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Journal:	*Quarterly Journal of Experimental Psychology*
Manuscript ID	QJE-STD-24-281.R1
Manuscript Type:	Standard Article
Date Submitted by the Author:	06-Nov-2024
Complete List of Authors:	Towler, John; Swansea University,
Keywords:	expression recognition, emotion, dark triad, alexithymia, autism, facial emotion

DOI: 10.1177/17470218241307763

Alexithymia does not explain facial expression recognition difficulties across the dark triad spectrum

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Declarations

Conflict of interest

The authors declare that they have no conflict of interest. The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

Ethical Approval

DOI: 10.1177/17470218241307763

Approval was granted by the School of Psychology Ethics Sub-Committee at Swansea University. Authors did not preregister the study in an independent registry.

Informed Consent

Informed written consent was obtained from all participants who took part in the study.

DOI: 10.1177/17470218241307763

Abstract

The Dark Triad encompasses socially aversive personality traits – Narcissism, Psychopathy, and Machiavellianism – and has been shown to be associated with expression recognition difficulties. Alexithymia has been shown to be associated with the Dark Triad, and recent evidence has suggested that co-occurring alexithymia may explain facial expression recognition difficulties found in the autism spectrum. Here I tested this alexithymia hypothesis for individuals on the *dark triad spectrum*. Using an individual differences approach I assessed whether trait alexithymia was able to predict unique variance in facial expression discrimination ability and facial expression labelling ability above and beyond an individual's level of dark triad traits. Results showed that autistic traits, alexithymic traits and dark triad traits all correlated with expression recognition ability. However, linear regression models showed that an individual's level of dark triad traits, their level of autistic traits, and a brief measure of general cognitive ability each predicted unique variance in facial expression discrimination and facial expression labelling ability, but an individual's level of alexithymic traits predicted no additional unique variance. Results suggest that Dark

DOI: 10.1177/17470218241307763

Triad and Autistic traits each contribute to expression recognition ability in unique ways alongside general cognitive ability.

Key words: Alexithymia, autism, dark triad, psychopathy, expression recognition, facial emotion, individual differences, cognitive ability

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Introduction

The ability to recognise facial expressions of emotion is a core social cognitive skill and deficits in this ability have been associated with a range of social dysfunctions including psychopathy and the dark triad of personality traits (e.g., Dawel, O'Kearney, McKone, & Palermo, 2012). The Dark Triad traits include the anti-social and aversive personality dispositions of psychopathy, narcissism, and Machiavellianism (Paulhus, & Williams, 2002) and individuals who score highly on the Dark Triad tend to be callous and unemotional, have an unreasonably high sense of their own importance, and treat other people in an instrumental fashion that involves deception and manipulation. Dark Triad traits (particularly psychopathy and Machiavellianism) have been consistently related to deficits in social-cognitive abilities such as empathy (e.g., Jonason & Krause, 2013; Jonason & Kroll, 2015), and emotional intelligence (for meta-analyses: see: Miao, Humphrey, Qian, & Pollack, 2019; Michels & Schulze. 2021). Psychopathy has also been linked to poorer social outcomes and lower societal position (Aluja, Garcia, Rossier, Ostendorf, Glicksohn, Oumar, Hansenne, et al., 2022). Psychopathy and other Dark Triad traits have also been shown to predict difficulties recognising facial

DOI: 10.1177/17470218241307763

expressions of emotion. It was initially thought that expression recognition difficulties in psychopathy were relatively limited to fear and sadness (e.g., Marsh & Blair, 2008), however, it has since become clear that individuals with high levels of psychopathic traits have difficulties recognising a wider range of emotional expressions (for a meta-analysis: see: Dawel, O'Kearney, McKone, & Palermo, 2012). The successful recognition of the emotions of others is important for productive social interactions, and deficits in this skill are associated with negative social outcomes (e.g., Niedenthal, & Brauer, 2012). However, not all individuals with psychopathy or high levels of dark triad traits appear to have emotional expression recognition difficulties. Might other psychological factors that are related to psychopathy and the dark triad play a more important role in expression recognition ability?

Other socially relevant traits that have been strongly associated with expression recognition difficulties are autism spectrum disorder (ASD) and alexithymia. ASD is characterised by social and communicative difficulties as well as by rigid routines and strong interests (American Psychiatric Association, 2013), and alexithymia is defined by having difficulties identifying and describing one's own feelings and

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emotions (e.g., Bagby, Parker, & Taylor, 1994). Importantly, ASD and alexithymia are strongly associated with one another (Kinnaird, Stewart, & Tchanturia, 2019), and recent studies have suggested that co-occurring trait alexithymia may be the casual factor that explains an individual's facial expression recognition difficulties rather than autistic traits as is often assumed (e.g. Cook & Bird, 2013). This *alexithymia hypothesis* simply and elegantly proposes that to understand other people's expressions of emotion one must also be able to understand their own feelings and emotions. Importantly, alexithymia has been associated with difficulties recognising a range of emotional expressions (e.g., Grynberg et al., 2012), and the Dark Triad is also associated with alexithymia (for a meta-analysis, see: Burghart & Mier, 2022) making it an ideal candidate for explaining emotional recognition difficulties. Here I test the hypothesis that co-occurring alexithymia can explain facial expression recognition deficits that have previously been attributed to the dark triad.

