12, 15,

16, 20, & 22) pertaining to actual or threatened aggression towards non-living things such as others' personal possessions or public property (See Results section for reliability coefficients). The physically aggressive behavior subscale consisted of items such as "Hit, spat, threw stones at someone you know"; "Hurt or injured animals or birds on purpose". The non-aggressive behavior subscale included items such as "Deliberately damaged or destroyed property that did not belong to you"; "Sold an illegal drug to someone"; and Broken into a house or a building to try and steal something".

Participants

A sample of N=540 student volunteers from University of Sheffield, UK aged 17-25 years with a mean age of M = 20.43, SD=2.08 for female participants, and a mean age of M=20.12, SD=1.91 for male participants took part in the study. One of the participants did not fill in the demographic section. Therefore, in a sample of 539 participants 72% (n=390) were female and 28% (n=149) were male participants; 72% (n=391) identified themselves as home students, 9% (n=50) as EU students and 18% (n=99) identified themselves as Non-Europeans; 23% (n=126) were from Faculty of Arts and Humanities, 13% (n-70) from Engineering, 15% (n=83) from Medicine, Dentistry and Health, 27% (n=145) from Science, and 21% (n=114) were from Social Sciences.

Procedure

The ethics committee of Psychology department, University of Sheffield approved this research project. This study used a cross-sectional survey research design. An online survey on Qualtrics software with self-report measures as mentioned above was developed. This survey was sent to the students of University of Sheffield on 31st October 2013 through a university email distribution list consisting of an invitation to the study and a link to the survey. The survey remained active till 29th November 2013. To attract participants, a prize draw of £50 was offered. The data were analyzed using SPSS IBM 21.

Results

Data screening

The variables i.e. the demographic variables, the Brief Sensation Seeking Scale (Zuckerman et al., 1978), Empathy Quotient (Baron-Cohen & Wheelwright, 2004), and the Antisocial Behavior Measure (Smith & McVie, 2003) were then tested for normality. The Shapiro-Wilk normality tests for all the variables in this study were significant ($p<.001$) except for the mean score of sensation seeking ($p=.066$). Therefore, the data were non-normal. An attempt was made to normalize the data through transformation. However, even log and square root transformations did not make any difference to the data; hence it remained non-normal. However, the standardized residuals were normal.

Reliability analyses

The reliability analyses were conducted on the subscales of empathy (See Method section). The subscales of empathy have been confirmed in previous studies (Berthoz et al., 2008; Gouveia et al., 2012; Muncer & Ling, 2006). The three-factor structure consisting of cognitive empathy, emotional reactivity and social skills used in the current study was taken from previous studies (Berthoz et al., 2008; Gouveia et al., 2012; Muncer & Ling, 2006). The reliability analysis indicated a Cronbach's coefficient alpha reliability of 0.82 (N=5) for cognitive empathy, 0.71 (N= 5) for social skills, and 0.59 (N=5) for emotional reactivity.

The reliability analysis for the subscales of the Antisocial Behavior Measure (see Method section and Appendix) was also carried out. The reliability analysis indicated an alpha coefficient of 0.77 (N=7) for physically aggressive behavior, and 0.75 (N= 10) for non-aggressive behaviors. As a result of item deletion process, the items "13-Hit, kicked or punched a brother or sister on purpose", "21-Carried a knife or other weapon with you for protection or in case it was needed in a fight" were deleted from the Physically Aggressive Behaviour subscale and the items "1-Travelled on a bus or train without paying enough money", "7-Ignored someone you know on purpose, or left them out of things" and "8-Said nasty things about someone you know, slagged them off or called them names" were deleted from the Non-Aggressive Behavior subscale.

Spearman rank correlational tests were conducted to find out if subtypes of empathy have an inverse relationship with subtypes of antisocial behaviors. Following are the results.

Inferential Statistics

Table 1. Correlations between subtypes of empathy and subtypes of antisocial behaviors. (N= 540)

Measure	Emotional reactivity	Cognitive empathy	Social Skills	Physically aggressive behavior	Non-aggressive behaviors
Emotional reactivity	-				
Cognitive empathy	**.36****	-			
Social Skills	**.33****	**.46***	-		
Physically aggressive behavior	**-.20****	**-.10***	**-.16****	-	
Non-aggressive behaviors	**-.21****	**-.09***	**-.12****	**.50****	-

Note. Correlation was significant at the 0.01 level (2-tailed).**
Correlation was significant at the 0.05 level (2-tailed).*

Table 1 shows that all three subtypes of empathy had a significant negative correlation with both subtypes of antisocial behaviors.

