

Developing an understanding of the relationship between anxiety and dissociation in adolescence

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TITLE: Developing an Understanding of the Relationship Between Anxiety and Dissociation in Adolescence

Short title: Anxiety and dissociation in adolescence

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Abstract

Anxiety is a common problem in adolescence and hypothesised to be associated with dissociation, a range of distressing symptoms associated with reduced psychosocial functioning. Yet, to date, research into the mechanisms of dissociation in adolescents has been limited. The present study investigated the link between trait anxiety and dissociative experiences (depersonalisation and 'felt sense of anomaly') using an online survey. Cognitive appraisals of dissociation, perseverative thinking, and body vigilance were assessed as potential mediating factors of this relationship. 1211 adolescents aged 13-18 years were recruited via social media advertisements and local schools. Linear regression showed a moderate positive relationship between trait anxiety and both dissociation constructs. Hierarchical regression indicated that cognitive appraisals of dissociation and perseverative thinking mediated the relationship between trait anxiety and both dissociation constructs, but trait anxiety was a significant predictor for felt sense of anomaly but not depersonalisation after including the mediators. The final models accounted for 58.7% of variance in depersonalisation and 68.4% of variance in felt sense of anomaly. These results support the hypothesis that dissociation is associated with anxiety in adolescence. They also demonstrate that cognitive-behavioural conceptualisations may be valid for understanding dissociation in adolescence.

Keywords: depersonalisation, panic, cognition, cognitive-behavioural therapy

1. Introduction

Anxiety disorders in adolescents are common, with recent prevalence rates of 7.9% of 11–16-year-olds in the UK (Sadler et al., 2018). In adults, symptoms of anxiety are linked to dissociative experiences (Černis et al., 2020; Evren et al., 2008). The term ‘dissociation’ has been used to describe a broad range of symptoms, including experiences of disconnection or detachment known as derealisation (Holmes et al., 2005), feelings of unreality linked to disconnect from the body, known as depersonalisation (Sierra & Berrios, 1998), and post-traumatic alterations in consciousness (Bækkelund et al., 2018). More recently, Černis, Beierl, et al. (2021) have delineated a subset of dissociative experiences characterised by a subjective ‘felt sense of anomaly’, i.e., a type of dissociative symptom where the core phenomenological experience is one of strangeness, including sensations of unfamiliarity, unreality, automaticity, or disconnection. This subjectively anomalous experience may affect one or more ‘domains’ of experience, such as perception, identity, cognition, or the physical body, and is thought to overlap with the constructs of depersonalisation and derealisation. There is some evidence that dissociation is a common experience in adolescents with panic disorder; for example, Kearney et al. (1997) found 55% of 40 adolescents with panic disorder experienced depersonalisation symptoms. However, little is known about the relationship between dissociation and anxiety symptoms more broadly during this developmental stage. Notably, evidence-based treatments for adolescent anxiety (e.g., the C.A.T project; Kendall et al., 2003) do not address dissociation symptoms. Understanding the relationship between adolescent anxiety symptoms and dissociation, and elucidating the mechanisms involved in the relationship, may lead to the identification of potential treatment targets.

Symptoms of anxiety are implicated in the development and maintenance of dissociation in adults. In Hunter et al.’s (2003) cognitive-behavioural model of depersonalisation, an increase in anxiety leads to threat appraisals, e.g., thoughts of losing control, going ‘mad’, or other catastrophic attributions (Hunter et al., 2003; Sierra & Berrios, 1998). These appraisals, along with behavioural responses, such as avoidance and checking, trigger and then maintain dissociative symptoms. In studies of (non-clinical) undergraduate students, Soffer-Dudek (2017) provided support for this by demonstrating a cross-sectional positive correlation between depersonalisation-derealisation and anxiety symptoms, and also a longitudinal link between increases in depersonalisation-derealisation and increases in

