

Appraisal, Coping and Negative Affect: Comparative Evaluation between Typically Developing and Children with High-Functioning Autism

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Abstract

Children with High Functioning Autism (HFA) have been argued to use faulty appraisals and avoidance patterns of coping behaviour in negative and stressful social situations, but the research evidence is limited. The current study investigated the role of cognitive appraisals and coping behaviour in relation to negative emotions and social adjustment in children with HFA and typically developing (TD) children. Results from the current study made a valuable contribution to the existing, under-developed literature by confirming results from previous study on significant differences between TD and HFA groups for cognitive appraisals of emotion-focused coping potential, problem-focused coping potential, future expectancy and self-accountability as well as for the negative emotions of guilt, sadness and fear. Scores for frequency and perceived effectiveness of avoidance and approach coping and social adjustment were also significantly different. Another unique finding from this study was on significant associations between appraisals and emotions, appraisals and coping; and coping and social adjustment. These findings provide useful insights into the various facets of the emotional and cognitive experiences of children with HFA.

Keyword: Autism; Cognition; Coping; Emotion regulation; Anxiety

Introduction

It has been argued that the ability to cope with demanding situations is a crucial determinant of social adjustment in children with autism [1]. Study of coping as a process was heavily influenced by the work of Lazarus [2]. According to Lazarus, coping was not just a specific response to a specific stressor, but was more diverse and complex in its structure with the aim of protecting one's emotional, social and physical functioning. Lazarus and other researchers followed this up with further research studies aimed specifically at studying the dynamic nature of coping [3]. Lazarus and Folkman [2] defined coping as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands appraised as taxing or exceeding the resources of a person" (p. 141). Coping has been delineated to serve two main functions [2]: first, to try and reduce the harm induced by a stressor by directly acting on it; and second to deal with the emotional consequences, manage one's own emotional state and stay calm. Referring to these functional differences, a distinction between problem-focused and emotion-focused coping has been made. Problem-focused coping is defined as the efforts to manage or alter the stressor, and emotion-focused coping is defined as the efforts to deal with one's own emotional reactions. It was further proposed that people who employ problem-focused coping strategies are better adjusted to varied stressful situations than people who employ emotion-focused coping strategies. This hypothesis has been empirically supported [4].

In a similar vein, although adopting a different methodology, Roth and Cohen [5] proposed approach and avoidance as two different types of coping in stressful situations. Approach coping is defined as an engaged form of coping with the goal of reducing, eliminating or managing the internal or external demands of a stressor, which can be argued to be theoretically comparable to the definition of problem-focused coping. Avoidance coping was compared to emotion-focused coping, since both involve attempts aimed at directing all the efforts away from a stressor [4].

Emotion regulation strategies in children with autism

There is limited research evidence on how children with autism

manage their excessive anxiety and stress, and the findings suggest that they might be using maladaptive forms of coping strategies. For example, Gupta and Sharma [6] studied coping choices of children with high-functioning autism and found they frequently used avoidance and passive coping strategies for management of fear. Konstantareas and Stewart [7] found that children with AS used non-adaptive affect regulation strategies like emotion-focused coping in a stereotyped, repetitive behaviour to manage adverse social situations compared to a group of TD children.

In addition, coping choices of children with autism have been argued to be mostly focused on their negative emotions and involve attempts for regulating their anxiety in particular. Similarly, it has been argued that common behaviours characterised by extreme shyness with strangers, self-isolation, obsessions and compulsions in children with autism are aimed at reducing the sense of uncertainty and bringing a sense of order to their surrounding environment. Use of avoidance coping to manage social anxiety was also mentioned by Baron-Cohen, Groden, Groden and Lipsitt. Kanner stated that children with autism use repetitive patterns of behaviour as defences against high anxiety, suggesting that the avoidance patterns of coping have been noted in behaviour of children with autism from the early days of the study of this topic. Cognitive behaviour therapy programmes that were shown to be effective have included elements to improve emotion regulation strategies of children with autism [8,9]. For example, Barry et al. [10] developed a comprehensive treatment approach for improving socio-emotional abilities of children with autism.