Regression Analysis was conducted to find out which subtypes of empathy predicted which subtypes of antisocial behaviors while controlling for age, student status (Home, EU, or Non-EU) and faculty (area of study) as covariates. The findings were as follows.

Table 2. Simple regression showing subtypes of empathy in predicting subtypes of antisocial behavior. (N=540)

Variable			**Physically aggressive** R^2**=. 059**		
	B	SE(B)	β	*t*	Sig. (p)
Emotional Reactivity	-.091	.021	-.196	-4.261	**.000**
Cognitive empathy	-.001	.022	-.003	-.060	**.952**
Social Skills	-.035	.019	-.088	-1.797	**.073**
Variable		**Non-Aggressive** R^2**=. 047**			
	B	SE(B)	β	*t*	Sig. (p)
Emotional Reactivity	-.068	.018	-.173	-3.728	**.000**
Cognitive empathy	-.001	.019	-.002	-.038	**.970**
Social Skills	-.028	.016	-.086	-1.732	**.084**

Note. p<.001

Table 2 shows that only emotional reactivity as an empathy subtype negatively predicted physically aggressive and non-aggressive behaviors.

Then sensation seeking was added to the regression model consisting of subtypes of empathy predicting physically aggressive and non-aggressive behaviors as shown below.

Table 3. Simple regression showing subtypes of empathy and sensation seeking traits in predicting subtypes of antisocial behavior. (N=540)

Variable			**Physically aggressive** R^2**=.074**		
	B	SE(B)	β	*t*	Sig. (p)
Sensation seeking	.039	.013	.127	2.997	**.003**

Emotional Reactivity	-.083	.021	-.179	-3.875	**.000**
Cognitive empathy	-.004	.022	-.009	-.185	**.854**
Social Skills	-.041	.019	-.105	-2.141	**.033**
Variable		**Non-Aggressive R^2=.092**			
	B	SE(B)	β	*t*	Sig. (p)
Sensation seeking	.056	.011	.214	5.121	**.000**
Emotional Reactivity	-.056	.018	-.143	-3.130	**.002**
Cognitive empathy	-.005	.018	-.012	-.250	**.803**
Social Skills	-.038	.016	-.114	-2.346	**.019**

Note. p<.001, *p*<.05

Table 3 shows that sensation-seeking traits were a positive predictor, whereas emotional reactivity and social skills was a negative predictor of both physically aggressive and non-aggressive behaviors.

Sensation seeking emerged not only as a predictor of physically aggressive and non-aggressive behaviors but the inclusion of sensation seeking in the regression model changed the relationship between subtypes of empathy and subtypes of antisocial behaviors. Social skills became a predictor of both physically aggressive and non-aggressive behaviors in the presence of sensation seeking traits. Therefore the role of sensation seeking traits as a moderator was examined in a 2 way ANOVA.

Table 4. A two way ANOVA showing sensation seeking as a moderator between subtypes of empathy and subtypes of antisocial behavior. (N=540)

Effect	**Physically aggressive behavior**		**Non-aggressive behavior**		***df***
	F	*p*	*F*	*p*	
Sensation seeking × Emotional reactivity	3.38	**.04**	2.87	**.06**	2
Sensation seeking × Cognitive empathy	1.83	**.16**	4.26	**.02**	2
Sensation seeking × Social skills	4.29	**.01**	3.64	**.03**	2

Note. p<.05

Table 4 shows an interaction between sensation seeking and emotional reactivity for physically aggressive behaviors (Figure 1) but no interaction between sensation seeking and emotional reactivity for non-aggressive behaviors (Figure 2).

There was an interaction between sensation seeking and cognitive empathy for non-aggressive behaviors (Figure 4) but no interaction between sensation seeking and cognitive empathy for physically aggressive behaviors (Figure 3).

There was an interaction between sensation seeking and social skills for both physically aggressive (Figure 5) and non-aggressive behaviors (Figure 6).