anxiety from daily data over 14 days. Additionally, Myers & Llera, (2020) found that social anxiety significantly predicted dissociation severity and Černis, Evans, et al. (2021) found a robust association between anxiety symptoms and felt sense of anomaly in an adult community population using network analysis. However, research into dissociative experiences in adolescence, including the relationship with anxiety symptoms, has been limited thus far. One longitudinal study (Lee et al., 2012) found that teacher-estimated adolescent anxiety symptoms (assessed at age 13, using unvalidated measures) was the sole significant predictor of adult depersonalisation in a UK population-based birth cohort. This supports a link between adolescent anxiety symptoms and later dissociative experiences but does not address the possible mechanisms of this association in adolescence. It is important to consider this age range separately from adulthood as adolescence is an age of significant biopsychosocial maturation. In particular, there are concerns regarding identity and selfhood in adolescence (Blakemore & Mills, 2014; Sebastian et al., 2008) which may influence experience of dissociation.

In adults, three factors are implicated in the relationship between anxiety and dissociative symptoms that may also be relevant to an adolescent population: cognitive appraisals, perseverative thinking, and body vigilance. First, consistent with Hunter et al.'s (2003) model of dissociation, research has found that adult patients with psychosis who experience dissociation tend to perceive it negatively and make catastrophic interpretations about their experiences (Černis et al., 2020), and that these cognitive appraisals are robustly associated with a felt sense of anomaly (Černis et al., 2022). Furthermore, adults with anxiety disorders have been shown to exhibit a similar pattern to those with depersonalisation disorder in endorsing catastrophic appraisals for 'unusual or strange sensations' (Hunter et al., 2014).

Perseverative thinking, i.e., the tendency to ruminate upon (negative) thoughts, may also mediate the relationship between anxiety and dissociative symptoms, but again this has not been tested in adolescents. It is proposed that perseverative thinking about the negative cognitive appraisals of dissociative experiences contributes to a prolonged experience of dissociation symptoms in adults (Černis et al., 2022; Hunter et al., 2003). Freeman et al. (2013) have provided experimental evidence supporting this by demonstrating that inducing worry

in adults with persecutory delusions resulted in an increase in depersonalisation symptoms, whereas a worry reduction condition led to a reduction in symptoms of dissociation. Furthermore, Vannikov-Lugassi et al. (2021) found that rumination levels longitudinally predicted greater probability of reporting depersonalisation-derealisation in an adult sample.

Finally, body vigilance, i.e., the conscious attention paid to internal cues of bodily sensations, may also mediate the relationship between anxiety and dissociation. Hunter et al. (2003) propose that heightened attention to bodily sensations may reinforce negative cognitive appraisals and bodily sensations experienced in dissociation. Using network analysis, Černis et al. (2022) found an indication that body vigilance could be related to felt sense of anomaly. In addition, body vigilance has been shown to be elevated in adults with panic disorder, compared to social phobia patients and nonclinical controls (Schmidt et al., 1997). This study also found that higher levels of body vigilance were associated with a history of panic attacks, anxiety sensitivity, and anxiety symptomatology in an adult non-clinical sample. Evidence also exists for a link between body vigilance and anxiety sensitivity in children; Eley et al. (2004) assessed heartbeat perception, one facet of body vigilance, in children aged 8 to 11 years and found that those with good heartbeat perception (a more accurate estimate of their heart rate) had significantly higher anxiety sensitivity and panic symptoms than those with poor heartbeat perception.

The aim of the present study, therefore, was to firstly, investigate the relationship between trait anxiety and dissociation (depersonalisation and felt sense of anomaly) and secondly, to examine the impact of three potential mediators (cognitive appraisals, perseverative thinking, and body vigilance) on this relationship in a community population of adolescents aged 13-18 years. We chose to focus on trait anxiety, as this reflects an individual's proneness to react with anxiety under stressful circumstances, can explain individual differences in the frequency, intensity, and duration of episodes of state anxiety, and is seen as a marker of risk for anxiety disorders (Grupe & Nitschke, 2013; Raymond et al., 2017). Two subtypes of dissociation were chosen as depersonalisation and felt sense of anomaly are thought to overlap, with felt sense of anomaly encompassing derealisation as well as depersonalisation, and potentially also including less severe or harder to articulate

dissociative experiences (Černis, Beierl, et al., 2021). Including both would allow examination of this overlap and the extent to which these are separate constructs. Hypotheses were:

1. There will be a significant relationship between trait anxiety and dissociation subtypes: (a) depersonalisation and (b) felt sense of anomaly.
2. Cognitive appraisals of dissociation, perseverative thinking, and body vigilance will mediate the relationship between trait anxiety and dissociation subtypes: (a) depersonalisation and (b) felt sense of anomaly.