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Appraisal dimensions and coping behaviour

It has been argued if the coping behaviour enabled is in harmony with appraisal dimensions, coping attempts are successful, adaptation is achieved and the child functions effectively [2,11]. No studies have investigated appraisal-coping relationship in children with autism, but there is excess of research on appraisal-coping relationship in other groups. For example, studies by Rogers and Holmbeck [12], Gamble [13] and Grych and Fincham [14] showed that appraisal dimensions of future expectancy and coping potential were directly predictive of approach coping. However, children who made low expectations about the outcome and low coping potential perceptions used avoidance coping more frequently. Appraisal of self-blame was also found to be directly predictive of avoidance coping in situations of inter-parental aggression and parental divorce. A negative association between avoidance coping and appraised coping potential was also shown by Causey and Dubow [15], and Lengua and Sandler [16]. These findings suggest that children who had higher appraisals of coping potential and positive expectations about the outcome used high levels of approach coping. Consistent with this view, a significant association between appraisals of a stressor on the coping behaviour of TD children [17] has also been reported.

Research on appraisal-emotion relationship in autism

Several research studies have found supporting evidence for appraisal-emotion association in TD children, children with clinical symptoms of anxiety disorders and other special backgrounds, such as with inter-parental conflict/divorce [18]. Role of appraisals in determining emotions in children with autism have however been only investigated by one study [19]. Sharma et al. investigated appraisals in relation to fears and anxiety in a group of 29 children with HFA and 29 TD children. Children with HFA were found to appraise frustrating social situations as high in self-accountability but low in future expectancy, emotion-focused coping potential and problem-focused coping potential. Such a profile of appraisals was significantly different than appraisals of TD children and was significantly associated with fear and anxiety. This finding is in agreement with other research evidence on appraisals being significantly associated with fears and anxiety in children with other special needs [20] and TD children [21].

It will however be premature to conclude any association between appraisals and emotions in children with autism on the basis of just one study. The current study thus aim to further investigate the findings of the previous study by Sharma et al. [19] using a different methodology and a larger sample size. This study would provide further valuable contribution to the literature since a larger sample size would allow for a regression analysis to be carried out. Results from a regression analysis will provide greater insights into the association between appraisals and negative emotions in children with autism. As compared to the previous study by Sharma et al. [19], current study would investigate new variables of coping, social adjustment, guilt and sadness in relation to cognitive appraisals, thus add new knowledge in this field.

Research Questions

1. Are appraisals of self-accountability, emotion-focused coping potential and problem-focused coping potential and future expectancy significant predictors of fear, guilt and sadness in the HFA and TD groups?
2. Is coping behaviour predictive of social difficulties in the HFA and the TD groups?
3. Are appraisals of self-accountability, emotion-focused coping

potential, problem-focused coping potential and future expectancy significant predictors of avoidance and approach coping behaviour in the two groups?

Hypotheses

1. The HFA group will have a higher mean for the appraisal dimensions of self-accountability but lower means for emotion-focused coping potential, problem-focused coping potential and future expectancy compared to the TD group [19].
2. The HFA group will have higher means for the negative emotions of fear, guilt and sadness compared to the TD group [22,23].
3. The HFA group will report more frequent use of avoidance coping strategies whereas the TD group will report on more frequent use of approach coping strategies [6,7].
4. The average social adjustment scores would be significantly higher for the HFA than TD group, indicating greater social adjustment difficulties in HFA group [24].

Methodology

Sample size and selection procedure

Inclusion criteria for the selection and recruitment of participants were that all children must be in the age-group of 8-12 years, children in the HFA group should have previously received a formal diagnosis of high-functioning autism/Asperger's Syndrome; and children in the TD group should have no developmental delays or diagnosis for any special needs or disabilities. Participants were recruited through five main sources: the National Autistic Society (NAS), mainstream and special units of schools in Glasgow, North Lanarkshire, Renfrewshire and Edinburgh, parent support groups and from the University of Strathclyde campus. Before contacting families with request for participation, necessary ethical permissions were obtained from the respective Ethics Committees of the University of Strathclyde, local education councils and the NAS. Families were contacted via post and/or email depending on the kind of contact information that was available. Participant pack consisted of a parent information sheet, child information sheet, a consent form and a self-addressed stamped envelope. In total, 42 children in the HFA group and 40 TD children were recruited.

