

Maladaptive cognitive appraisals in children with high-functioning autism: Associations with
fear, anxiety and theory-of-mind.

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Abstract

Despite the well-documented success of cognitive restructuring techniques in the treatment of anxiety disorders, there is still little clarity on which cognitions underpin fear and anxiety in children with high-functioning spectrum disorders (HFASD). This study examined whether certain cognitive appraisals, known to be associated with fear and anxiety in non-HFASD groups, may help explain these emotions in children with HFASD. It also investigated relations between these cognitive appraisals and theory-of-mind (TOM).

Using a vignette approach, appraisals, fear and anxiety were assessed in 22 children with HFASD and 22 typically developing (TD) children. The two groups differed significantly on all four appraisal types. Anxiety was negatively correlated with future expectancy and positively with problem-focused coping potential in the HFASD group, but was not correlated with appraisals in the TD group. Emotion-focused coping potential was the only appraisal correlated with fear in the HFASD group and only self-accountability in the TD group. Linear regression analysis found appraisals of emotion-focused coping potential, problem-focused coping potential and future expectancy to be significant predictors of TOM ability in the HFASD group. These findings indicate that specific, problematic patterns of appraisal may characterise children with HFASD.

Unusual fears (Rapp, Vollmer, & Hovanetz, 2005; Witwer & Lecavalier, 2010) and exaggerated symptoms of anxiety are common across autism spectrum disorders (Gillott, Furniss & Walter, 2001; Kim, Szatmari, & Bryson et al., 2000; Mazefsky, Conner, & Oswald et al., 2010), and are particularly marked in children with high-functioning autism spectrum disorders (HFASD) (Farrugia & Hudson, 2006). Fear in DSM-IV (APA, 1994) is defined as the perception or anticipation of threat in the environment which is characterised by increased heart rate, tensed muscles, and fight or flight reactions. Failure to resolve a fear despite attempts to do so on the part of an individual is thought to lead to the formation of anxiety disorders (Klein, 2009). Anxiety is classified as a clinical disorder and differs from fear in the degree of severity, frequency, persistence of symptoms and associated difficulties such as depression (Turner, Beidel, & Townsley, 1992). Anxiety disorders are thought to occur in 2-15% of general population (APA, 1994), but estimates of the prevalence of anxiety problems in children with autism is reported to be 49% greater than in the general population (Bellini, 2004).

DSM-IV (APA, 1994) identifies anxiety-like symptoms as commonly associated with autism and empirical studies have shown a higher occurrence of anxiety in children with autism when compared to control groups of typically developing (TD) children (e.g., Evans, Canavera, & Kleinpeter et al., 2005; Kuuisko, Pollock-Wurman, & Jussila et al., 2008; Weisbrot, Gadow, Wincent, & Pomeroy, 2005). Autism and social anxiety may also overlap (Melfsen, Walitza, & Warnke, 2006; Russell & Sofronoff, 2005). For example, symptoms of autism were found to co-occur in 45 children and adults who already had a diagnosis of at least one anxiety disorder (Towbin, Pradella, & Gorrindo et al., 2005). Similarly, Sukhodolsky, Scahill, and Gadow, et al (2008) report that 43% of a sample consisting of

children with autism (n= 151), AS (n= 6) and pervasive developmental disorders (n= 14) also met the criteria for a DSM-IV diagnosis of social anxiety disorder.

Research aiming to clarify the etiology, maintenance, and treatment of anxiety disorders indicates that cognition may be a key internal process (Alfano, Beidel, & Turner, 2008; Miers, Blöte, & Westenberg, 2011; Rapee and Heimberg 1997; Schultz, & Heimberg, 2008). The current study therefore sought to address the extent to which specific stress-related cognitions are associated with anxiety among HFASD and typically developing populations.

Role of cognition in anxiety

The underlying principle of cognitive theories is that inaccurate or skewed interpretations of events lead to fear and anxiety in harmless situations (Clark & Beck, 1999; Clark & Wells, 1995). Specifically, a child's belief about the nature of fear objects, their own ability to deal with them, their perceived responsibility, and the anticipated outcomes predict the development and maintenance of fears and symptoms of anxiety. These difficulties are referred to as cognitive errors (Beck & Emery, 1985), interpretation biases (Heinrichs & Hofmann, 2001), or impairment in cognitive appraisals (Lazarus & Folkman, 1987).

One influential model, proposed by Smith and Lazarus (1993), illustrates how the cognitive evaluation of a social situation determines emotional reactions and elaborates on appraisal dimensions underpinning individual negative emotions. These authors proposed that specific, unique appraisal dimensions are responsible for the occurrence of any emotional reaction. This model included four distinct appraisal dimensions of *self-accountability*, *emotion-focused coping potential*, *problem-focused coping potential* and *future expectancy*. According to this appraisal model, each situation is evaluated against each of these appraisal dimensions, which then determine a person's emotional reaction. This evaluation along the appraisal dimensions was also proposed to be contingent upon one's goals, abilities and

motives. Thus, the same situation will be appraised differently by different individuals. Smith and Lazarus (1993) proposed that people engage in an assessment of their ability to change or influence incongruent situations and their ability to deal with them emotionally. These were referred to as secondary appraisal dimensions of *problem-focused coping potential* and *emotion-focused coping potential*, respectively. *Emotion-focused coping potential* underlies the emotional reaction of fear; for example, feeling uncertain about one's own emotional reaction in a future situation, such as examination results. Appraisal of low problem-focused coping potential would lead a person to feel incapable of finding a solution to low scores in an examination. Finally, *future expectancy* poses the question of how certain a person can be about, whether an outcome will be favourable or unfavourable in a given situation. Believing that examination results will definitely be bad is an example of appraisal of future expectancy. In the case of sadness, both *future expectancy* and *problem-focused coping potential* were argued to account for variation. *Self-accountability* dimension involves an assessment of how much responsibility an individual takes for a confronting situation, characterises guilt. Feeling guilty for loss of scores on a question that had been identified to be out of course in the examination would characterise high appraisal of self-accountability.