Figure 1 illustrates the proposed theoretical model being tested.

2. Method

2.1 Design

The present study was a cross-sectional online survey comprising six self-report questionnaires. These were selected to measure symptoms of trait anxiety, depersonalisation, felt sense of anomaly, cognitive appraisals of dissociation, perseverative thinking, and body vigilance. Hypotheses were pre-registered using the Open Science Framework (<https://osf.io/hzp8x/>). This study received approval from the University of Oxford Medical Sciences Interdivisional Research Ethics Committee, R71497/RE001.

2.2 Participants

To be eligible, participants had to be aged 13-18 years, based in the UK, and have a sufficient level of English to engage with the research materials. The study was described as ‘an online survey about a range of thoughts and feelings’. 1211 adolescents took part in the study. Table 1 contains the demographic data for the sample, mean age 16.4 years, 60.6% female, 85.6% white.

2.3 Measures

As measures were all designed for use with adults, we consulted with adolescents within the age range of 13-18 years on the language used in the measures to ensure that all questions could be accurately understood. As a result, we made minor adaptations to two of the measures, the Cambridge Depersonalisation Scale (Sierra & Berrios, 2000) and the Body Vigilance Scale (Schmidt et al., 1997) (see Supplementary Material). This involved changing ‘an automaton’ to ‘a robot’ in the Cambridge Depersonalisation Scale and changing ‘heart

palpitations' to 'fast heartbeat' and 'hot flashes' to 'feeling very hot' in the Body Vigilance Scale.

Only the Cambridge Depersonalisation Scale has previously been validated in an adolescent population, but in the current sample, all measures had high levels of internal consistency (Cronbach's α range .821-.974; see Table 2).

2.3.1 Demographic questions

Participants were asked to provide their age, gender, and ethnic background. As a measure of socio-economic status, they were also asked to provide the employment status and job title for up to two parents or guardians.

2.3.2 Five Item Trait Scale from the State-Trait Anxiety Inventory (STAIT-5, Zsido et al., 2020; Spielberger, 1983).

The STAIT-5 is a five-item self-report measure of trait anxiety developed by Zsido et al. (2020) through confirmatory factor analysis of the Spielberger State-Trait Anxiety Inventory (STAI) (Spielberger, 1983). Each item (e.g., 'I worry too much over something that really doesn't matter') is rated on a four-point Likert-type scale from 1 ('not at all') to 4 ('very much') indicating how a person generally feels.

2.3.3 Cambridge Depersonalisation Scale (adapted) (CDS; Sierra & Berrios, 2000)

This is a 29-item self-report scale of depersonalisation experiences examining the frequency of each symptom in the last six months. Each item (e.g., 'I have the feeling of being outside my body') is measured on a five-point Likert-type scale from 0 ('never') to 4 ('always'). The total score of the scale is the sum of all items (range 0-116), with higher scores indicating greater frequency of depersonalisation experiences. Sierra & Berrios (2000) conducted the original validation study and found good psychometric properties and high internal consistency in adults aged 18-60 years. Although the full version has not yet been validated in an adolescent population, Michal et al. (2015) found high reliability of the two-item version of the Cambridge Depersonalisation Scale in a community sample of participants aged 12-18 years.

2.3.4 *Černis Felt Sense of Anomaly (ČEFSA) scale* (Černis, Beierl, et al., 2021).