Contact details for the researcher were also included in the information sheets, so that families who had any doubts could directly get in touch. Study objectives and procedures were explained to parents and children in both the groups. They were assured that their participation was voluntary, that they had the right to withdraw at any time of the study; and that the information obtained from them would be treated in confidence and subsequently destroyed, 5 years after the study was complete. Signed consents were obtained from all the children and parents on a paper copy of the consent form.

Procedure

Data for this study were collected by telephone due to the costs of travel money and time. All the participants were living in the UK. Data were anonymised and separate code sheets containing confidential background information about the participants were stored separately for the purpose of analysis. Data were later transferred to SPSS and were stored on a password protected University computer. In an independent pilot sample of eight TD children and eight children with HFA, who used both types of administration (face-to-face and telephone), large significant ($p \leq 0.05$) correlations ranging from .66

to .98 were found between face-to-face and telephone testing in both groups. This suggested that telephone and face-to-face administration produced comparable scores. A weaker correlation was found only for problem-focused coping potential and this was only in the HFA group, where $r = 0.29$, $p = 0.47$. No significant differences were found between data collected through face-to-face and telephone testing modes. Since a non-significant correlation was found for the appraisal dimension of problem-focused coping potential, findings related to this variable will be interpreted with a degree of caution.

For data collection, questionnaires with instructions for parents and a self-addressed stamped envelope for the return of completed questionnaires were sent by post. Participants were asked to complete the questionnaires in a fixed order to ensure consistency across all the participants. In order to ensure this, the researcher stayed on phone throughout the testing session and read out the questions and instructions. Throughout the testing session parents were present in the same room and were advised that their help might be required and to be ready to prompt their child to respond. In all cases, since the child appeared comfortable in speaking to the researcher by telephone, researcher read out the instructions and questions. Telephone was kept on loud speaker setting during the testing.

Measures

A combination of self-report scales, questionnaires and narrative recall measures were used.

Narrative recall: The technique of narrative recall has been used by other researchers in past for the investigation of cognitions and emotions in children and adults [25]. By asking children to recall a past negative situation, the primary appraisal dimensions of motivational relevance and motivational incongruence were established to set the stage for measurement of the other secondary appraisal dimensions in the recalled situation. Once children said they were ready with a past situation in their mind, three questions about the experience designed to enable a fuller recall of previous negative experience in children were asked. For example: children were asked "What happened in this situation to make it appear unpleasant to you?" Then questionnaires designed to measure their appraisals, emotions and coping strategies were administered. These are described below.

Appraisal questionnaire: This questionnaire based on the work of Smith and Lazarus [26] for the respondents in the HFA and TD groups. It consisted of four face-valid items designed to measure individual appraisal dimensions of emotion-focused coping potential, problem-focused coping potential, future expectancy and self-accountability. Children were invited to respond on a 3 point scale (1-3).

Emotion questionnaire: Emotion questionnaire consisted of three emotional adjectives corresponding to fear, sadness and guilt, with one adjective for each emotion. This scale originally used by Smith and Lazarus [26], only one item was used for each of the three negative emotions to be rated on a 3 point scale (1-3).

KIDCOPE: Spirito, Stark and William's [27] KIDCOPE is a brief self-report measure that consists of 15 items. It has also been shown to have moderate correlations with other commonly used scale: the Coping Strategies Inventory [28]. Children were invited to respond yes or no for each coping strategy to indicate whether they used a specific coping strategy to manage the negative situation they had just described. Responses were scored as 0 (no), 1 (yes) for the frequency of using a coping strategy and were given scores of 0 (not at all), 1 (a little) and 2 (a lot) for the effectiveness of each coping strategy. The 15 items

in the KIDCOPE scale were classified in 10 sub-categories to form 10 distinct sub-scales, out of which five sub-scales consisted of two items each: distraction, social withdrawal, problem solving, emotional regulation, wishful thinking. The remaining five sub-scales were single item measures: cognitive restructuring, self-criticism, blaming others, social support and resignation.