However, not all empirical work has supported such a proposition. Nezelek, Vansteelandt, Mechelen and Kuppens (2008) found that more than one appraisal was associated with negative emotions in a typically developing group of adults. Similarly, among children with anxiety disorders, research suggests that appraisal biases can be grouped into two broad categories: (i) overestimating the nature of threat and (ii) underestimating one's own ability to deal with it (Beck, Amery & Greenberg, 1985; Pilecki & McKay, 2011; Wright & Borden, 1991). Examples of the former category include overgeneralisation (believing that a negative outcome will repeat itself in all future situations), catastrophising (holding very negative

expectancies about the probable outcome of a situation), and personalising (holding oneself responsible for negative outcomes) (Creswell, O'Connor, & Brewin, 2006). More than one cognitions could thus be associated with anxiety disorders. Indeed, studies of children with anxiety disorders have highlighted an association between anxiety difficulties and several cognitions including low future anticipation, high self-responsibility, and high uncertainty about ways of dealing with the negative consequences of a social situation (Bögels & Zigterman, 2000; Creswell, Shildrick, & Field, 2011).

Underpinning cognitions might however vary across different kinds of anxiety disorders. For example, cognitive theories of OCD in children and adults have emphasised the prime role of inflated responsibility in causing OCD (Salkovskis, 1985, 1989), which is defined as holding oneself responsible for all negative events in a generalised fashion. Research studies too found supporting evidence for this theory (e.g., Bouchard, RheAume, & Ladouceur, 1999; Wilson & Chambless, 1999). The cognition of inflated responsibility is conceptually similar to the appraisal dimension of self-accountability and these findings yet again suggest link between appraisal dimension and anxiety. A significant association has been shown between cognitions related to likelihood and cost of negative social and non-social events in a group of adolescents with social anxiety disorder (Rheingold, Herbert & Franklin, 2003). 'Likelihood' here referred to expectancies about future, and 'cost' meant personal relevance and coping potential to deal with the negative situation. Once again, by definition, cognition of likelihood is comparable to appraisal dimension of future expectancy, cost to appraisals of motivational relevance and coping potential. Cognition of future expectancy has been shown to be high in people with specific phobias (Muris, Huijding, Mayer, Den Brejen, & Makkellie, 2007; Rachman & Bichard, 1988; Thorpe & Salkovskis, 1995; Tomarken, Mineka & Cook, 1989) as well as generalised anxiety disorders (Wells, 2005), whereby phobic adults

overestimated the occurrence of negative outcomes in fearful as well as non-fearful situations.

These findings lead us to speculate that children with HFASD may exhibit similar cognitive errors since they too experience high levels of anxiety. Indeed, cognitive therapy intervention programmes for reducing the occurrence of fears and anxiety in children with autism (especially those with IQ>70, *i.e.* HFASD) already address maladaptive cognitions related to responsibility, relevance, and belief in their ability to deal with a negative social situation (Lang, Register, Lauderdale, Ashbaugh, & Haring, 2010). Interventions based on these principles have been successful in reducing levels of anxiety among children with autism (e.g., Chalfant, Rapee & Carroll, 2007; Greig & McKay, 2005; Wood, Drahota, Sze et al., 2009).

While intervention techniques involving cognitive restructuring have demonstrated a reduction in anxiety symptoms in children with autism, their focus has generally been on bringing about change rather than on exploring the broader conceptual issues regarding which specific cognitions might contribute most to the raised levels of anxiety and fear in this population. This issue is the focus of the present study, which investigates the set of cognitions known as appraisals.

Ambiguity

Interpretation biases have been observed in ambiguous situations (e.g., Barrett & Healy, 2003; Daleiden & Vasey, 1997; Hadwin, Garner, & Perez-Olivas, 2006; Micco & Ehrenreich, 2008). Barrett, Rapee, Dadds and Ryan (1996) presented ambiguous situations representing some sort of physical or social threat to groups of children with anxiety disorders and then compared their responses to both control and non-anxious clinical groups. Anxious and non-

anxious clinical groups interpreted ambiguous events as more threatening than the control group. In a similar study by Bögels and Zigterman (2000), children with anxiety disorders were exposed to ambiguous threatening situations and more negative cognitions were reported by the anxious group compared to the control group. This finding in hypothetical ambiguous social situations has been widely replicated and a statistically significant association has been shown between trait anxiety and threat interpretations (Chorpita, Albano, & Barlow, 1996; Creswell & Connor, 2010; Hadwin, Frost, French, & Richards, 1997; Muris, Kindt, Bögels, et al., 2000; Muris, Rapee, Meesters, Shouten, & Geers, 2003). It may be that when clear, relevant information in a situation is lacking, children instead have to rely on personality dispositions and past experiences when making judgements or inferring meaning (Crick & Dodge, 1994; Lazarus & Folkman, 1984). These judgements are likely to involve negative self-appraisals, since these are more likely to be generated by individuals who experience a high degree of anxiety in socially ambiguous situations (Huppert, Pasupuleti, Foa, & Mathews, 2007). In this way, perceived situational ambiguity can influence social cognitive interpretation process (Constans, Penn, Ihen, & Hope, 1999).

Theory-of-mind ability

For children with autism, social situations might appear ambiguous because of a Theory-of-Mind (TOM) deficit (Baron-Cohen, Jollive, Mortimore, & Robertson, 1997). TOM deficits imply a state of uncertainty with regards to other person's thoughts in a social situation (Frith & Happè, 1995), which is likely to reduce clarity and increase ambiguity. It is proposed that a TOM deficit is a contributing factor for anxiety and social difficulties in children with autism spectrum disorders (Blackshaw, Kinderman, Hare, & Hatton, 2001; Brent, Rios, Happé, & Charman, 2004). It may therefore be the case that TOM deficits in children with autism are an important factor when considering appraisals relating to social

situations. To our knowledge, only Farrugia and Hudson (2006) have investigated cognitions in relation to anxiety in children with HFASD. They recruited 29 adolescents with Asperger Syndrome (AS), 30 with anxiety disorder, and 30 TD controls, and found higher scores for anxiety and negative thoughts in the AS group than the anxiety-disordered and the TD groups. Significant associations were also found between anxiety symptoms and negative cognitions such as “I will never overcome my problems”, “Something awful is going to happen”, and “There is something very wrong with me”. So, children’s beliefs about the nature of fear objects, their perception of their ability to deal with them, their level of perceived responsibility, and their anticipated outcomes appear to be associated with symptoms of anxiety.