This is a 35-item self-report scale designed to evaluate dissociative symptoms where the core phenomenological experience is a felt sense of anomaly'. Items include 'I feel like a stranger to myself' and 'I feel detached from my emotions'. Frequency of experiencing each item in the last two weeks is rated on a five-point Likert-type scale from 0 ('never') to 4 ('always'). The total score of the scale is the sum of all items (range 0-140), with higher scores indicating greater frequency of dissociative experiences of the felt sense of anomaly subtype. The scale was found to have excellent internal consistency in a non-clinical adult sample (aged 18 years or over).

2.3.5 *Cognitive Appraisals of Dissociation in Psychosis measure (CAD-P)*; Černis, Bird, et al., 2021).

This is a 13-item self-report measure designed to assess key appraisals of dissociation arising in the context of psychosis. Although the scale was developed for use with people with psychosis, the items are sufficiently general to be applicable outside this context and demonstrated good psychometric properties in a non-clinical adult group (Černis et al., 2022). The scale rates how often a person thinks items such as 'I can't trust my own mind' when they feel 'strange, disconnected, unreal, or dissociated'. Each item is assessed using a five-point Likert scale from 0 ('never') to 4 ('always') and the total score is the sum of all items (range 0-52), with higher scores reflecting greater frequency of negative cognitive appraisals of dissociation.

2.3.6 *Perseverative Thinking Questionnaire (PTQ)*; Ehring et al., 2011)

This is a 15-item self-report measure allowing evaluation of trait ruminative thinking. Participants are asked to describe how they 'typically' think about negative experiences or problems (e.g. 'the same thoughts keep going through my mind again and again'). Each item is rated using a five-point Likert-type scale from 0 ('never') to 4 ('almost always') and the total score is the sum of all items (range 0-60), with higher scores indicating greater severity of negative ruminative thinking. Ehring et al. conducted measure validation in a non-clinical sample of adults (aged 18 years or over) and found good internal consistency.

2.3.7 *Body Vigilance Scale (adapted) (BVS; Schmidt et al., 1997)*

This is a four-item self-report measure designed to assess attentional focus paid to bodily sensations. The first three items assess the degree of attentional focus, perceived sensitivity to changes in sensations, and average amount of time spent attending to sensations, and the fourth contains individual ratings for 15 sensations (e.g., chest pain/discomfort), commonly experienced in panic attacks. All four items are rated on a ten-point Likert-type scale, with instructions that ratings should be based on feelings in the past week. Items one and two are rated from 0 ('not at all') to 10 ('extremely'), Item three is rated 0 ('never') to 100 ('constantly'), and item four is rated from 0 ('none') to 10 ('extreme'). To calculate the total score, item three is divided by ten and the 15 sensations in item four are averaged to give one value for item four. The total score is then the arithmetic sum of these scores plus the scores of items one and two, resulting in a range of 0-40, with higher ratings corresponding to a greater degree of body vigilance. Schmidt et al. explored the psychometric properties of the BVS with a sample of undergraduate students (mean age 18.0 years) and showed that the scale has high internal consistency.

2.4. Procedure

Recruitment was conducted through UK schools and social media outreach and advertising. The school recruitment process involved emailing headteachers with the study information and providing recruitment materials comprised of the study information sheets and publicity materials to be forwarded to students aged 13-18 years. Social media adverts comprised an advert on Instagram aimed at 13-18-year-olds and an advert across Facebook platforms aimed at parents or guardians of adolescents aged 13-18 years.

The online survey was constructed and delivered using Qualtrics software (*Qualtrics*, 2020). Participants completed the survey individually at a time of their choosing. For adolescents in school years 8-11 (aged 13-16 years), their parent or guardian was presented with a parent information sheet, and they then provided written consent for their child to take part. Following this, the adolescent was presented with an information sheet and provided written assent. For participants in school years 12-13 (aged 16-18 years), participants were provided with an information sheet and then provided written consent to take part. Parental consent was not required. The participants then proceeded to the six self-report measures

listed above, before being given the option to enter a prize draw for Amazon vouchers (parent or guardian consent for this was required at the start of the survey for participants in school years 8-11). The final page of the survey contained debrief material including relevant self-help resources.