These sub-scales could be further combined into the larger categories of approach coping and avoidance coping for analysis [27,29]. Spirito proposed that positive/ approach coping scale consisted of the sub-scales of cognitive restructuring, problem solving, social support and emotional regulation. Negative/ avoidance coping scale consisted of the four sub-scales: distraction, blaming others, wishful thinking and resignation. Spirito et al. [27] report that test-retest reliability (for an interval of 3-7 days) for the KIDCOPE scales was 0.41 to 0.83, when administered to a sample of 330 children. In the present study, it was not possible to calculate reliability of the five single-item sub-scales as at least two items are required for the computation of Cronbach's alpha. The other five sub-scales that consisted of two items and the larger categories of approach and avoidance were found to be reliable with Cronbach's alpha values ranging from 0.80 to 0.84 for the HFA and TD groups.

Paediatric Symptom Checklist (PSC): The PSC scale was designed by Jellinek, Murphy and Burns [30] as a psychological screening tool to facilitate the recognition of cognitive, emotional and behavioural problems in children. This scale consisted of 36 statements about children's social life in general and the parents responded on a 3 point scale (0= never, 1= sometimes, 2= often). Total score is calculated by adding score for each of the 35 individual items on the scale. A cut-off score of 28 indicates a significant level of psychological impairment in children aged 6-16 years of age.

The PSC scale was also found to have a rate of 89% inter-rater agreement and a kappa coefficient of 0.52 when compared to the Child Behaviour Checklist. This scale has also been shown to exhibit re-test reliability coefficients of 0.86 at a gap of two weeks. It was found to be reliable with Cronbach's alpha coefficient of 0.87 for the HFA group and 0.86 for the TD group. It took about 5-10 minutes for the parents to complete this scale [30].

Vocabulary sub- test from the Wechsler Intelligence Scale for Children- Fourth UK Edition (WISC-IV): This was a test from verbal sub-scale of the WISC IV [31] scale, used for an assessment of children's understanding of vocabulary in children aged 6 years to 16 years and 11 months. The vocabulary sub-test is considered "to be the best single indicator of general intelligence" [32], correlating 0.72 with the full scale IQ on the WISC-IV scale. It was thus used as a proxy measure of cognitive ability in children in the current study and it showed good reliability in both the HFA ($\alpha = 0.84$) and the TD ($\alpha = 0.85$) group.

Childhood Autism Spectrum Test (CAST): The CAST scale was designed and standardised by Scott, Baron-Cohen, Bolton and Brayne [33] for the screening of children aged 4-12 years at the risk for autism. It consists of 37 statements about the child's current level of functioning in social, cognitive and communication domains. Parents are asked to mark either 'yes' or 'no' for each statement on the scale. Scores of 15 and over generally reflect clinical levels of difficulties associated with autism [33]. The CAST scale showed high reliability for the current sample with a Cronbach's alpha coefficient of .86 in the HFA group and .81 in the TD group.

Analysis strategy: Measures for assessing appraisals and coping consisted of single-item scales, which can increase the risk for the

occurrence of a higher measurement error. So, additional preliminary, statistical checks were carried out before proceeding with data analysis. Data was checked for normality, skewness and kurtosis issues. All the scales were found to be normal. The assumption related to homogeneity of variance was also examined by carrying out Levene's tests. Levene's test output was found to be non-significant. Further statistical assumptions recommended for regression analyses were also examined such as multi-collinearity, homoscedasticity, linearity and normality of residuals in the data were assessed; all these statistical measures were adequate, thereby increasing the confidence in use of the available data for analysis.

Results

Sample characterisation: Background information on age, gender, scores on the CAST and vocabulary sub-scales of the WISC-IV scale were assessed for between group differences. No significant differences were found between the HFA and the TD groups for age (HFA: Mean=10.26, S.D=0.73; TD: Mean=10.33, S.D=0.69; $t(df=80)=-0.39, p=0.69$), gender (N for male: HFASD=34, TD=30; N for female: HFASD=8, TD=10; $\chi^2(df=1, N=82)=0.42, p=0.51$); and vocabulary scores (HFASD: Mean=12.40, S.D=1.10; TD: Mean=12.30, S.D=1.11; $t(df=80)=0.42, p=0.67$). A significant difference was found between the HFASD (Mean=19.10, S.D=0.82) and TD groups (Mean=3.95, S.D=0.81) in their CAST scores ($t(df=80)=83.81, p<0.001$). All children in the HFA group scored between 17-26 and children in the TD group scored from 5-11. The cut-off score of 15 or above has been shown to be suggestive of a child being at the risk of developing autism-related symptoms [33]. Taken together, findings from the CAST scale and the vocabulary sub-test suggest that children in the HFA group had symptoms related to autism and were likely to be of average IQ.