To my knowledge, only one published study to date has attempted to address the question of whether alexithymia or the dark triad are associated with expression recognition deficits in the same study (Kyranides, Christofides, & Çetin, 2022). This previous study (sample size N=110) found that dark triad traits were associated with

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emotional expression recognition difficulties and alexithymic traits were not associated with emotional expression recognition accuracy. However, this work is difficult to interpret because it found no relationship between alexithymia and emotional expression recognition performance despite the great majority of published studies finding this basic association (for a systematic review, see: Grynberg, et al., 2012). It should be noted that this study had a small sample size and did not control for general cognitive ability or autistic traits. Additionally, the group-based statistical approach taken by Kyranides et al. precluded their study from addressing the question whether the dark triad or alexithymia contributes unique variance to expression recognition ability.

Here I employed an individual differences regression-based methodology in which I measured participants levels of Dark Triad traits using the Short Dark Triad-27 (Jones & Paulhus, 2014), autistic traits using the Autism Quotient-50 (Baron-Cohen et al., 2000), and alexithymic traits using the TAS-20 (Bagby et al., 1994). It is essential to examine these traits together in non-clinical samples to allow for greater generalisability of findings beyond those who are suffering from the most severe mental health and societal outcomes (e.g., institutionalised prison or psychiatric

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samples). In the present study emotional expression recognition ability was assessed using two standardised tests that were designed to measure verbal and non-verbal individual differences in expression recognition (Palermo, et al., 2013), due to a meta-analysis conducted by Wilson, Juodis, & Porter (2011) suggesting that expression recognition deficits in psychopathy may be primarily present for expression recognition tasks that involve a verbal component. One test measured emotional expression discrimination, focusing on categorical perception of basic facial expressions. This expression discrimination task assesses higher level expression perception than previous studies (e.g. Cook et al., 2013) because expressions must be recognised across identities rather than within identity or with identical images as in previous work. Relatedly, this task was shown to have a large inversion effect confirming that it is not reliably completed based on low-level visual similarity or dissimilarity (Palermo, et al., 2013). The other test was an emotional expression labelling task where a single face requires assignment to one of the six basic categories of emotional expression (Ekman, & Friesen, 1971). I also measured background demographic variables such as participant age and sex, as well as general cognitive ability via a short form of Ravens Progressive Matrices

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(RPM; Arthur Jr., & Day, 1994). Correlations were calculated between questionnaire measures and the standardised expression recognition tasks. To directly address the question whether dark triad traits account for expression recognition difficulties, or whether expression recognition difficulties are accounted for by alexithymia I ran linear regression models predicting emotional expression recognition task performance using dark triad traits, alexithymic traits, and autistic traits, as well as background demographic variables of sex and age, and general cognitive ability.

As suggested above, Autistic, Alexithymic and Dark Triad traits are all associated with expression recognition ability. However, Dark Triad and Alexithymic traits may be more uniquely associated with verbal labelling aspects of expression recognition (e.g., Wilson, Juodis, & Porter, 2011; Cook et al., 2013), while Autistic traits have been linked most strongly to a wide variety of sensory-perceptual differences (e.g., Robertson, & Baron-Cohen, 2017). This suggests that Autistic traits may be more uniquely linked to perceptual aspects of Expression Discrimination ability (e.g., Bothe, Palermo, Rhodes, Burton, & Jeffery, 2019). To address these issues, in addition to the main regression analysis described above I added an additional step in the regression model to control for the influence of Expression Discrimination

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accuracy on Expression Labelling accuracy, and vice versa for the model predicting Expression Discrimination accuracy. This additional step allowed for a purer measure of what makes each expression recognition unique, by accounting for individual variability in perceptual aspects of expression recognition ability on Expression Labelling, and to account for categorical verbal aspects of expression recognition on Expression Discrimination.

I predicted on the basis of the clinical and individual differences literatures that dark triad traits and autistic traits would not be strongly associated with one another (e.g., Rogers, Viding, Blair, Frith, & Happe, 2006; Blair, 2008; Oliver, Neufeld, Dziobek, & Mitchell, 2016), but that alexithymic traits should be associated with both of the other traits (Kinnaird, Stewart, & Tchanturia, 2019; Burghart & Mier, 2022). I also predicted that all three constructs would have basic linear associations with difficulties recognising expressions of emotion from faces. Importantly, if the alexithymia hypothesis is correct, then alexithymic traits should explain the lion's share of the variance in expression recognition performance for both the expression discrimination and (perhaps especially) expression labelling tasks rather than autistic traits or dark triad traits. Alternatively, it may be Autistic and Dark Triad traits that

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explain facial expression recognition difficulties in specific ways involving links with expression discrimination and expression labelling, respectively. An additional hypothesis that I explored was whether all three dark triad traits are associated with expression recognition difficulties, or whether psychopathy alone accounts for these impairments.