Despite widespread evidence of the success of cognitive restructuring techniques in the treatment of anxieties and fears in children with autism (Reaven, Blakeley-Smith, & Nicholas, et al., 2009; White, Albano, & Johnson, 2010), surprisingly little systematic work has been undertaken to study which specific cognitions might contribute to anxiety in this group. Lack of research could be attributed to historical beliefs that children with special needs do not possess sufficient cognitive abilities to process the evaluative and anticipatory aspects of emotional experience. There is however a strong rationale for predicting that anxieties and fears in this group are underpinned by specific cognitions.

The specific hypotheses and objectives of the current study are:

Replication of previous findings

1. The HFASD group will have significantly higher scores for fear and anxiety compared to TD group.
2. The HFASD group will have significantly lower scores for TOM ability than TD group.

Novel hypotheses

3. The HFASD group will have significantly higher scores for the appraisal dimension of self accountability, but lower for problem-focused coping potential, emotion-focused coping potential, and future expectancy than the TD group.

4. The four appraisal dimensions will be significantly associated with fear and anxiety in both the HFASD and TD groups.

Exploratory Research Question

1. Are the four appraisals dimensions significantly associated with each other?
2. Is TOM ability significantly associated with all four appraisal dimensions in the HFASD and TD groups?

Method

Participants and selection procedure

Sources of recruitment were: the National Autistic Society (NAS), the National Health Service (NHS), Scottish schools with special units, and voluntary parent support groups in England and Scotland. Ethical approval was obtained from the University Ethics Committee, NAS ethics, NHS ethics committee and local Education councils in which participating schools were located. Inclusion criteria were that children in both groups should be aged 8-12 years old. Children in the HFASD group had to have a diagnosis of high-functioning autism or AS (as reported by parents); and children in the TD group had to attend a mainstream school and have no diagnosis of developmental delay (as reported by parents). Data were collected from a community sample of 22 children for the HFASD group (18 boys, 4 girls) and community sample of 22 for the TD group (15 boys, 7 girls). Parents and children were informed that they would be asked to “*give a description of a past emotional experience*” and “*imagine being in a story about a frustrating situation and answer some questions about any feelings of anxiety*”. Study objectives and procedures were explained to parents and children

and they were advised that their participation was voluntary, that they could withdraw at any time of the study, and that information obtained from them would be treated in confidence.

Measures

Appraisals and Fear. To develop scenarios which children in this age group would perceive to be frustrating, we first asked 12 typically developing children and 14 with HFASD to recount an experience from the preceding two weeks when they felt frustrated (based on Losh & Capps, 2003). The word ‘frustrated’ was explained to ensure that there was uniformity in children’s understanding of this term. Thematic analysis (Braun & Clarke, 2006) was used to identify which situations were frustrating to children in both the HFASD and the TD groups. Four common themes were extracted: argument with siblings, bullying in school, rejection from peers, and emphasis by teachers on over-compliant behaviour. From these, four hypothetical frustrating scenarios were written.

For each of the four scenarios, children were asked to imagine themselves to be in the described situation and to write a few sentences describing their reactions. Next, they completed an appraisal questionnaire to measure perceived self-accountability, problem-focused coping potential, emotion-focused coping potential, and future expectancy relating to the vignette. Finally, participants completed a fear questionnaire to assess the extent to which they would feel fearful if they were in the vignette situation. The appraisal and fear questionnaires were adapted from Smith and Lazarus (1993), with language altered to be more age-appropriate. On each questionnaire, children were asked to rate on a scale of 0-11 for the extent to which each statement characterised their thoughts in that vignette and the extent to which each of three emotional adjectives for fear (frightened, scared and afraid) characterised their perceived emotional state with respect to the vignette. The questionnaires

were presented in the same order to all the participants in both the HFASD and the TD groups: appraisal questionnaire first and fear questionnaire second.

An inter-rater reliability check was carried out on these hypothetical frustrating situations for how well they illustrated a frustrating story on a 0-3 scale. Out of 10 non-psychologist raters, eight gave a score of 3 for each story and two gave a score of 2. These four scenarios were thus considered reliable and randomly distributed across participants, resulting in only one scenario administered to each participant.

Theory of Mind. To measure TOM ability in children, Happé's (1994) Strange Stories was used. This consisted of 24 short vignettes with questions. One question checked comprehension, and a second question asked for justification of the character's actions (two justification questions in some vignettes). The stories were presented in the same order to all participants. Children were asked to imagine being the central character in the story and then to answer the questions. Good internal reliability scores of between .80 and .86 in both the HFASD and the TD groups were found.

Anxiety. The Spence Children's Anxiety Scale (SCAS: Spence, 1998) is a 45-item self-report questionnaire which assesses overall anxiety as well as six sub-types of anxiety: Panic attack and agoraphobia, Separation anxiety, Physical injury fears, Social phobia, Obsessive-compulsive, and Generalized anxiety. The scale has parent and child versions on both of which respondents rate each item on a four-point scale of severity (Never, Sometimes, Often, Always). Spence (1997, 1998) reports excellent psychometric properties for the SCAS scale: internal reliability coefficient = .93, Guttman split-half reliability = .92, and test-retest reliability across six months = .60. The current study also found good internal reliability (from .84 to .92) on all the sub-scales.

Cognitive ability. This was estimated using the *Vocabulary test from The Wechsler Intelligence Scale for Children- Fourth UK Edition* (WISC-IV: Wechsler, 2003). This test assesses understanding of word knowledge and verbal concept formation 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” (Groth-Marnat, 2009; p. 151), correlating .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 HFASD ($\alpha = .82$) and the TD ($\alpha = .84$) group.

HFASD. The Childhood Autism Syndrome Test (CAST: Scott, Baron-Cohen, Bolton & Brayne (2002) was designed and standardised for the screening of children aged 4-12 years at risk for autism-related symptoms. 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 (Scott et al., 2002). The CAST scale showed high reliability for both the HFASD group ($\alpha = 0.80$) and the TD group ($\alpha = 0.79$).

Procedure

Personal accounts of past frustrating emotional experiences had been first elicited in group of participants as explained earlier. These same children then participated in the main study which took place two months later. For all self-report scales, children were asked if they would prefer questions to be read aloud or if they preferred to read them on their own. All children preferred the questions to be read aloud.