Further checks on other background variables such as parental education, family's socio-economic status and ethnicity were also collected. All the parents had gained University level education and had a family income of at least 25,000 GBP a year. However, Ethnicity of the participant families varied. Eight Hindu children were recruited in the TD group, which was considered to be a potential source of bias in the findings, since children from a different ethnic group might have been taught different values. Differences between Hindu and non-Hindu children's responses for background variables such as age, gender, CAST scores, vocabulary sub-test of WISC-IV scale; and other variables of appraisals, emotions, coping, social adjustment and were assessed. No significant differences were found between the two groups of children. There was no evidence that data from children belonging to different ethnic backgrounds were atypical, so all the children were combined in a single group for further analysis.

Appraisals and their association to the negative emotions (Research Question 1)

Three separate linear regression analyses using the 'Enter' method were carried out to estimate which of the four appraisals were associated with the three negative emotions of fear, guilt and sadness, for HFA and TD groups. Before regression analyses, between group differences for appraisals and emotions were examined.

Difference between two groups for appraisals and negative emotions (Hypotheses 1 and 2): The HFA group had a higher mean score for the appraisal of self-accountability but a lower score for the appraisal dimensions of emotion-focused coping potential, problem-focused coping potential and future expectancy than the TD group. These differences were significant with a medium to large effect size

for all the four appraisals. Similarly, for the three negative emotions of fear, guilt and sadness; HFA group had a higher mean score for all three emotions than the TD group (Table 1).

Which appraisal is associated with fear?: The model consisting of the four appraisals of emotion-focused coping potential, self-accountability and future expectancy as the independent variables and fear as the dependent variable was significant $F(4, 37) = 5.50, p = 0.001$. This model explained 30.5% of the variance (Adjusted $R^2 = 0.305$) in fear scores for the HFA group. The same model was non-significant in the case of the TD group, $F(4, 35) = 0.75, p = 0.56, R^2 = 0.026$. A measure of effect size for regression analyses is Cohen's $f^2 = R^2 / 1 - R^2$. A value of 0.02 for the Cohen's f^2 is interpreted as a small, 0.15 a medium and 0.35 indicates a large effect size [34]. For HFA group, Adjusted $R^2 = 0.305$, therefore $f^2 = 0.10$; and for the TD group, $f^2 = 0.03$.

Only emotion-focused coping potential had a significantly negative association with fear in the HFA group ($B = -0.08, t = -0.40, p = 0.69, \beta = -0.07$). Other three appraisals of future expectancy ($B = -0.15, t = -0.76, p = 0.45, \beta = -0.13$), problem-focused coping potential ($B = -0.05, t = -0.40, p = 0.69, \beta = -0.06$) and emotion-focused coping potential ($B = -0.54, t = -2.49, p = 0.02, \beta = -0.45$) had non-significant associations with fear.

Which secondary appraisal dimension is associated with guilt?: The four appraisals were significantly associated with guilt too, $F(4, 37) = 14.81, p < 0.001$ and explained 57.4% of the variance (Adjusted $R^2 = 0.574$), $f^2 = 0.49$; however it was non-significant for the TD group, $F(4, 35) = 0.90, p = 0.90$, Adjusted $R^2 = .082, f^2 = 0.09$.

Positive values for beta coefficients suggested that three appraisal dimensions of self-accountability ($B = 0.56, t = 3.16, p = 0.003, \beta = 0.41$), future expectancy ($B = 0.38, t = 2.13, p = 0.04, \beta = 0.29$) and problem-focused coping potential ($B = 0.30, t = 2.50, p = 0.02, \beta = 0.29$) had a linear relationship with guilt. Appraisal dimension of emotion-focused coping potential ($B = 0.01, t = 0.05, p = 0.96, \beta = 0.008$) had a non-significant association with guilt.