Methods

Materials and Procedures

Participants

A total of 235 adults (100 males and 135 females) participated in this study. Participants were an opportunity sample of university students and adults from the local community based around the Swansea City and County region. Mean age of participants was 23.97 years (SD = 8.51) ranging from 18 to 63 years and were based on a convenience sample. Participation was on a voluntary basis and all participants reported normal or corrected vision. This study was approved by the Department of Psychology Ethics Committee at Swansea University. Data was

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quality checked, and the widest possible range of SD-27, AQ-50, and TAS-20 scores was retained in the sample to maximise the effects of individual differences on these traits.

Sample Size considerations

Based on previous literature (e.g., Cook et al., 2013; Bothe, et al., 2019), correlations were predicted to span the range from small to medium-large (i.e. between r = .2 and r = .4). Power analysis revealed that to detect an effect size of r = .2 with standard parameters (power of 80%, and an alpha of .05), 193 participants would be required. Therefore, the sample size of 235 was more than sufficient and in line with general standards for individual differences studies. The smallest possible detectable correlation at this sample size is approximately r = .13.

The Short Dark Triad (SD-27). The SDT-27 (Jones & Paulhaus, 2014) is a 27 item self-report measure of dark triad traits with good reliability including 9 items for narcissism (α = .79), 9 items for psychopathy (α = .81), and 9 items for

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Machiavellianism (α = .85). Each item is scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores represent higher levels of dark triad traits.

The Toronto Alexithymia Scale (TAS-20). The TAS-20 is a 20 item self-report measure of alexithymia (Bagby, Parker, & Taylor, 1994). Each item is scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It provides a total score and three sub-scores: Difficulty Identifying Feelings (7 items), Difficulty Describing Feelings (5 items), and Externally Oriented Thinking (8 items). Difficulty Identifying Feelings assesses the ability to identify feelings and differentiate them from the somatic sensations of emotional arousal, Difficulty Describing Feelings measures the ability to describe feelings to other people, and Externally Oriented Thinking assesses an individual's tendency to have an interest in external physical events in the world while avoiding paying attention to "internal" psychological factors. Higher scores represent higher levels of alexithymic traits, and a score of 61 or above is indicative of clinically relevant levels of alexithymic traits. TAS-20 total scores have been shown to have strong reliability (Bagby, et al., 1994) for both

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student (α = 0.80) and clinical outpatient samples (α = 0.83), and have been shown to be between α = 0.61 and α = 0.81 for individual subscales.

The Autism Spectrum Quotient (***AQ).*** The AQ is a self-report scale that identifies the degree of autism spectrum traits in adults (Baron-Cohen, et al., 2001). The AQ consists of 50 items, with 10 items assessing 5 different areas: Social skills, Attention switching, Attention to detail, Communication skills, and Imagination. Each item is scored as 0 or 1 indicting the absence or presence of autistic traits. Higher scores represent a higher level of autistic traits, and a total score of 32 or above is indicative of clinically significant levels of autism spectrum traits. Cronbach's alpha calculations have shown that AQ-50 total scores have good reliability (α = .767), as well as reasonable to good reliability (α = .63 and α = .77) for each of the five subscales (Baron-Cohen et al., 2001).

Expression Discrimination Task. This task was equivalent to the Emotional Expression Matching task reported in Palermo et al. (2013) and was controlled by Superlab 5.0 (https://www.cedrus.com/superlab/). Images of individuals expressing the six basic facial emotions: happy, sad, fearful, surprised, disgusted, and fearful,

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were selected from the Karolinska Directed Emotional Faces database (Lundqvist, Flykt & Ohman, 1998), were presented in oval outlines, and in full color. Participants were presented with face arrays in which three different faces were simultaneously presented. The two distractor faces expressed the same emotion, and the target face expressed a different emotion. Participants were asked to select the target face that displayed an emotion that was different to the other two. Participants were instructed to answer as quickly and accurately as possible. There were 100 trials in total, target faces (22 happy, 20 angry, 17 sad, 15 surprised, 14 disgusted, 12 fearful) were presented in either a full-frontal face pose, three-quarter left facing pose, or three-quarter right facing pose, on a gray background. Target and distractor faces were paired on each trial to be maximally confusable to participants: happiness-surprise; surprise-fear; fear-sadness; sadness-disgust; disgust-anger; anger-happiness (e.g., Young, Perrett, Calder, Sprengelmeyer, Ekman, 2002). This task was previously validated (Palermo, et al., 2013), has good reliability ($\alpha = 0.77$), and has been shown to have a large inversion effect, suggesting that it measures high-level face processing. Expression pairs were selected and retained in the final test to maximise the ability to measure individual differences in general expression

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recognition ability. Face arrays were presented for 4,500 msec and an interstimulus interval was present for 7,000 msec or until participants made a response. Participants were able to respond during the stimulus duration or during the interstimulus interval.

Expression Labelling Task. This task was equivalent to the emotion labelling task reported in Palermo et al. (2013) and was controlled by Superlab 5.0 (https://www.cedrus.com/superlab/). A single expressive face was presented on a grey background on each trial accompanied by six emotional labels (Angry, Disgusted, Fearful, Happy, Sad, or Surprised). The face images used in this task were the same as the full-frontal faces in the emotion discrimination task. Participants were asked to use the mouse to indicate the most appropriate emotion label for each face. There were 144 trials in total, with 24 items for each emotional expression. Face duration was 1000 msec and this was followed by a 7000 msec interstimulus interval (or until a response was made) during which time the emotion labels remained on screen. Participants were able to respond during the face duration or during the 7000 msec time window. Participants were instructed to answer as quickly and accurately as possible. This task was previously validated

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(Palermo, et al., 2013), has good reliability (α = 0.76), has been shown to have a large inversion effect, and correlates with vocal emotion labelling accuracy, suggesting that it measures high-level face processing and high-level emotion processing.