Difficulties with self-awareness and self-expression have been documented across the autism spectrum disorder; however this ability is known to be well developed for high-functioning individuals with autism (Braverman, Fein, Lucci, & Waterhouse, 1989; Ozonoff,

Pennington, & Rogers, 1990). To account for any difficulties understanding or completing self-report questionnaires, pictorial aids were presented, each question was repeated twice and children were always asked if they have fully understand the question. Parents were also present in the same room, to provide assistance if necessary and each measure was well explained to both parents and children in advance to avoid any anxieties resulting from unpredictability or exposure to novel stimuli; these strategies have been shown to be successful with children with autism (Ozonoff 1997; Ozonoff & Jensen 1999). All 44 children in both the HFASD and the TD groups had the questions read out to them. Two children in the TD group had initially chosen to read themselves but subsequently gave up and asked the researcher to read for them. Scales were presented in the same order to all children: first Strange Stories, then hypothetical frustrating scenarios followed by the appraisal and fear questionnaires, next the SCAS (child version) and finally the Vocabulary sub-test. The CAST scale was completed by parents separately, after testing with their child was over. All children were given a break of 8-10 minutes after administration of the appraisal and fear questionnaires before continuing with the remaining measures.

Analysis strategy: After data cleaning procedures that consisted of missing value analysis, double entry of randomly selected 10% of responses and then running frequency counts to check for odd entries, skewness and kurtosis of the data were checked to establish choice of an analysis strategy (all data were found to be normally distributed). Between-group differences for background characteristics (age, gender, CAST scores, vocabulary sub-test of WISC-IV scale), fear, anxiety (Hypothesis 1), TOM ability (Hypothesis 2) and appraisal dimensions (Hypothesis 3) will be investigated through independent *t*-tests. The correlation results will be reported for assessing association of appraisals with fear and anxiety (Hypothesis 4) and linear regression analysis will be carried out to assess the strength of association between appraisals and TOM ability (Research Question 1).

Results

Sample characteristics

INSERT TABLE 1 ABOUT HERE

There was no difference in age or gender between the HFASD and TD groups (see Table 1). On the CAST scale, the HFASD group had a significantly higher mean than the TD group with a large effect size (see Table 1). Scores for all children in the HFASD group ranged from 15-27 indicating the presence of symptoms of autism in this group (Williams, Scott, & Stott, et al., 2005), while the TD group's scores ranged from 1-12, *i.e.*, below the cut-off value of 15. For the WISC Vocabulary sub-test, children in the HFASD group did not significantly differ from those in the TD group, and both groups scored within the average range. These two results together provided independent supporting evidence that the children were correctly classified into HFASD and TD groups.

Differences between HFASD and TD groups on fear and anxiety (Hypothesis 1)

The HFASD group had significantly higher fear scores and significantly higher anxiety scores than the TD group on all six sub-scales of both the child-report and the parent-report versions of the SCAS with large effect sizes (see Table 2).

INSERT TABLE 2 ABOUT HERE

Differences between HFASD and TD groups on appraisals (Hypothesis 2)

INSERT TABLE 3 ABOUT HERE

Table 3 shows that the HFASD group had significantly lower emotion-focused coping potential, problem-focused coping potential, and future expectancy than the TD group, but significantly higher self-accountability. These findings indicate that in hypothetical

frustrating situations, children in the HFASD group held negative expectancies about the outcome, had low confidence in their ability to deal with the adverse consequences of that situation, and took greater responsibility for negative outcomes.

Differences between the HFASD and TD groups on theory-of-mind (Hypothesis 3)

INSERT TABLE 4 ABOUT HERE

As hypothesised, the HFASD group scored significantly lower than the TD group on TOM ability. This was true for TOM overall and also for all three sub-scales (see Table 4).

Association of appraisals with fear and anxiety (Hypothesis 4)

Anxiety was significantly correlated with problem-focused coping potential and self-accountability appraisals for the HFASD group. There were no significant appraisal accountability correlations for the TD group (see Table 5). These findings indicate that in hypothetical frustrating social situations, low expectations about the outcome and low confidence in one's own ability to deal with the adverse consequences of a situation were associated with higher anxiety in the HFASD group. For fear, only the negative correlation with emotion-focused coping potential was significant for the HFASD group, and only the positive correlation with self-accountability was significant for the TD group.

INSERT TABLE 5 ABOUT HERE

Correlation coefficients for the HFASD and TD groups were compared to see whether they were significantly different using Fisher's r - z transformation (Howell, 2007). There were significant between-group differences for the correlation of anxiety with appraisal of problem-focused coping potential; anxiety with self-accountability; and fear with self-accountability (see Table 5). However, there were no significant differences between the

HFASD groups in correlations between anxiety and emotion-focused potential, or fear and emotion-focused coping potential.

Associations between appraisal dimensions (Research Question 1)

Bivariate correlation analysis showed that in the HFASD group, emotion-focused coping potential was significantly associated with future expectancy; and self-accountability with problem-focused coping potential (see Table 6). There were no significant correlations in the TD group.

INSERT TABLE 6 ABOUT HERE

Association of appraisals with TOM ability (Research Question 2)

Two linear regressions, each using the Enter method, were carried out with the four appraisal dimensions of self-accountability, emotion-focused coping potential, problem-focused coping potential, and future expectancy as the predictor variables and TOM ability as the outcome variable. The first regression, with the HFASD participants, resulted in a significant model, $F(4, 17) = 14.72, p < .001$, and explained 77.6% of the variance (Adjusted $R^2 = .776$). Emotion-focused coping potential ($\beta = .41, p = .007$), problem-focused coping potential ($\beta = -.54, p = .001$), and future expectancy ($\beta = .43, p = .005$) were all significant and unique predictors of TOM ability, however self-accountability ($\beta = .23, p = .10$) was not.” The second regression, with the TD participants, was not significant, $F(4, 17) = 1.70, p = .19$, Adjusted $R^2 = .29$.

Discussion

The HFASD group scored significantly higher than the TD group on fear and on all six categories of anxiety disorders. This robust evidence, from both child- and parent reports, supports previous findings based on parent report only (e.g., Kim et al., 2000; Mazefsky et

al., 2010; Muris et al, 2000; Witwer & Lecavalier, 2010). Our results also indicate that the HFASD group's appraisals of the frustrating vignettes reflected higher self-accountability lower emotion- and problem-focused coping potential, and lower future expectancy than was the case for the TD group. The finding that appraisals are associated with fear and anxiety for children in the HFASD group is novel. Furthermore, associations between appraisals and feelings of both fear and anxiety were significantly different for the HFASD and TD groups. These findings are discussed in detail below.