Which secondary appraisal dimension is associated with sadness?: the four appraisals were significantly associated with sadness, $F(4, 37) = 17.19, p < 0.001$, and explained 61.2% of the variance (Adjusted $R^2 = 0.612$), $f^2 = 0.59$, however model was non-significant in the case of the TD group, $F(4, 35) = 0.26, p = 0.90$, Adjusted $R^2 = 0.029, f^2 = 0.03$.

Negative value of the beta coefficient suggests that future expectancy ($B = -0.73, t = -4.46, p < 0.001, \beta = -0.58$) had a significant, inverse relationship with sadness, while other three appraisals of self-accountability ($B = -0.14, t = -0.89, p = 0.38, \beta = -0.11$), problem-focused

Appraisal dimensions/ Emotions	HFASD (N=42)		TD (N=40)		t-test (df=80)	Effect size (d)
	Mean	S.D	Mean	S.D		
Emotion-focused coping potential	1.07	0.81	2.10	0.81	-5.37 (p=0.002)	0.51
Problem-focused coping potential	1.31	1.02	2.55	0.50	-10.17 (p<0.001)	0.75
Self-accountability	1.12	0.80	0.42	0.50	4.24 (p=0.001)	0.43
Future expectancy	0.90	0.76	2.55	0.50	-11.97 (p<0.001)	0.80
Fear	2.50	1.15	0.45	0.50	9.93(p<0.001)	0.74
Guilt	1.60	1.06	0.50	0.51	8.54 (p<0.001)	0.69
Sadness	0.98	0.81	0.65	0.66	2.64 (p=0.009)	0.28

Table 1: Difference between the HFASD and TD groups for appraisals and emotions.

coping potential ($B = -0.29, t = -2.65, p = 0.01, \beta = -0.29$) and emotion-focused coping potential ($B = -0.03, t = -0.16, p = 0.88, \beta = -0.02$) had a non-significant association with sadness.

Is coping associated with social difficulties? (Research Question 2)

Between group analysis for coping and social adjustment scores preceded regression analysis.

Difference in coping and social adjustment scores between HFA and TD groups (Hypotheses 3 and 4): Since there were ten sub-scales for which the responses of children in the HFA and TD groups were compared, multiple t-tests were run, which can increase the chances of a type-I error [35]. Bonferroni correction was therefore carried out by adjusting the p value to one-tenth of its value [36]. The new p value was therefore set at 0.005 (0.05/10) while carrying out t-test calculations. All differences between the HFA and TD groups for the ten sub-categories of coping were found to be significant at $p < 0.005$ with medium to large effect size (Table 2).

Scores for the sub-categories of coping were totalled to give scores for the larger categories of approach and avoidance coping. The HFA group had a significantly higher mean value for avoidance coping and its efficacy score but lower for approach coping and its efficacy score than the TD group. The HFA group also had statistically significant higher average PSC scores than the TD group. Effect size for all the outputs was large (Table 2).

In a linear regression model, approach and avoidance coping were entered as explanatory variables and average PSC score the outcome variable. This model was significant for the HFA group, $F(2, 39) = 12.185, p < 0.001$ and explained 35.0% variance in social adjustment scores as $\text{Adjusted } R^2 = 0.35, f^2 = 0.54$. It was found that avoidance coping ($B = -1.32, t = -4.34, p < 0.001, \beta = -0.55$) made a significant contribution to the PSC scores, while approach coping did not ($B = -0.40, t = -1.85, p = 0.07, \beta = -0.23$). Negative value of beta coefficient indicated that with an increase in use of avoidance coping strategies, social adjustment might worsen.