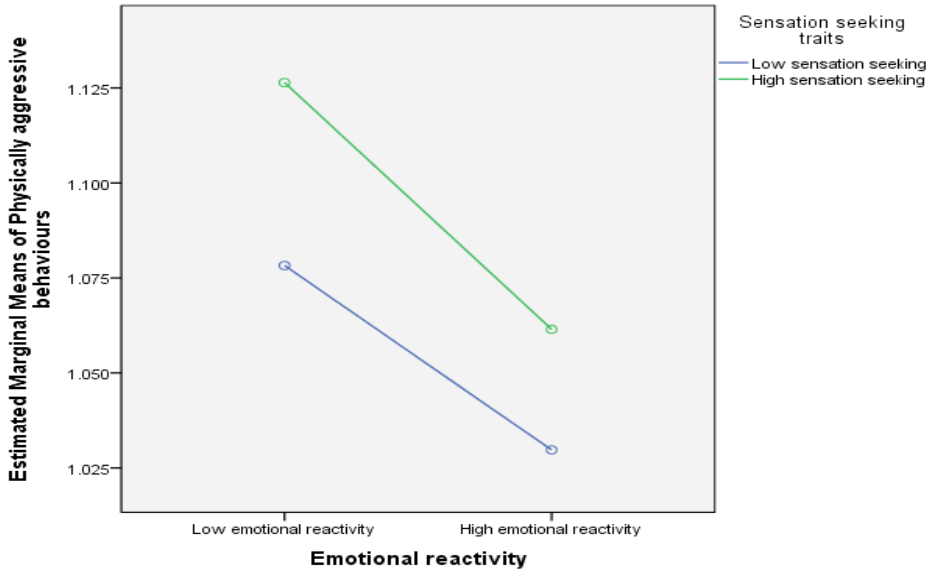

Figure 1: Sensation seeking with emotional reactivity in predicting physically aggressive behaviors

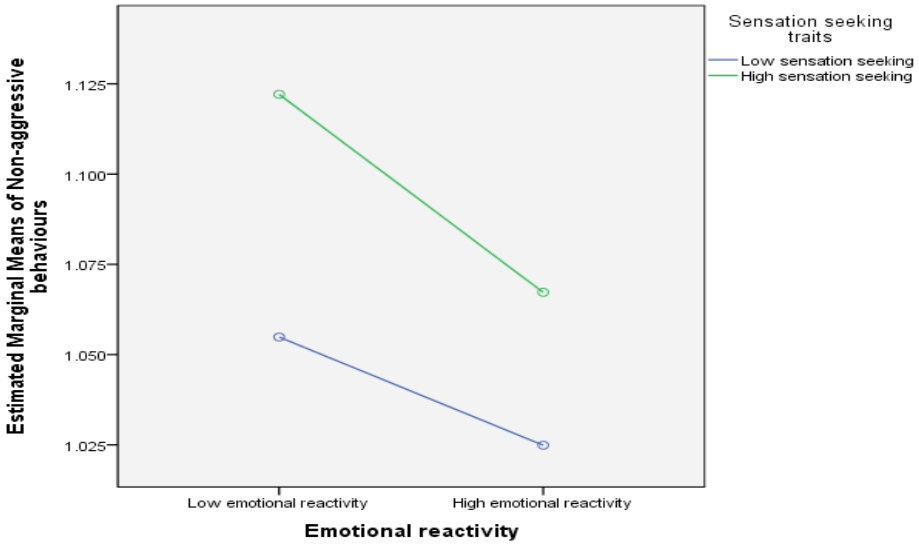

Figure 2: Sensation seeking with emotional reactivity in predicting non-aggressive behaviors