Raven's Progressive Matrices. The Raven's Progressive Matrices (RPM) is a nonverbal test of abstract reasoning, commonly used as a measure of fluid intelligence. This abbreviated version consists of 12 matrix-style items, each with a missing piece. Participants were instructed to select the correct piece from a set of options that completes the pattern in a logical sequence. The 12-item version was chosen for its brevity and efficiency in assessing general cognitive ability (Arthur, & Day, 1994), this task has been shown to have reasonable reliability (α = 0.66).

Procedure. Upon arrival, participants were informed of the nature of the study and what was expected from their participation. Oral and written instructions were given to participants, and they were reminded that they could withdraw their participation at any time. After informed consent was obtained, participants were first asked to complete the self-report questionnaires (SD-27, TAS-20, AQ-50) in a

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counterbalanced order. After the questionnaires participants were asked to first complete the Ravens Progressive Matrices, the Expression Discrimination Task, followed by the Expression Labelling Task. At the end of the study participants were debriefed. The experiment took on average approximately 30 minutes to complete in total.

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Results

Table 1 shows means, standard deviations, and ranges, for the key variables of interest. Importantly, I was able to cover a wide range of scores for the questionnaire measurements that strongly overlapped with clinically relevant levels of these traits for the AQ-50, TAS-20, and SD-27. I also covered a wide range of scores on the cognitive tests which spanned from approximately chance performance to near ceiling performance on all tests. Mean scores were appropriate for all measurements, and in line with previously reported literature.

--- Insert Table 1 about here ---

Table 2 shows Pearson's correlations for the key variables of interest. As predicted all questionnaire-derived trait scores (SD-27, TAS-20, AQ-50) correlated with Expression Labelling accuracy, and both AQ and SD-27 significantly correlated with Expression Discrimination accuracy. RPM significantly correlated with both the Expression Discrimination and Expression labelling tasks, but not with any of the questionnaire measurements ($p > .05$). TAS-20 scores correlated with both AQ-50

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traits and with SD-27 traits, but the SD-27 and AQ-50 were unrelated to one another ($p > .05$).

--- Insert Table 2 about here ---

Separate scatterplots depicting the simple Pearsons correlations with the Expression Discrimination and Expression Labelling tasks with the three main variables of interest (SD-27, AQ-50, and TAS-20) can be seen in Figure 1. Analyses with and without the three participants with high AQ scores (middle panels) had quantitatively very similar patterns of significant correlations with other variables and therefore the three participants were retained in the sample as meaningful individual differences rather than rejected as artifacts. Every scatterplot correlation was significant, excluding the link between TAS-20 and Expression Discrimination (also see Table 2).

--- Insert Figure 1 about here ---

I performed two hierarchical forced-entry linear regression models predicting Expression Discrimination accuracy and Expression labelling accuracy separately

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using the predictors Age, Gender, RPM, AQ-50, TAS-20, and SD-27 in Step 1. For Step 2, the previous predictor variables were retained, and the other expression recognition task was added as a predictor, for example, for the model predicting Expression Discrimination, Expression Labelling was added as an additional predictor, and vice versa (see Table 3). Step 1 for the model predicting Expression Discrimination accuracy was significant, $F(6,228) = 11.984$, $p < .001$, $R^2 = .24$, $R^2_{adj} = .22$. Step 1 for the model predicting Expression Labelling accuracy was also significant, $F(6,228) = 11.397$, $p < .001$, $R^2 = .231$, $R^2_{adj} = .21$.

--- Insert Table 3 about here ---

Step 1 of the models revealed that SD-27, AQ-50, and RPM were all uniquely associated with Expression Discrimination and Expression Labelling accuracy. In both cases TAS-20 scores failed to contribute unique predictive variance to the model. Age was shown to uniquely predict Expression Discrimination accuracy, but not Expression Labelling accuracy, and Gender was not uniquely predictive of accuracy on either Expression Recognition test.

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To examine the hypothesis whether SD-27, AQ-50, or TAS-20 uniquely contribute variance to the specific features of the Expression Discrimination and Expression labelling tasks while controlling for the effect of each type of expression recognition ability on the other, I added a second step to each regression model. Step 2 of the model predicting Expression Discrimination accuracy was highly significant, $F(7,227) = 23.921$, $p < .001$, $R^2 = .425$, $R^2_{adj} = .407$. Importantly, Step 2 had a significant increase in predictive power from Step 1 ($\Delta R^2 = .185$, $p < .001$), showing that Expression Labelling accuracy is significantly and uniquely associated with Expression Discrimination accuracy. Similarly, Step 2 of the other model predicting Expression Labelling accuracy was also highly significant, $F(7,227) = 23.26$, $p < .001$, $R^2 = .418$, $R^2_{adj} = .40$. Step 2 of this model had a significant increase in predictive power from Step 1 ($\Delta R^2 = .187$, $p < .001$), again, confirming that the two expression recognition tasks are significantly and uniquely associated with one another when accounting for all other variables.