The significant association between the cognition of self-accountability with anxiety in the HFASD group supports previous studies of children with anxiety disorders that have indicated inflated self-blame as a problematic cognition underpinning anxiety (Freeston, Rheume, & Ladouceur, 1996; Rassin, Muris, Schmidt, & Merckelbach, 2000; Rheume, Ladouceur, Freeston, & Letarte, 1995). As far as we are aware, there is no published evidence on cognitive appraisals in an HFASD sample. However, the current findings support previous research associating anxiety with negative expectancies and perceptions about ability to cope among non-autistic individuals with anxiety (Creswell, Schneiring & Rapee, 2005; Thorpe & Salkovskis, 1995) and among non-anxious adolescents (Smari, Petursdottir & Porsteindottir, 2001).

The finding of only one appraisal dimension being associated with fear in both the HFASD and the TD groups is consistent with Smith and Lazarus's model (1993). However, they report the association between emotion-focused coping potential and fear in typically developing individuals; instead, in the current study this association was only evident in the HFASD group, and not in the TD group. Among TD children, it was self-accountability that was associated with fear. It could be that in typically developing child samples, appraisal-emotion relationships are different from adult appraisal-emotion relationships; and also that

such relationships are different in typically developing and autism groups. Or perhaps because of the small sample size in the present study, not all significant relationships emerged in the present study, since Green (1991) argued that regression models with sample sizes of smaller than 109 + number of predictors might provide an accurate test for the significance of a regression model, but might not be strong enough to show significance of individual predictor variables.

As with previous research findings, the HFASD group also scored significantly lower than the TD group on all three sub-scales of the Strange Stories task. Further analysis showed that three of the four appraisal types were uniquely associated with TOM ability in the HFASD group but not in the TD group. This suggests that appraisals may be associated in some way with the deficit in TOM ability. Previously, TOM ability has been shown to be associated with emotional difficulties (Brent, Rios, Happé, & Charman, 2004), and our results suggest that there is merit in testing the proposal that appraisals mediate this relationship. Specifically, lower levels of TOM may reduce children's perceived ability to deal with frustrating situations, and may increase the anticipation of poor outcomes, possibly as a result of the contextual ambiguity introduced by poor TOM ability. Future research should test this hypothesis.

The findings from the current study suggest that cognitive appraisals might be crucial in understanding fear and anxiety and such appraisals might form the focus of cognitive restructuring techniques employed to counter anxiety in this group. There are already cognitive based treatment programmes aimed at improving theory-of-mind ability and reducing the occurrence of anxiety in children with autism are already in use (Sofronoff, Attwood & Hinton, 2005; White, Albano, Johnson et al., 2010). Our findings provide a new direction for research into what specific cognitions could be targeted when further refining

cognitive therapy programmes for the treatment of fear and anxiety in children with HFASD. Based on current findings, cognitions related to negative expectancies about the outcome of a situation and low belief in one's ability to deal with the adverse consequences of a situation are significantly associated with anxiety, should be targeted in a cognitive intervention programme, in a manner that expectancies and belief in own ability are improved.

One limitation of the present study was its use of vignettes about hypothetical events that are frustrating. This technique relies upon the ability of children with HFASD to understand a story and then correctly report on their thoughts as if they were in such a situation. However, children with autism are known to experience difficulty understanding social contexts (Ropar, Mitchell, & Ackroyd, 2003; Sobel, Capps & Gopnik, 2005) which may limit the effectiveness of their engagement with the task. Furthermore, while this experimental method increases our ability to control extraneous variables, it also places constraints upon the ecological validity of the results. Nonetheless, this was the first study of the relationship of appraisals with TOM ability, fear and anxiety in children with HFASD, and as such provided a useful starting point for further research.

A second limitation of the study is that parents were relied upon to accurately report diagnoses of high-functioning autism. However, these reports were given credence by the CAST scores of both groups (though, of course, the CAST only identifies children at risk of autism, and is not a diagnostic instrument). Finally, while the WISC-IV Vocabulary sub-test was used as a proxy measure of IQ it should be noted that while it correlates well with the full scale WISC-IV IQ for typically developing individuals (Groth-Marnat, 2009), this relation has not been verified for children with autism spectrum disorders.

In conclusion, the present study was the first to investigate relation between anxiety and the appraisal of social situations children in an HFASD. These children appraised social

situations in specific and potentially maladaptive ways characterised by high self-accountability but low coping potential and low future expectancy compared to a TD group. Appraisal styles similar to these have previously been associated with anxiety and negative emotions in groups of children without autism. The present study reports a significant association between TOM ability and appraisal dimensions was present only for children with HFASD. Future investigation of these issues is important for both, developing theory relating to our understanding of fear and anxiety in children with HFASD, and for developing intervention work with this group directed toward more positive cognitions.

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Table 1

Difference between HFASD and TD Groups on Anxiety

Anxiety Measure	HFASD		TD		<i>t</i> (<i>p</i> value) df = 56	<i>Effect size</i> (<i>d</i>)
	Mean	S.D.	Mean	S.D.		
Child-report:						
Panic attack and agoraphobia	17.60	1.10	4.39	1.47	38.82 (<i>p</i> =.004)	.57
Separation anxiety	11.43	1.38	4.32	1.68	17.66 (<i>p</i> =.007)	.92
Physical injury fears	12.47	1.69	5.04	2.09	14.87 (<i>p</i> =.006)	.89
Social phobia	14.77	1.58	2.46	1.14	34.30 (<i>p</i> =.004)	.97
Obsessive-compulsive	16.60	2.21	1.89	.87	32.92 (<i>p</i> =.001)	.97
Generalised anxiety	15.43	1.19	4.50	1.14	35.63 (<i>p</i> =.006)	.98
Parent-report:						
Panic attack and agoraphobia	18.53	.51	4.5	.51	105.07(<i>p</i> = .001)	.99
Separation anxiety	10.50	.58	2.50	.53	59.83(<i>p</i> = .006)	.96
Physical injury fears	11.50	.52	2.54	.57	67.12(<i>p</i> = .002)	.97
Social phobia	11.60	.49	1.54	.51	76.16(<i>p</i> = .001)	.97
Obsessive-compulsive	15.53	.51	4.93	1.88	29.71(<i>p</i> = .006)	.91
Generalised anxiety	14.13	1.63	3.50	.51	32.95(<i>p</i> = .003)	.92