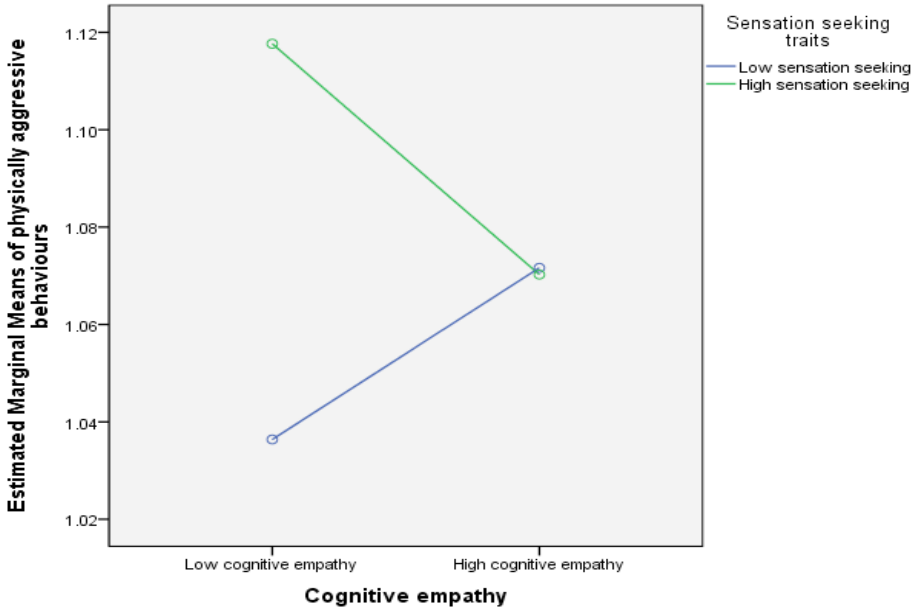

Figure 3: Sensation seeking with cognitive empathy in predicting physically aggressive behaviors

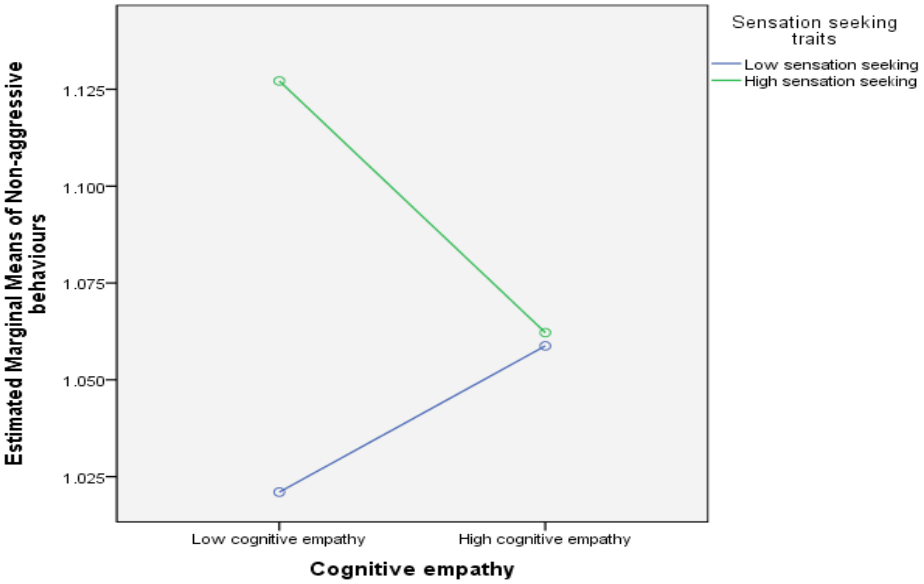

Figure 4: Sensation seeking with cognitive empathy in predicting non-aggressive behaviors