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Importantly, these results clearly show that in Step 2 for the model predicting Expression Discrimination accuracy, RPM and AQ-50 scores remain significant unique predictors once Expression Labelling accuracy has been accounted for, however, SD-27 scores no longer predict unique variance in Expression Discrimination (see Table 3). For Step 2 of the model predicting Expression Labelling accuracy while accounting for Expression Discrimination accuracy, SD-27 scores remain unique predictors, however, RPM and AQ-50 scores no longer predict unique variance once Expression Discrimination accuracy has been accounted for. When Expression Discrimination accuracy and Expression Labelling accuracy are included as predictors of the other kind of expression task, they add approximately 20% additional variance to each model, suggesting substantial specific shared cognitive or perceptual processing between the two expression recognition tasks above and beyond RPM and the questionnaire measures. In general, these findings from Step 2 of the regression models suggest that AQ traits contribute especially specific unique variance to Expression Discrimination accuracy, while SD-27 traits contribute especially specific unique variance to Expression Labelling accuracy.

--- Insert Table 4 about here ---

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To investigate the additional hypothesis regarding dark triad subscales, I performed simple Pearsons's correlations for the three dark triad traits and the expression discrimination and expression labelling tasks separately (see Table 4). These analyses showed that all three dark triad traits were associated with expression labelling accuracy, and only psychopathy and Machiavellianism were significantly associated with expression discrimination ability.

Discussion

The results were clear cut. As expected, simple correlations conducted prior to regression analyses revealed that Dark Triad traits, Autistic traits, and Alexithymic traits were all associated with Emotional Expression Labelling ability, and that both Dark Triad traits and Autistic traits (but not Alexithymic traits) were associated with Expression Discrimination ability. I also confirmed that alexithymic traits were associated with autistic and dark triad traits, but that autistic and dark triad traits were not associated with one another. However, and against the predictions of the

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alexithymia hypothesis, the linear regression models found that Dark Triad traits and Autistic traits were associated with unique variance in both expression labelling and expression discrimination ability, and that alexithymic traits were not uniquely associated with performance on either of these facial expression recognition tasks. I show that those with high levels of Dark Triad traits are not only impaired on tasks that have an explicit verbal labelling component, but also in tasks that require categorical perceptual discriminations with no verbal component (Wilson, Juodis, & Porter, 2011). In short, the alexithymia hypothesis did not explain individual differences in facial expression recognition ability when autistic traits and dark triad traits were both accounted for.

The findings run counter to some previous studies which have found that alexithymic traits account for expression recognition difficulties above and beyond autistic traits. However, I note that this literature has produced inconsistent findings to date with some studies finding that alexithymia is uniquely associated with recognition of emotions in others rather than autistic traits (e.g., Cook et al., 2013; Connolly, Lefevre, Young, & Lewis, 2020) and other studies finding that autistic traits are also uniquely associated with expression processing (Bothe, Palermo, Rhodes, Burton, & Jeffery,

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2019). Yet other studies have produced mixed results with respect to whether alexithymic or autistic traits are the main contributing factor to the amount of time spent fixating on the eyes of joyful, angry, and disgusted faces (Stephenson, Luke, & South, 2019; Bird, Press, Richardson, 2011; Cuve, Castiello, Shiferaw, Ichijo, Catmur, & Bird, 2021) with some studies finding autism is the main predictor and others alexithymia. It is important to note that none of these studies have examined the role of dark triad traits.

The findings add support to the contrary hypothesis, namely that autistic traits are a main contributor to expression recognition difficulties rather than alexithymic traits. In addition, I provide novel evidence that an individual's level of dark triad traits also contributes to expression recognition difficulties above and beyond autistic and alexithymic traits. It may be the case that where alexithymia has been associated with expression recognition difficulties in previous studies that it is co-occurring dark triad traits that are responsible for this association. Interestingly, this finding is consistent with the clinical and behavioural genetics literature on autism and psychopathy which have found that these two disorders are not essentially associated with one another at the cognitive or genetic levels (Rogers, Viding, Blair, Frith, & Happe, 2006; Jones,

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Larsson, Ronald, Rijsdijk, Busfield, Mcmillan, et al., 2009) but rather that individuals that have both of these tendencies experience a “double hit” to their social cognitive abilities. One suggestion is that empathic difficulties associated with autism can be accounted for by difficulties with cognitive empathy and theory of mind, and the empathic difficulties associated with psychopathy and the dark triad can be largely accounted for by difficulties with emotional or affective empathy (e.g., Blair, 2008). If this is the case, I suggest that both cognitive and affective aspects of empathy may be unique and additive contributors to emotional expression recognition ability (for related findings, see: Besel, 2006). The implication of these findings is that individuals may find it difficult to perceive, understand, and decode expressions of emotion despite often showing a genuine interest in other people (autism), while others struggle with this ability because they are disinterested in the emotional states of others, or motivated to misperceive them (psychopathy) and therefore don’t learn expression recognition as intensively over the lifespan.