2.5. Power Analysis

G*Power (Erdfelder et al., 1996) was used to conduct an a priori power analysis with .80 power to detect a small effect size of .10 at the standard .05 alpha error probability and produced a target sample size of 145 participants. A small effect size was used as this was consistent with previous studies using similar measures (Černis et al., 2022).

2.6. Data Analysis

Statistical analysis was conducted using IBM SPSS Statistics Version 27 (IBM Corp., 2020). A total of 2017 responses were recorded on Qualtrics. Data were included in analyses where participants had completed a minimum of 80% of all six questionnaires ($n = 1211$). Missing responses comprised 2.2% of the resulting data; these were treated as being missing at random and replaced using multiple imputation, consistent with previous studies (e.g., Černis et al., 2022, Černis et al., 2022, Černis et al., 2022). Anomalous response checking was conducted through identifying scores which deviated from the mean by 1.5 times the interquartile range (Tukey, 1977) and retaining these if the participant exhibited variance in responses. Using these criteria, no data points were excluded. Data were assessed for assumptions of Normality, skewness, and kurtosis. The Normality of the distribution of scores on each measure was assessed using the Kolmogorov-Smirnov Test and on all measures, the distribution was significantly different from a Normal distribution. However, given the power afforded by the large sample size, the use of parametric tests was warranted (Ghasemi & Zahediasl, 2012). Skewness and kurtosis were also assessed, and the data was not substantially skewed, further supporting the use of parametric tests (Hair et al., 2017). To test the first hypothesis that there would be a significant relationship between anxiety symptoms and symptoms of dissociation (depersonalisation and felt sense of anomaly), regression analyses were conducted. To assess the secondary hypothesis, that cognitive appraisals of dissociation, perseverative thinking, and body vigilance would mediate the relationship between trait anxiety and depersonalisation/felt sense of anomaly, bootstrapped mediation

analysis (Hayes, 2017) was conducted with each of the potential mediators to assess whether they individually mediated the relationship whereby anxiety leads to depersonalisation symptoms. Next, a hierarchical multiple regression was conducted to establish the amount of variance explained by trait anxiety and each of the three potential mediators when placed in a model together. All significance testing was two-tailed.

3. Results

Table 2 provides the mean, standard deviation, range, and the internal consistency for each measure.

3.1 Hypothesis 1a: There will be a significant relationship between trait anxiety and dissociation (depersonalisation)

Consistent with the hypothesis, simple linear regression indicated that STAIT-5 score was a significant predictor of CDS score, $F(1, 8206) = 1911, \beta = .435, p < .001, \text{adjusted } R^2 = .189$.

3.2 Hypothesis 1b: There will be a significant relationship between trait anxiety and dissociation (felt sense of anomaly)

As hypothesised, simple linear regression indicated that STAIT-5 score was a significant predictor of ĆEFSA score, $F(1, 1199) = 278, \beta = .434, p < .001, \text{adjusted } R^2 = .188$.

3.3. Hypothesis 2a: Cognitive appraisals of dissociation, perseverative thinking, and body vigilance will mediate the relationship between trait anxiety and depersonalisation.

Mediation analysis indicated that CAD-P score ($p < .001$), PTQ score ($p < .001$), and BVS score ($p < .001$) mediate the relationship between STAIT-5 score and CDS score when assessed individually.

Hierarchical multiple regression was then used to assess STAIT-5, CAD-P, PTQ, and BVS as predictors of CDS. These were added in the order listed, with the proposed mediator variables added in order of individual mediation effect size to produce four models, summarised in Table 3.

Model 1, containing only STAIT-5 score, accounted for 18.3% of the variance in CDS score, . STAIT-5 score was a significant positive predictor of CDS score.

Model 2, containing both STAIT-5 score and CAD-P score, accounted for 58.1% of the variance in CDS score. Both variables were significant positive predictors of CDS score.