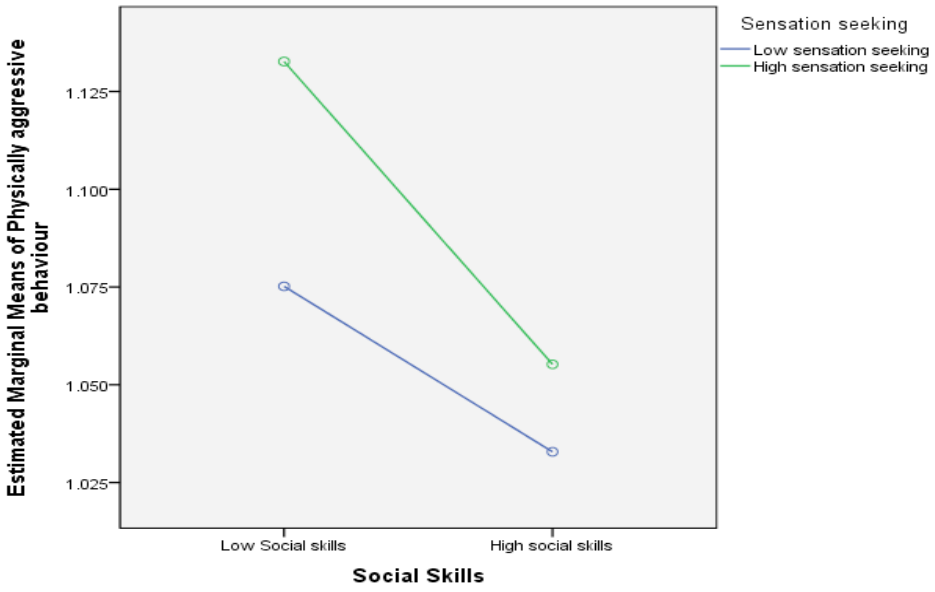

Figure 5: Sensation seeking with social skills in predicting physically aggressive behaviors

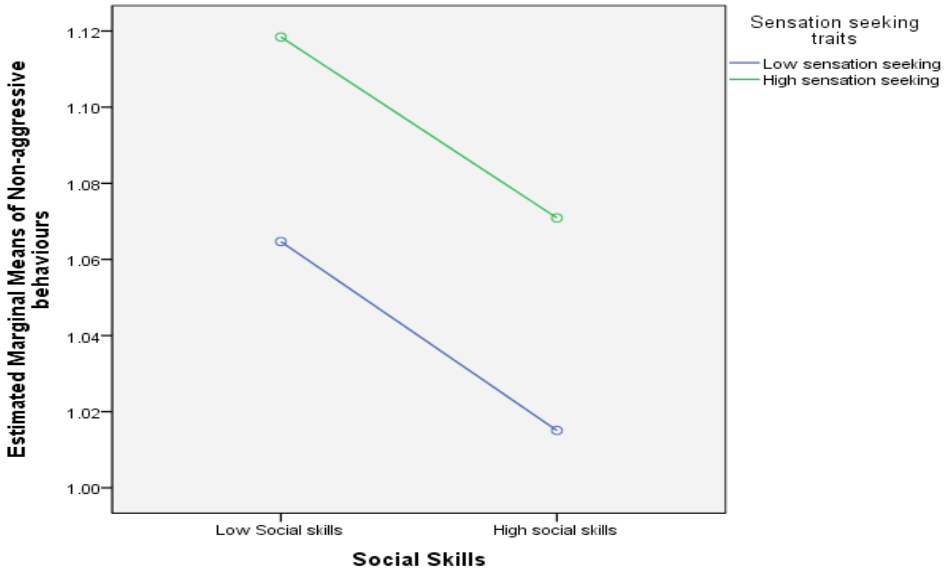

Figure 6: Sensation seeking with social skills in predicting non-aggressive behaviors

Discussion

The first hypothesis $\mathbf{H_1}$ that subtypes of empathy i.e. cognitive empathy, emotional reactivity and social skills would be inversely related to subtypes of antisocial behaviors i.e. physically aggressive and non-aggressive behaviors was supported (Table 1). The second hypothesis $\mathbf{H_2}$ that emotional reactivity would predict physically aggressive behaviors while cognitive empathy and social skills would predict non-aggressive behaviors in a regression model including only subtypes of empathy was partially supported (Table 2) because of all the subtypes of empathy in

the regression model only emotional reactivity predicted physically aggressive and non-aggressive behaviors. The third hypothesis that **H_3** that the addition of sensation seeking to subtypes of empathy in the regression model would change the relationship between subtypes of empathy and subtypes of antisocial behavior was supported. Social skills predicted physically aggressive and non-aggressive behaviors in addition to emotional reactivity and sensation seeking when sensation seeking was added to the regression model (Table 3). The fourth hypothesis **H_4** that sensation seeking would moderate the relationship between subtypes of empathy and subtypes of antisocial behaviors, whereby sensation seeking interacts with emotional reactivity in physically aggressive behaviors; and sensation seeking interacts with cognitive empathy and social skills in the non-aggressive behaviors; was partially supported (Table 4, Figures 1-6).

High sensation seeking interacted with low emotional reactivity and low social skills in predicting physically aggressive behavior (Figures 1 & 5). High sensation seeking also interacted with low social skills and low cognitive empathy in predicting non-aggressive behaviors (Figure 4 & 6). However, low sensation seeking interacted with high cognitive empathy in non-aggressive behaviors (Figure 4).