In line with the above suggestion, the second Step of the regression analyses factored in individual variation in Expression Labelling accuracy on Expression Discrimination accuracy, and Expression Discrimination on Expression Labelling accuracy. These

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analyses found that Autistic traits were most uniquely associated with Expression Discrimination ability, but not with Expression Labelling ability. On the other hand, Dark Triad traits were most uniquely associated with Expression Labelling ability, but not with Expression Discrimination ability. This pattern of findings suggests that Autistic traits are primarily associated with difficulties perceiving and decoding differences and similarities between emotional expressions (which can have knock on effects on Expression Labelling). This finding is consistent with at least one study that has measured autistic and alexithymic traits alongside expression matching and labelling ability (Bothe, et al., 2019). Dark Triad traits are instead linked with associating expressions with the wrong verbal labels or misperceiving displays of emotion as belonging to other emotions. These results may help to clarify the unique but additive effects of Autistic and Dark Triad traits on general emotional expression recognition ability.

In addition to autistic and dark triad traits, I also found clear associations between, RPM, a brief measure of general cognitive ability, and both of the facial expression recognition tasks. This association was found to be unique and predicted performance on both tasks in linear regression models when the questionnaire measures were

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considered. This result shows that the recognition of facial expressions of emotion is not entirely distinct from general cognitive ability, and that more cognitively able individuals tend to perform more accurately at these social-emotional cognitive tasks (for related findings, see Schulte, Ree, & Carretta, 2004). This measure of general cognitive ability was not associated with dark triad traits, alexithymic traits, or autistic traits. Additionally, I found that sex failed to contribute unique variance once the questionnaire measures were considered in the regression analyses. Participant age was found to be negatively associated Expression Discrimination accuracy (but not Expression Labelling accuracy), and this was shown to be a unique predictor in the linear regression model, mirroring the relative age-related decline in RPM accuracy.

In terms of addressing the question of whether any of the three dark triad traits is the main predictor of emotional expression recognition difficulties, simple correlations revealed that all three aspects of the Dark Triad were very similarly associated with expression labelling difficulty. This suggests that it is the shared dark triad variance that accounts for expression labelling difficulties rather than any one of these dark personality traits alone. The link between dark triad traits and expression discrimination was generally weaker and only psychopathy and Machiavellianism

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showed small but significant correlations. These findings are generally consistent with the main regression analyses and show that it may be tasks with an explicit verbal labelling component that are more likely to reveal difficulties associated with the dark triad (similar to the hypothesis of Wilson, Juodis, & Porter, 2011).

In summary, the findings suggest that reasons why some individuals with high levels of dark triad traits do not have difficulties with expression recognition include that high general cognitive ability and lower than average levels of autistic traits can act as protective factors which compensate for the negative impact of dark triad traits. In the round, my findings strongly suggest that facial expression recognition is not explained by the alexithymia hypothesis. Instead, facial expression recognition is best explained by a multivariate model that includes factors such as general cognitive ability, age, and the specific presence of autistic and the dark triad traits which impact uniquely on expression discrimination and expression labelling ability.

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References

Aluja, A., Garcia, L. F., Rossier, J., Ostendorf, F., Glicksohn, J., Oumar, B., ... & Hansenne, M. (2022). Dark triad traits, social position, and personality: a cross-cultural study. *Journal of Cross-Cultural Psychology*, *53*(3-4), 380-402. https://doi.org/10.1177/00220221211072816

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Arthur, W., Jr., & Day, D. V. (1994). Development of a short form for the Raven Advanced Progressive Matrices test. *Educational and Psychological Measurement*, 54, 394–403. doi:10.1177/0013164494054002013

Bagby, R. M., Parker, J. D., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*(1), 23-32. https://doi.org/10.1016/0022-3999(94)90005-1

DOI: 10.1177/17470218241307763

Besel, L. D. S. (2006). *Empathy: The role of facial expression recognition* (Doctoral dissertation, University of British Columbia). https://dx.doi.org/10.14288/1.0100322

Blair, R. J. R. (2008). Fine Cuts of Empathy and the Amygdala: Dissociable Deficits in Psychopathy and Autism. *Quarterly Journal of Experimental Psychology*, 61(1), 157-170. https://doi.org/10.1080/17470210701508855

Dawel, A., O'Kearney, R., McKone, E., & Palermo, R. (2012). Not just fear and sadness: Meta-analytic evidence of pervasive emotion recognition deficits for facial and vocal expressions in psychopathy. *Neuroscience & Biobehavioral Reviews*, *36*(10), 2288-2304. https://doi.org/10.1016/j.neubiorev.2012.08.006

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, *17*(2), 124. https://psycnet.apa.org/doi/10.1037/h0030377

Grynberg, D., Chang, B., Corneille, O., Maurage, P., Vermeulen, N., Berthoz, S., & Luminet, O. (2012). Alexithymia and the processing of emotional facial expressions (EFEs): systematic review, unanswered questions and further

DOI: 10.1177/17470218241307763

perspectives. *PLoS One*, 7, e42429. https://doi.org/10.1371/journal.pone.0042429

Jonason, P. K., & Krause, L. (2013). The emotional deficits associated with the Dark Triad traits: Cognitive empathy, affective empathy, and alexithymia. *Personality and Individual Differences*, *55*(5), 532-537. https://doi.org/10.1016/j.paid.2013.04.027