Are appraisal dimensions and coping associated? (Aim 3)

Four separate linear regression analyses were carried out, one with the outcome variable of approach coping and the other with avoidance coping, separately for the HFA and TD groups. In the case of HFA group, model consisting of four appraisals was found to be a significant predictor of avoidance coping, $F(4, 37) = 8.09, p < 0.001, \text{Adjusted } R^2 = 0.41, f^2 = 0.69$ but was non-significantly associated with approach coping, $F(4, 37) = 0.76, p = 0.56, \text{Adjusted } R^2 = -0.24, f^2 = 0.31$. The same regression model was a non-significant predictor of both approach, $F(4, 35) = 0.26, p = 0.89, \text{Adjusted } R^2 = -0.08, f^2 = 0.12$ and avoidance coping, $F(4, 35) = 0.78, p = 0.55, \text{Adjusted } R^2 = -0.23, f^2 = 0.29$ in case of the TD group.

Negative value of the coefficients indicated that with an increase in appraisals of emotion-focused coping potential ($B = -0.59, t = -2.68, p < 0.01, \beta = -0.45$) and problem-focused coping potential ($B = -0.33, t = -2.35, p < 0.01, \beta = -0.32$), use of avoidance coping might decrease. Appraisals of self-accountability ($B = -0.15, t = -0.73, p = 0.47, \beta = -0.11$) and future expectancy ($B = -0.04, t = -0.21, p = 0.83, \beta = -0.03$) were found to be non-significantly associated with avoidance coping.

Discussion

The findings suggest that the HFA group exhibit impairment in appraisals in the negative and frustrating social situations, such that the situations are appraised as high in self-accountability, but lower in emotion-focused coping potential, problem-focused coping potential and future expectancy. These findings support the results of the previous study by Sharma et al. [19]. Current findings also support the existing literature on the experience of negative emotions by children with autism by showing significantly higher levels of fear [37], sadness [23] and guilt [22] in the HFA group. All the three regression models, consisting of the four appraisals of emotion-focused coping potential, problem-focused coping potential, self-accountability and future expectancy, were found to be significant predictors of the three negative emotions of fear, guilt and sadness, in HFA group. These findings also suggest that the HFA group might not only differ from the TD group on mean scores of the appraisal dimensions, but also on significance of the appraisal-negative emotion relationships.

Fear only had one significant association with emotion-focused coping potential, sadness with future expectancy and guilt with self-accountability. Future expectancy was significantly associated with sadness. This finding is in agreement with Smith and Lazarus's [26] appraisal model. These findings also supported results from study by Rossman [38], who showed association between self-accountability and guilt; and another study by Rossman, Antoniou and Jose [39] who found future expectancy to be associated with sadness. Taken together, these findings confirm findings from study by Sharma et al. [19] by suggesting that impairment in appraisal dimensions might be associated with occurrence of negative emotions for children with HFA.

The HFA group used avoidance coping to manage the recalled negative events more than the TD group. The efficacy scores of the HFA group for avoidance and approach coping were also found to be significantly lower than those of the TD group. Coping strategies chosen by the HFA group were thus perceived by them to be ineffective in comparison to the TD group. Current findings added further evidence to the pool of limited existing research findings on the coping choices of children with HFA [6].

The HFA group also had significantly higher scores for social difficulties as measured by the parent-report PSC questionnaire [30]. Previous studies have consistently shown social difficulties to be central

Coping strategy	HFASD (N=42)		TD (N=40)		t-test analyses df=80	Effect size (d)
	Mean	S.D	Mean	S.D		
Distraction	9.14	0.78	4.32	1.53	18.12 ($p=0.003$)	0.43
Social withdrawal	9.02	0.84	4.52	1.15	20.24 ($p=0.002$)	0.45
Cognitive restructuring	4.45	1.13	10.25	1.23	-22.18 ($p=0.002$)	0.46
Self-criticism	2.88	0.86	1.00	0.78	10.32 ($p=0.003$)	0.34
Blaming others	1.71	0.77	4.00	0.82	-13.01 ($p=0.003$)	0.37
Problem solving	1.98	0.84	8.95	0.81	-38.31 ($p<0.001$)	0.57
Emotional regulation	3.00	0.83	10.20	1.56	-26.35 ($p=0.001$)	0.49
Wishful thinking	3.60	1.08	0.90	0.78	12.88 ($p=0.003$)	0.37
Social support	2.90	0.85	4.85	0.83	-10.46 ($p=0.003$)	0.34
Resignation	10.38	1.23	2.08	0.76	36.54 ($p<0.001$)	0.56
Approach coping	5.10	1.62	10.28	1.15	16.59 ($p<0.001$)	0.88
Avoidance coping	9.26	0.99	4.58	1.59	17.28 ($p<0.001$)	0.88
Efficacy of approach coping	1.93	0.98	7.07	0.90	58.91 ($p<0.001$)	0.98
Efficacy of avoidance coping	3.72	1.08	4.35	0.90	12.08 ($p<0.001$)	0.80
Social adjustment (PSC average score)	23.95	2.79	13.20	3.17	16.31 ($p<0.001$)	0.87