Relationship between subtypes of empathy and subtypes of antisocial behaviors (Table 1; First hypothesis)

The Spearman rank correlations showed that subtypes of empathy i.e. emotional reactivity, cognitive empathy and social skills, had an independent inverse correlation with physically aggressive and non-aggressive behaviors (Table1). This finding corresponds to previous studies (e.g. Kokkinos et al., 2014; Shechtman, 2002; Vitaro, Brendgen, & Barker, 2006) which have also shown an inverse relationship between subtypes of empathy and subtypes of antisocial behaviors.

We note that these findings indicate that the direction of relationship was inverse for all three subtypes of empathy in relation to physically aggressive behaviors, i.e. aggression against living things.

Moreover, we note that the direction of relationship was also inverse for all three subtypes of empathy in relation to non-aggressive behaviors, i.e. aggression against other people's possessions.

The results showed that low levels of empathy were associated with antisocial behaviors regardless of the subtype of empathy or subtype of antisocial behavior. Nevertheless, all subtypes of empathy were not equally important in predicting physically aggressive and non-aggressive behaviors. Emotional reactivity had a higher correlation to both physically aggressive and non-aggressive behaviors followed by social skills and cognitive empathy. Therefore, emotional reactivity was the most important subtype of empathy and cognitive empathy was the least important subtype of empathy in relation to subtypes of antisocial behaviors. This finding supported previous studies (e.g. Aaltola, 2013; de Kemp, Overbeek, de Wied, Engels, & Scholte, 2007; Jolliffe & Farrington, 2006, 2007, 2011; Maurage et al., 2011; Shechtman, 2002).

However, the current results contradicted some previous findings (e.g. Ang & Goh,

2010; Mayberry & Espelage, 2007; Milojević & Dimitrijevic, 2014), which showed a positive correlation or no correlation of empathy subtype to antisocial behavior subtypes. Those studies found different results from the current study probably because they had different definitions for aggressive behaviors or a different population of youth. For instance, there was a different definition of aggressive and non-aggressive behaviors. Aggressive behavior referred to proactive and reactive aggression subtypes and non-aggressive behavior referred to uninvolved youth (Mayberry & Espelage, 2007). In another example, the sample consisted of juvenile offenders (Milojević & Dimitrijevic, 2014) instead of university students. Similarly, gender could affect the relationship between a certain subtype of empathy and antisocial behaviors. For example, cognitive empathy was the same for groups with high and low levels of cyberbullying for female participants (Ang & Goh, 2010).

Moreover, it should be noted that the significant correlations in the current study were low. Therefore strong conclusions regarding the relationship between subtypes of empathy and subtypes of antisocial behaviors cannot be made.

Subtypes of empathy as predictors of subtypes of antisocial behaviors in the regression model (Table 2, Second hypothesis)

Previous research (Kokkinos et al., 2014) revealed an inverse relationship between emotional reactivity and cyberbullying which is a type of non-aggressive behavior. The current research added to the literature by demonstrating that emotional reactivity is inversely related to both physically aggressive (antisocial behaviors targeted against people/animals) and non-aggressive behaviors (antisocial behavior targeted against objects). Amongst all the subtypes of empathy, only emotional reactivity appeared as the inverse predictor of both physically aggressive and non-aggressive behaviors. This not only revealed the significance of emotional reactivity as a predictor of antisocial behaviors, but also revealed that low levels of emotional reactivity amongst university students predicted antisocial behavior, regardless of the antisocial behavior subtype.

The nature of the two subtypes of antisocial behaviors as defined in the current study did not involve any romantic aggression, relational aggression, neutral or docile behavior. Both subtypes of antisocial behaviors involved actual, threatened, serious and deliberate criminal acts, which could for example include rule breaking, abuse or violence. Therefore the definitions of antisocial behavior subtype i.e. whether it refers to aggression against living things or aggression against property of others should be kept in mind before interpreting the relationship between emotional reactivity and antisocial behavior subtypes.