Jonason, P. K., & Kroll, C. H. (2015). A multidimensional view of the relationship between empathy and the dark triad. *Journal of Individual Differences*, 36(3), 150-156. https://psycnet.apa.org/doi/10.1027/1614-0001/a000166

Jones, A. P., Larsson, H., Ronald, A., Rijsdijk, F., Busfield, P., Mcmillan, A., ... & Viding, E. (2009). Phenotypic and aetiological associations between psychopathic tendencies, autistic traits, and emotion attribution. *Criminal Justice and Behavior*, *36*(11), 1198-1212. https://doi.org/10.1177/0093854809342949

DOI: 10.1177/17470218241307763

Jones, D. N., & Paulhus, D. L. (2014). Introducing the Short Dark Triad (SD3): A brief measure of dark personality traits. *Assessment*, 21, 27–40. http://dx.doi.org/10.1177/1073191113514105.

Kinnaird, E., Stewart, C., & Tchanturia, K. (2019). Investigating alexithymia in autism: A systematic review and meta-analysis. *European Psychiatry*. 55, 80-89. doi:10.1016/j.eurpsy.2018.09.004

Kyranides, M. N., Christofides, D., & Çetin, M. (2022). Difficulties in facial emotion recognition: taking psychopathic and alexithymic traits into account. *BMC Psychology*, *10*(1), 239. https://doi.org/10.1186/s40359-022-00946-x

Marsh, A. A., & Blair, R. J. R. (2008). Deficits in facial affect recognition among antisocial populations: A meta-analysis. *Neuroscience & Biobehavioral Reviews*, *32*(3), 454-465. https://doi.org/10.1016/j.neubiorev.2007.08.003

Miao, C., Humphrey, R. H., Qian, S., & Pollack, J. M. (2019). The relationship between emotional intelligence and the dark triad personality traits: A meta-analytic review. *Journal of Research in Personality*, *78*, 189-197. https://doi.org/10.1016/j.jrp.2018.12.004

DOI: 10.1177/17470218241307763

Michels, M., & Schulze, R. (2021). Emotional intelligence and the dark triad: a meta-analysis. *Personality and Individual Differences*, *180*, 110961. https://psycnet.apa.org/doi/10.1016/j.paid.2021.110961

Niedenthal, P. M., & Brauer, M. (2012). Social functionality of human emotion. *Annual Review of Psychology*, *63*, 259-285. https://doi.org/10.1146/annurev.psych.121208.131605

Oliver, L. D., Neufeld, R. W., Dziobek, I., & Mitchell, D. G. (2016). Distinguishing the relationship between different aspects of empathic responding as a function of psychopathic, autistic, and anxious traits. *Personality and Individual Differences*, *99*, 81-88. http://dx.doi.org/10.1016/j.paid.2016.04.058

Palermo, R., O'Connor, K. B., Davis, J. M., Irons, J., & McKone, E. (2013). New tests to measure individual differences in matching and labelling facial expressions of emotion, and their association with ability to recognise vocal emotions and facial identity. *PLoS One*, *8*(6), e68126. https://doi.org/10.1371/journal.pone.0068126

DOI: 10.1177/17470218241307763

Paulhus, D. L, & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality*, 36, 556–563. https://psycnet.apa.org/doi/10.1016/S0092-6566(02)00505-6

Robertson, C. E., & Baron-Cohen, S. (2017). Sensory perception in autism. *Nature Reviews Neuroscience*, *18*(11), 671-684. https://doi.org/10.1038/nrn.2017.112

Rogers, J., Viding, E., Blair, R. J., Frith, U. T. A., & Happe, F. (2006). Autism spectrum disorder and psychopathy: shared cognitive underpinnings or double hit? *Psychological Medicine*, *36*(12), 1789-1798. doi:10.1017/S0033291706008853

Schulte, M. J., Ree, M. J., & Carretta, T. R. (2004). Emotional intelligence: Not much more than g and personality. *Personality and Individual Differences*, *37*(5), 1059-1068. https://psycnet.apa.org/doi/10.1016/j.paid.2003.11.014

Wilson, K., Juodis, M., & Porter, S. (2011). Fear and Loathing in Psychopaths: a Meta-Analytic Investigation of the Facial Affect Recognition Deficit. *Criminal Justice and Behavior*, 38(7), 659-668. https://doi.org/10.1177/0093854811404120

DOI: 10.1177/17470218241307763

Figure Captions

Figure 1. Scatterplots showing simple Pearsons' correlations for the Expression Discrimination Task (top panels), and the Expression Labelling Task (bottom panels), with SD-27 total scores, AQ-50 total scores, and TAS-20 total scores.