Table 2

ANOVA Results Assessing Effect of Action Readiness Manipulation on Appraisals

Appraisal dimension	Main effect of action readiness	Main effect of group	Interaction effect (group*action readiness)
Self-accountability	$F(2, 110) = 362.73$, $p < .001$, $\eta^2 = .79$	$F(1, 55) = 3646.46$, $p < .001$, $\eta^2 = .87$	$F(2, 110) = 28.26$, $p < .001$, $\eta^2 = .34$
Emotion-focused coping potential	$F(2, 110) = 289.63$, $p < .001$, $\eta^2 = .84$	$F(1, 55) = 1479.92$, $p < .001$, $\eta^2 = .96$	$F(2, 110) = 48.29$, $p < .001$, $\eta^2 = .47$
Problem-focused coping potential	$F(2, 110) = 219.42$, $p < .001$, $\eta^2 = .80$	$F(1, 55) = 1108.93$, $p < .001$, $\eta^2 = .95$	$F(2, 110) = 35.96$, $p < .001$, $\eta^2 = .39$
Future expectancy	$F(2, 110) = 169.78$, $p < .001$, $\eta^2 = .75$	$F(1, 55) = 1852.21$, $p < .001$, $\eta^2 = .97$	$F(2, 110) = 14.32$, $p < .001$, $\eta^2 = .21$

Table 3

Correlation Analyses: Appraisals, Fear and Anxiety

Appraisal dimension	Fear: <i>r</i> (<i>p</i> value)		Anxiety: <i>r</i> (<i>p</i> value)	
	HFASD	TD	HFASD	TD
Emotion-focused coping potential	-.72 (.004)	-.20 (.04)	-.59 (.006)	-.17 (.79)
Problem-focused coping potential	-.67 (.004)	-.15 (.76)	-.49 (.02)	-.12 (.67)
Self-accountability	.46 (.01)	.17 (.80)	.51 (.01)	-.09 (.51)
Future expectancy	-.39 (.02)	-.18 (.83)	-.58 (.01)	-.14 (.59)

Table 4

Difference in TOM Ability between HFASD and TD Groups

Strange Stories sub-scale	HFASD		TD		<i>t</i> (<i>p</i> value)	<i>Effect size</i> (<i>d</i>)
	Mean	S.D.	Mean	S.D.	df = 56	
Ability to correctly identify non-literal utterance in story	18.93	1.84	23.18	1.61	-26.93 (<i>p</i> <.001)	.96
Ability to correctly explain non-literal utterance in story	32.57	2.11	45.46	1.79	-9.33 (<i>p</i> <.001)	.78
Ability to infer advanced mental state of central character	32.87	2.82	44.36	3.35	14.87 (<i>p</i> =.006)	.89
Average TOM ability	84.37	4.09	113.00	4.00	-14.14 (<i>p</i> <.001)	.88

Table 5

Correlation between Appraisals and TOM Ability

Appraisal dimensions	TOM ability: <i>r</i> (<i>p</i> value)	
	HFASD group	TD group
Emotion-focused coping potential	.27 (.02)	.20 (.03)
Problem-focused coping potential	.28 (.02)	.19 (.03)
Future expectancy	.41 (.01)	.28 (.02)
Self-accountability	-.12 (.07)	-.06 (.25)

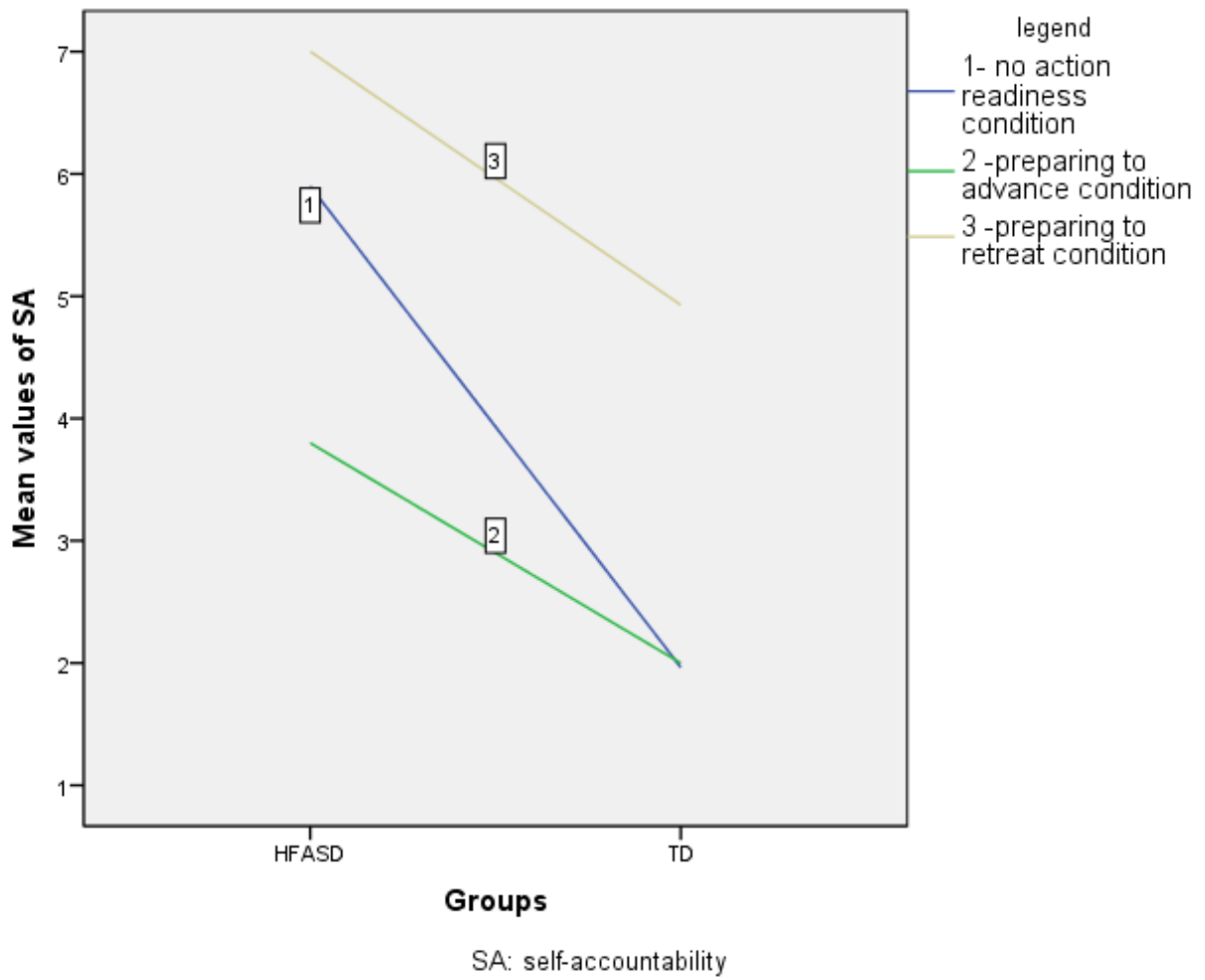


Figure 1: Line chart for the secondary appraisal dimension of self-accountability