The current findings corroborated previous literature (Aaltola, 2013; Shechtman, 2002) which showed an inverse relation of affective empathy to subtypes of antisocial behaviors. However, the current findings contradicted studies (e.g. Dadds et al., 2009; Domes, Hollerbach, Vohs, Mokros, & Habermeyer, 2013; Hosker-Field, 2011; Milojević & Dimitrijevic, 2014; van Heerebeek, 2010), which did not find any relationship or a positive relationship of affective empathy to physically aggressive and non-aggressive behaviors. The reason for this contradiction might be attributed to the different definitions of subtypes of empathy and subtypes of antisocial behaviors as well as the different demographic characteristics of the participants in the literature.

Sensation seeking and Subtypes of empathy as predictors of subtypes of antisocial behaviors in the regression model (Table 3, Third Hypothesis)

Sensation seeking traits emerged as a predictor in addition to emotional reactivity in the regression model. Past research (e.g Kokkinos et al., 2014) showed the relationship of subtypes of empathy to both non-aggressive behaviors and subtypes of sensation seeking but it did not show the competing effects of sensation seeking traits with subtypes of empathy in predicting both physically aggressive and non-aggressive antisocial behaviors. The present study showed the relative position of sensation seeking when it was included as a predictor of physically aggressive and non-aggressive behaviors in addition to subtypes of empathy as predictors.

While sensation seeking traits were the strongest predictor of non-aggressive behaviors followed by emotional reactivity and social skills; emotional reactivity was the strongest predictor of physical aggressive behavior, followed by sensation seeking and social skills. Sensation seeking emerged as a significant predictor of physically aggressive and non-aggressive behaviors in addition to emotional reactivity. However, low emotional reactivity superseded sensation seeking in physically aggressive behaviors while sensation seeking superseded low emotional reactivity in non-aggressive behaviors.

Moreover, it must be noted that social skills were not significant in the absence of sensation seeking traits in the previous regression model (Table 2). However, social skills became a significant predictor of physically aggressive and non-aggressive behaviors in the regression model with sensation seeking traits. This might have occurred due to the relationship between sensation seeking and social skills, which was beyond the scope of this study. Furthermore, akin to sensation seeking, low levels of social skills were significant in non-aggressive behaviors as compared to physically aggressive behaviors.

The finding that low social skills predicted non-aggressive behaviors while low emotional reactivity predicted physically aggressive behaviors was in line with previous studies (see Table 3; e.g. Jolliffe & Farrington, 2004; Lunsford, 2014; van Langen et al., 2014; Xu et al., 2014; Yeo et al., 2011). Nevertheless, the addition of sensation seeking to the regression model changed the relative levels of significance of the subtypes of empathy in predicting subtypes of antisocial behaviors.

As sensation seeking changed the regression model, it was worth examining the interaction between sensation seeking and subtypes of empathy in predicting subtypes of antisocial behaviors.

The interaction of sensation seeking with subtypes of empathy in predicting subtypes of antisocial behaviors in the regression model (Table 4, Figures 1-6, Fourth hypothesis)

Previous studies (e.g. McTernan et al., 2014; Pouw, Rieffe, Oosterveld, Huskens, & Stockmann, 2013; Pursoo, 2013; Yeo et al., 2011) identified emotional reactivity and sensation seeking as predictors of aggressive behaviors, and cognitive empathy as a predictor of non-aggressive behaviors. The interaction analyses in the current study supported these past findings by showing that high sensation seeking interacted with

low levels of emotional reactivity in predicting physically aggressive behaviors (Figure 1), and high sensation seeking interacted with low cognitive empathy in predicting non-aggressive behaviors (Figure 4).

Sensation seeking also changed the direction of relationship between cognitive empathy and non-aggressive behavior. At low sensation seeking, there was a positive relationship between cognitive empathy and non-aggressive behavior but at high sensation seeking there was an inverse relationship between cognitive empathy and non-aggressive behavior (Figure 4). This meant that low sensation seekers understood others' state of mind and still engaged in non-aggressive behaviors while high sensation seekers had low levels of understanding of others' state of mind when they engaged in non-aggressive behavior. This implied that sensation seeking might not be the primary reason for those with a high level of cognitive empathy. Therefore, another hidden variable might be motivating individuals with high cognitive empathy and low sensation seeking traits to engage in non-aggressive behaviors. However, sensation seeking might be a potential excuse for those with low levels of cognitive empathy for engaging in non-aggressive behaviors.