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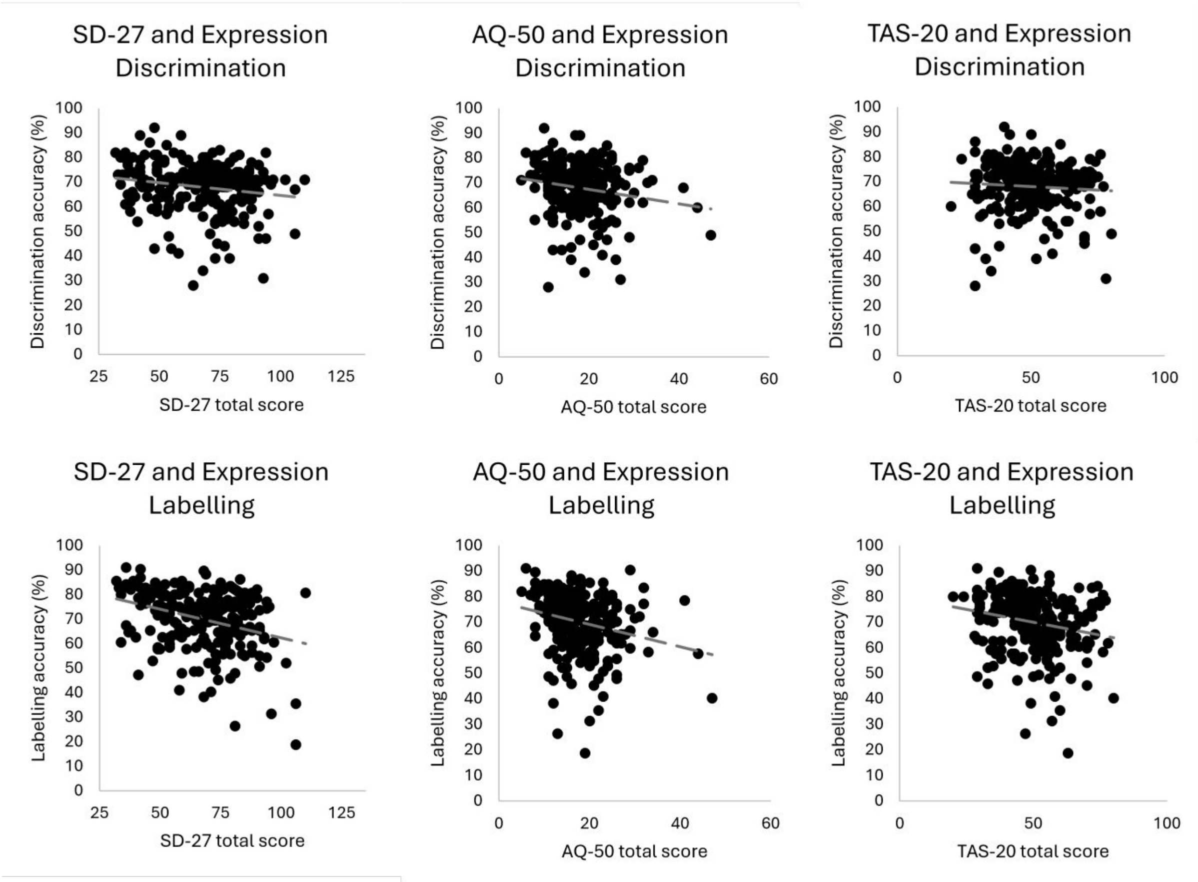

Figure 1. Scatterplots showing simple Pearsons' correlations for the Expression Discrimination Task (top panels), and the Expression Labelling Task (bottom panels), with SD-27 total scores, AQ-50 total scores, and TAS-20 total scores.

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Table 1. Descriptive statistics for key variables showing Means, Standard Deviations, and Range of scores for the participant sample.

Task (maximum possible score)	Mean	SD	Range
TAS-20 (/100)	49.46	12.19	20-80
AQ-50 (/50)	17.88	6.31	5-47
Dark Triad-27 (/135)	67.22	16.59	32-110
Expression Discrimination Task (%)	68.01	10.13	28-92
Expression Labelling Task (%)	70.01	11.77	19-91
RPM (/12)	9.13	2.26	2-12

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Table 2. Correlation matrix showing simple Pearsons correlations between key variables.

	TAS-20	AQ-50	RPM	SD-27
Expression Discrimination	-0.067	-0.182*	0.37**	-.171**
Expression Labelling	-0.206**	-0.233**	0.195*	-.33**
TAS-20	-	.462**	.017	.288**
AQ-50	-	-	.07	.015
RPM	-	-	-	.092

*Correlation significant at p < .01, **Correlation significant at p < .001

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Table 3. Standardised coefficients (β) are shown for forced entry linear regression models predicting Expression Discrimination and Expression Labelling accuracy separately.

****p* < .01, ***p* < .001**

Step and Predictor	Expression Discrimination (ED)	Expression Labelling (EL)
Step 1		
Age	-.161*	-0.034
Gender	-0.035	0.094
RPM	0.4**	0.254**
AQ-50	-0.254**	-0.237**
TAS-20	0.085	-0.001
SD-27	-.234**	-.327**
Step 2		
Age	-.095	.052
Gender	-.003	.078
RPM	.275**	.049
AQ-50	-.147*	-.108
TAS-20	.081	-.046
SD-27	-.073	-.208**
Other Task (EL/ED)	.49**	.496**

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Table 4. Individual Dark Triad subscales correlated with the expression discrimination and expression labelling task accuracy.

*$p < .01$, **$p < .001$

Variable	Expression Discrimination	Expression Labelling
Psychopathy	-.166*	-.298**
Narcissism	-.093	-.272**
Machiavellianism	-.183**	-.299**

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