Model 3, containing STAIT-5 score, CAD-P score, and PTQ score, accounted for 58.7% of the variance in CDS score. CAD-P score and PTQ score were both significant positive predictors of CDS score but STAIT-5 score was no longer a significant predictor of CDS score after controlling for CAD-P score and PTQ score.

Model 4, containing STAIT-5 score, CAD-P score, PTQ score, and BVS score, accounted for 58.7% of the variance in CDS score. CAD-P score and PTQ score were significant positive predictors of CDS score. After controlling for the three mediators, STAIT-5 score and BVS score were not significant predictors of CDS score.

3.4. Hypothesis 2b: Cognitive appraisals of dissociation, perseverative thinking, and body vigilance will mediate the relationship between trait anxiety and felt sense of anomaly.

Mediation analysis indicated that CAD-P score ($p < .001$), PTQ score ($p < .001$), and BVS score ($p < .001$) mediate the relationship between STAIT-5 score and ČEFSA score when assessed individually.

Hierarchical multiple regression was then used to assess STAIT-5 score, CAD-P score, PTQ score, and BVS score as predictors of ČEFSA score. These were added in the order listed, with the proposed mediator variables added in order of individual mediation effect size, to produce four models, summarised in Table 4.

Model 1, containing only STAIT-5 score, accounted for 18.6% of the variance in ČEFSA score. STAIT-5 score was a significant positive predictor of ČEFSA score.

Model 2, containing both STAIT-5 score and CAD-P score, accounted for 67.4% of the variance in ČEFSA score. CAD-P score was a significant positive predictor of ČEFSA score but STAIT-5 score was no longer a significant predictor of ČEFSA score after controlling for CAD-P score.

Model 3, containing STAIT-5 score, CAD-P score, and PTQ score, accounted for 68.3% of the variance in ČEFSA score. STAIT-5 score, CAD-P score, and PTQ score were all significant positive predictors of ČEFSA score.

Model 4, containing STAIT-5 score, CAD-P score, PTQ score, and BVS score, accounted for 68.4% of the variance in ČEFSA score. STAIT-5 score, CAD-P score and PTQ score were all significant positive predictors of ČEFSA score. After controlling for the other variables, BVS score was not a significant predictor of ČEFSA score. Therefore, this analysis supports the hypothesis that the relationship between trait anxiety and felt sense of anomaly is mediated by cognitive appraisals of dissociation and perseverative thinking. Whilst body vigilance was found to be a significant mediator when assessed independently, this effect was no longer significant when the other potential mediators were included in the model.

4. Discussion

This is a novel study investigating the relationship between trait anxiety and dissociation symptoms (depersonalisation and felt sense of anomaly) in adolescents and the hypothesised influence of cognitive appraisals of dissociation, perseverative thinking, and body vigilance as potential mediating factors on this relationship. As hypothesised, we found a significant relationship between trait anxiety and both types of dissociative experience. Our second hypothesis around mediating factors was partially met. When the potential mediators were included in a regression model, cognitive appraisals of dissociation and perseverative thinking were both shown to significantly mediate this relationship. However, body vigilance was not found to mediate the relationship between trait anxiety and either type of dissociative experience.

The moderate associations between trait anxiety and dissociation symptoms found in this age group are consistent with previous theory and research in adult clinical and non-clinical groups (Černis et al., 2022; Hunter et al., 2003), including supporting the proposed overlap between depersonalisation and felt sense of anomaly (Černis, Beierl, et al., 2021). This finding is also consistent with research on adolescents with panic disorder that shows around 50% of adolescents experience symptoms of dissociation (Kearney et al., 1997). It also develops the findings of Lee et al. (2012), that teacher-estimated childhood anxiety was associated with dissociation symptoms in adulthood, by demonstrating that anxiety symptoms and dissociation symptoms co-occur within adolescence.