Table 2: Difference between the HFASD and TD groups for coping strategies used.

to the condition of autism [24] and social difficulties have been cited as the essential and necessary conditions for the diagnosis of autism in children (DSM-5; APA, 2013). This finding thus added further evidence for the presence of social difficulties in children with autism, when assessed using a parent-report questionnaire.

The association between coping and social difficulty was also assessed and the results were significant for the HFA group only. The mean scores of avoidance coping had a negative association with the scores on social difficulty, while approach coping had a non-significant association. The former finding is in agreement with previous research evidence for children and adults without autism, whereby avoidance coping has been shown to be associated with social difficulties [12,40]. None of these correlations were however significant for the TD group.

Significant correlations were found between avoidance coping and the four appraisals of self-accountability, emotion-focused coping potential, problem-focused coping potential and future expectancy. Once again, these associations were statistically significant only for the HFA group. Positive correlation was found between self-accountability and avoidance coping, while the correlation output was negative for the other three appraisal dimensions. It suggested that in the situations characterised by high mean scores for the appraisals of emotion-focused coping potential, problem-focused coping potential and future expectancy, the scores for avoidance coping were relatively lower in the case of the HFA group. The opposite is indicated by the positive correlation coefficient between self-accountability and avoidance coping.

Further, of the four appraisals, emotion-focused coping potential had the largest value of correlation coefficient for its association with avoidance coping. Smith and Lazarus [26] also proposed a direct association between the appraisal of low coping efficacy and actual coping, resulting in escape and avoidance in typically developing individuals. This might be true to the group of children with HFA as well. Other studies too have supported the association between the appraisals related to coping potential and the subsequent coping choices of children [3], but the relationship between appraisals and coping has not been studied in children with HFA before. Current study has thus suggested a potentially important role of the cognitive appraisal dimensions in association with not only these negative emotions, but also with avoidance coping, which is already known to be maladaptive [40].

In terms of limitations, the finding of non-significant associations in the TD group is odd when compared to previous studies. It could be because of small numbers as Green had argued that in studies with numbers smaller than 109, the overall significant of the model might be shown but not of individual predictor variables. It is however important to note that although the association between appraisals and negative emotions were found to be non-significant in the TD group, the effect size for the same analyses varied from small-to-medium. So, it is possible that if re-investigated with a larger sample size, the finding of non-significant associations in the TD group between appraisals and negative emotions might be statistically significant.

There is also the issue of the interpretation of the findings from regression analyses, as the current study had a cross-sectional design. It is not necessary that the appraisals 'predicted' the development of the three negative emotions or the choice of avoidance coping strategies in the HFA group. The inverse relationship could also be true. This can only be clarified in a longitudinal design where the independent and dependent variables are measured at Time 1 and then reassessed

at Time 2. Such a design can help assess which variable would lead to the development of the other. Findings of significant association with the appraisal of problem focused coping potential also needs to be interpreted with caution as the correlation between data collected via telephone and face-to-face modes was non-significant. It should also be noted that all parents of the participant children were university educated and had a good income, which is a limitation of the study in terms of the ability to generalise the findings. This may have meant that children were more likely to have received interventions, and to be well supported and in good educational placements in families that valued education. So, future work should aim to recruit from a broader SES sample.

Despite such limitations, it can nevertheless be argued that the present research advances current understanding, supports findings of previous study by Sharma et al. [19] on appraisals and emotions; and also provides a preliminary conceptual base for explaining the cognitive bases of emotional and coping choices in a small group of children with high-functioning autism. The findings on this area have immense potential for further extension and replication through future research.

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