Moreover this study revealed that high sensation seeking interacted with low social skills in predicting physically aggressive behaviors (Figure 5). This finding was against expectations because social skills had a higher significance level in predicting non-aggressive behaviors as compared to predicting physically aggressive behaviors in the non-interactive model consisting of all the variables including sensation seeking traits. Although low social skills can be associated with antisocial behaviors (Buck, 2013; Ttofi et al., 2014), there is limited evidence regarding the specific relationship of social skills to physically aggressive and non-aggressive behaviors. On the other hand past findings (Dahlen et al., 2004; McTernan et al., 2014), have only shown the involvement of high sensation seeking in aggressive behaviors. The current study added to the literature by showing that high sensation seeking interacted with low social skills in physically aggressive behaviors (Figure 5). Moreover, this study showed that low sensation seeking interacted with low social skills in non-aggressive behaviors (Figure 6).

The comparison between the non-interactive model and the interactive model of sensation seeking with subtypes of empathy in predicting physically aggressive and non-aggressive behaviors

When a comparison between the interactive model (Table 4) was made with the non-interactive model (Table 3) of sensation seeking traits, the non-interactive model shows sensation seeking, emotional reactivity and social skills as predictors of physically aggressive and non-aggressive behaviors.

However, in the interactive model, in addition to other variables cognitive empathy also emerges as a predictor of non-aggressive behavior. This was an important finding as it revealed that even though cognitive empathy did not emerge as a significant predictor in the non-interactive model, it was significant in the interactive model. This suggests the covert significance of cognitive empathy in non-aggressive behaviors.

On the other hand non-interactive model displayed social skills as a more significant predictor of non-aggressive behaviors than of physically aggressive behaviors. The

interactive model supported the finding of the non-interactive model by demonstrating the relative position of sensation seeking with social skills in physically aggressive and non-aggressive behaviors. Thus low social skills interacted with high sensation seeking in predicting physically aggressive behaviors while low social skills interacted with low sensation seeking in predicting non-aggressive behaviors. Although social skills were low in both antisocial behavior subtypes, the levels of sensation seeking varied while interacting with social skills with low levels of sensation seeking in non-aggressive behaviors. Thus these findings suggested whether or not social skills interacted with sensation seeking, social skills might be of greater significance in non-aggressive behaviors than in physically aggressive behaviors.

Nevertheless, the interactive model gives a better view of interactions between subtypes of empathy and sensation seeking in subtypes of antisocial behaviors.

Limitations

One limitation was that reliability analysis revealed low correlations for two of the items in the emotional reactivity subscale which were "If I say something that someone else is offended by, I think that that's their problem, not mine" and "I usually stay emotionally detached when watching a film." Therefore by excluding these two items the alpha coefficients increased from .59 to .63. Nevertheless, these two items were retained according to the confirmatory factor analysis conducted in previous studies (e.g. Berthoz et al., 2008; Gouveia et al., 2012; Muncer & Ling, 2006). However, even these studies (i.e.Berthoz et al., 2008; Gouveia et al., 2012; Muncer & Ling, 2006) reported low alpha coefficients for these two items.

Conclusion and Implications

The current study demonstrated the significance of subtypes of empathy alone as well as sensation seeking traits with subtypes of empathy in predicting physically aggressive and non-aggressive behaviors. Thus, this study highlighted how opposing emotions i.e. sensation seeking and subtypes of empathy interacted in different types of antisocial behaviors. Emotional reactivity emerged as the most significant predictor of antisocial behaviors regardless of the subtype of antisocial behavior. While sensation seeking emerged as a significant predictor of physically aggressive and non-aggressive behaviors, it moderated the relationship between subtypes of empathy and subtypes of antisocial behaviors.

The current study would be useful in informing theory and practice that high sensation seeking with low emotional reactivity, and high sensation seeking with low social skills are involved in physically aggressive behaviors whereas high sensation seeking with low cognitive empathy, low sensation seeking with high cognitive empathy and low sensation seeking with low social skills are involved in non-aggressive behaviors. Keeping in view these distinctive interactions between sensation seeking and subtypes of empathy in physically aggressive and non-aggressive behaviors, different interventions might be needed for youth involved in physically aggressive behaviors and youth involved in non-aggressive behaviors.

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