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The hierarchical regression models indicate that trait anxiety, cognitive appraisals of dissociation, and perseverative thinking combine to form models which explain the majority of variance in depersonalisation and felt sense of anomaly. Notably, trait anxiety was a significant predictor for felt sense of anomaly but not for depersonalisation when cognitive appraisals of dissociation and perseverative thinking were included in the models. Furthermore, in comparison to the depersonalisation model, the mediators for felt sense of anomaly have larger coefficients, indicating a greater influence of cognitive appraisals of dissociation and perseverative thinking on felt sense of anomaly than on depersonalisation. These findings may indicate a contrast between the two subtypes of dissociation in their relationship to the two cognitive factors proposed as mediators, as well as in their relationship to trait anxiety, potentially reflecting that despite their high correlation, depersonalisation and felt sense of anomaly may be overlapping but somewhat distinct phenomenological experiences. Depersonalisation may involve more focus on experiences related to the body and 'selfhood', whilst felt sense of anomaly encompasses these within the context of a broader category of experiences characterised by a sense of 'strangeness', which may have a stronger association to experiences of anxiety. Therefore, this highlights the importance of specifying the precise construct under consideration when working in this field.

The mediating role of cognitive appraisals and perseverative thinking was consistent with cognitive-behavioural models of dissociation, demonstrating the importance of symptom interpretation in the persistence of dissociative symptoms. This aligns with previous studies showing a robust association between cognitive appraisals and felt sense of anomaly (Černis et al., 2022) and research showing that greater worry is associated with increased depersonalisation symptoms (Freeman et al., 2013). Negative appraisals and persistent thoughts of dissociative symptoms appear to contribute to the maintenance and exacerbation of these symptoms.

However, body vigilance was not found to be a significant mediator for the relationship between trait anxiety and either depersonalisation or felt sense of anomaly. Hunter et al.'s (2003) This replicates the findings of Černis et al. (2022), who also found that body vigilance did not mediate the relationship between anxiety and felt sense of anomaly in a group of adult survey respondents. The lack of mediating role suggests that the other factors

included in the maintenance cycle of Hunter et al. (2003) (e.g. catastrophic attributions for dissociative symptoms and increased anxiety) may be more important in the persistence of dissociative experiences than increased attention paid to bodily sensations.

It is important to acknowledge the strengths and limitations of the current study. Notably, it has investigated the relationship between anxiety symptoms and dissociation in adolescents, an age group with very little prior research in this area despite the high prevalence of anxiety disorders. It also explored two different constructs of dissociation, increasing robustness of findings and representing a wider range of dissociative symptoms. Because we recruited adolescents from a community population, we were able to recruit a large, mostly representative sample, e.g., the ethnicity and socioeconomic status demographics were broadly representative of the UK (Office for National Statistics, 2016). While the gender distribution in our sample reflects the much higher prevalence rates of anxiety symptoms and disorders in adolescent girls than boys (Sadler et al., 2018), findings may not be generalisable to the broader adolescent population. We chose to recruit from the community as symptoms of anxiety and dissociation appear to be sufficiently prevalent and dimensional rather than categorical in nature (Kihlstrom et al., 1994; Lebeau et al., 2012). Nevertheless, there are limitations in terms of generalisability to clinical populations and it would have been interesting to have obtained information regarding any past or current psychiatric diagnoses within this sample. In addition, the recruitment method required self-selection which may introduce response bias. Steps were taken to ensure the study was methodologically rigorous, for example the pre-registration of hypotheses. However, the cross-sectional design of the current study means that conclusions cannot be drawn about causality or the direction of correlational relationships. Because the measures had been developed for adults, we consulted with adolescents to ensure that questions were understandable in this age group and made minor adaptations to two measures based on this feedback. The Cronbach's α values reported from the present research ranged between .821 and .974, suggesting excellent internal consistency of the measures within this sample. Nevertheless, the use of measures designed specifically for adolescents would have been preferable to ensure accurate self-report of the assessed constructs and it may be difficult to accurately capture a complex construct, such as dissociation, via questionnaires delivered online. Finally, the high correlation (.896) between the two dissociation constructs

(depersonalisation and felt sense of anomaly) could indicate a limitation in the constructs representing different outcomes. However, the separation of these constructs was chosen for theoretical reasons, to allow comparison between them.