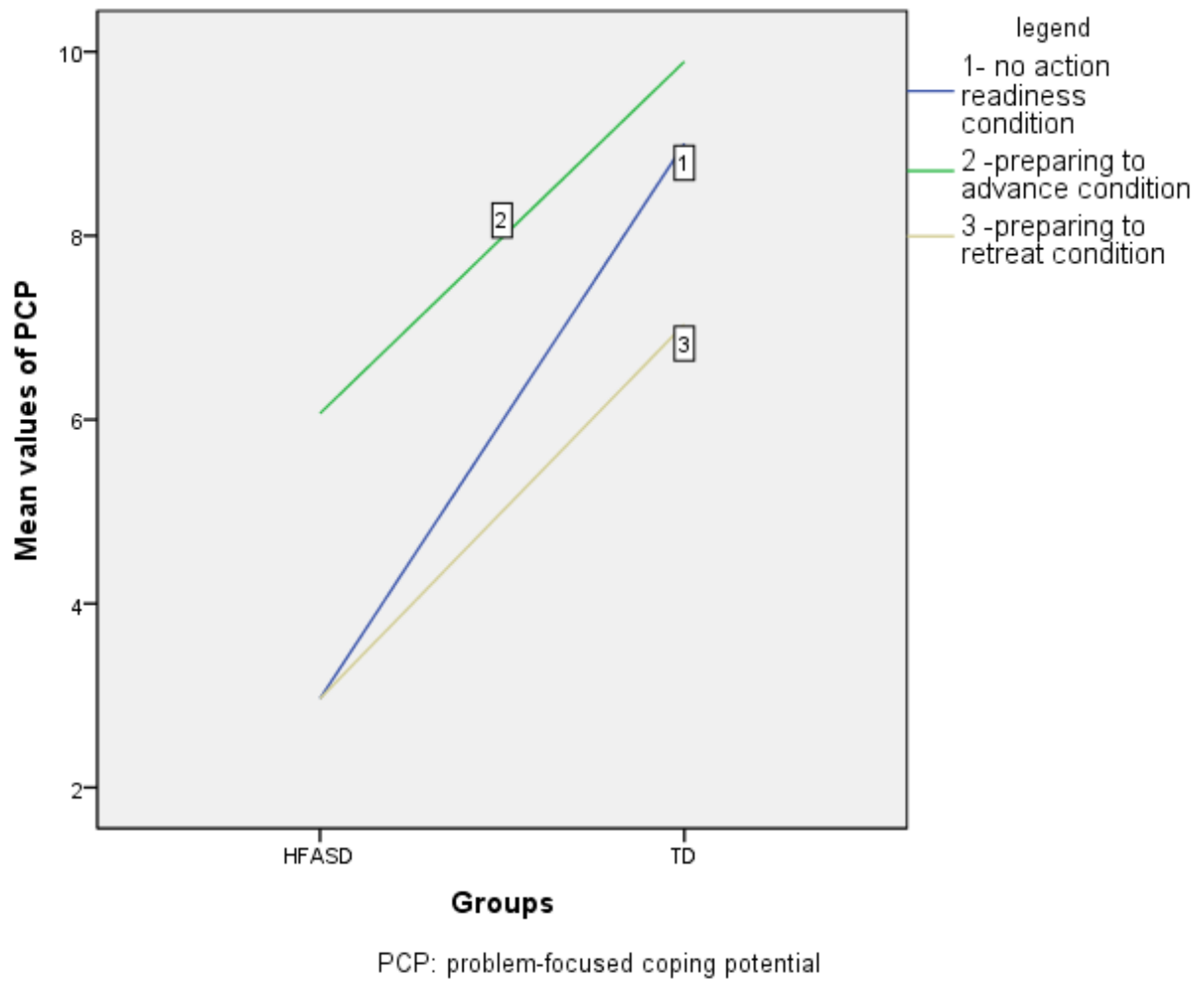


Figure 2: Line chart for the secondary appraisal dimension of problem-focused coping potential

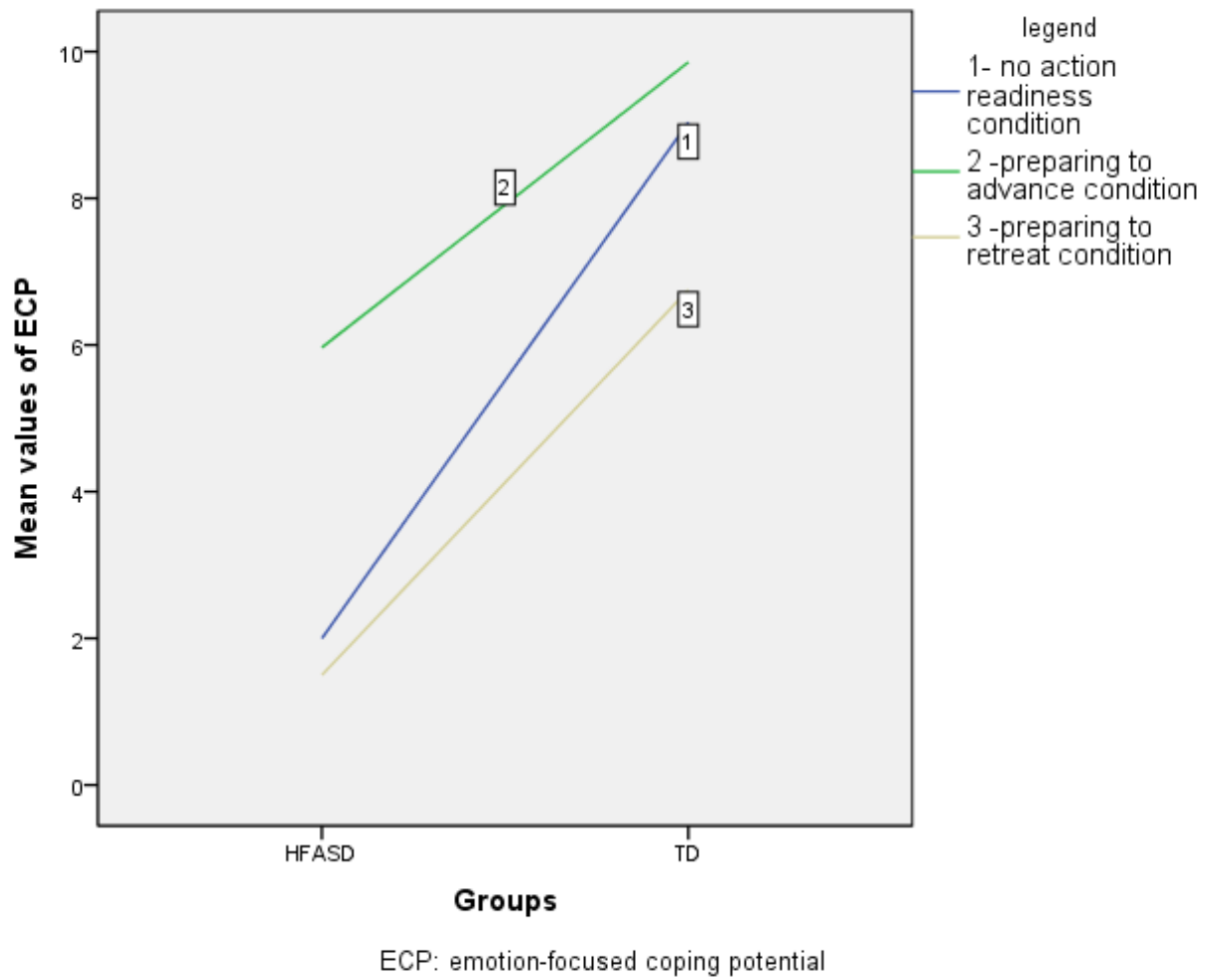


Figure 3: Line chart for the secondary appraisal dimension of emotion-focused coping potential

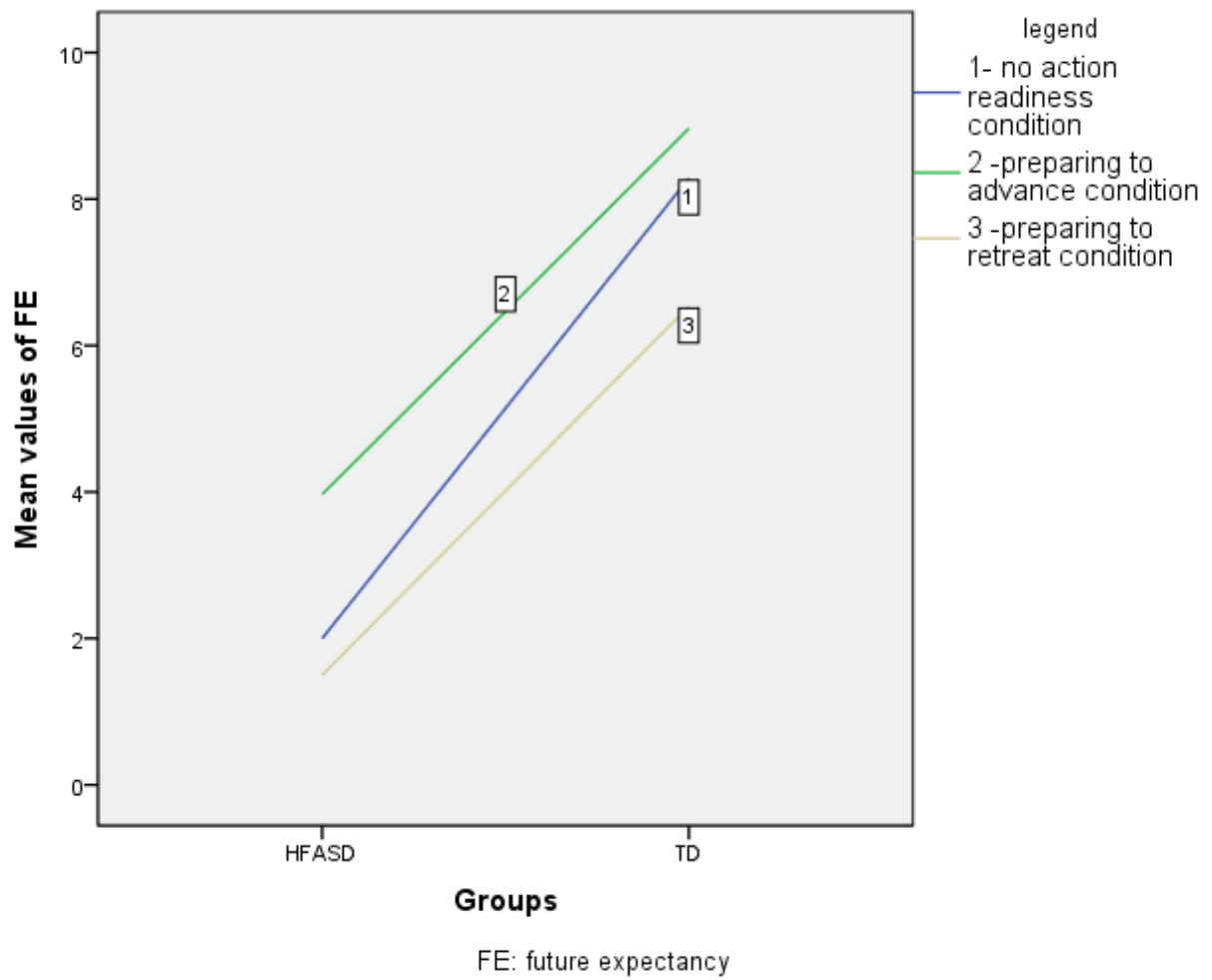


Figure 4: Line chart for the secondary appraisal dimension of future expectancy