The present study suggests a range of additional avenues of research. A longitudinal design would accommodate causal examination of these associations and provide important information about the direction of relationship between anxiety and depersonalisation in adolescence, and the timeframe over which effects take place. There will also be other potential moderators that could explain the large amounts of variance unaccounted for by trait anxiety and the mediating variables in our models. For example, research with large adult non-clinical community and psychosis patient samples (Černis, Evans, et al., 2021; Černis et al., 2022) have found direct relationships linking felt sense of anomaly with alexithymia and affect intolerance. In addition, since a high level of state anxiety may escalate beyond the common fight or flight response into a state of experiencing dissociation (Schauer & Elbert, 2015), future research may wish to explore the relationship between state anxiety and dissociation symptoms in adolescents and to compare the constructs of state and trait anxiety. Since this study recruited adolescents from the community, further research could also examine these constructs in a clinically anxious population of adolescents. Should the findings be replicated in a clinical sample, the proposed theoretical model could be used to inform treatment of dissociative symptoms, for example by addressing the hypothesised cognitive pathway. (Černis et al., 2019)

In conclusion, the present study has established that a significant relationship exists between trait anxiety symptoms and dissociative symptoms (depersonalisation and felt sense of anomaly) in adolescents. This relationship is mediated by cognitive appraisals of dissociation and perseverative thinking. In addition, depersonalisation and felt sense of anomaly have been demonstrated as highly correlated constructs which may have slightly different underlying mechanisms. Future research should therefore specify the exact dissociation construct being assessed and expand on the work presented here by examining the direction of the relationship between anxiety and dissociation in a clinical adolescent population and identifying other feasible mediators of this relationship in this group.

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Table 1*Sample demographic characteristics*

	<i>n</i> = 1211
Age in years, mean (<i>SD</i> , range)	16.4 (1.29, 13.00-18.98)
Gender, <i>n</i> (%)	
Male	275 (22.7)
Female	734 (60.6)
Other	154 (12.7)
Unspecified	48 (4.0)
Ethnicity, <i>n</i> (%)	
White (any background)	1037 (85.6)
Black (any background)	17 (1.4)
Asian (any background)	62 (5.1)
Mixed (any background)	82 (6.8)
Any other ethnic group	6 (0.5)
Ethnicity not stated	7 (0.6)
Socio-economic status, <i>n</i> (%)	
Professional (Class 1 – 3)	778 (64.2)
Other employed (Class 4 – 9)	313 (25.8)
Other (e.g., unemployed, occupation/employment status unspecified, deceased)	120 (9.9)

Note: Socio-economic status was calculated using the CASCOT tool (Warwick Institute for Employment Research, 2018).

Table 2*Descriptive Statistics for all measures*

Measure	<i>n</i>	<i>M</i>	<i>SD</i>	Range	Cronbach's α
STAIT-5 total score	1211	16.3	3.4	5-20	.821
CDS total score	1211	47.6	22.2	0-112	.949
ČEFSA total score	1201	68.2	31.2	0-140	.974
CAD-P total score	1211	26.8	12.4	0-52	.919
PTQ total score	1209	58.2	10.9	4-60	.937
BVS total score	1209	16.2	6.5	1.2-31.1	.912

Note: STAIT-5 = 5-Item Trait Anxiety Scale, CDS = Cambridge Depersonalisation Scale ČEFSA = Černis Felt Sense of Anomaly Scale, CAD-P = Cognitive Appraisals of Dissociation in Psychosis Scale, PTQ = Perseverative Thinking Questionnaire, BVS = Body Vigilance Scale.

Table 3*Correlation Matrix containing All Variables*

	STAIT-5 Score	CDS Score	ČEFSA Score	CAD-P Score	PTQ Score	BVS Score
STAIT-5 Score	1					
CDS Score	.427**	1				
ČEFSA Score	.434**	.896**	1			
CAD-P Score	.516**	.761**	.821**	1		
PTQ Score	.736**	.559**	.598**	.651**	1	
BVS Score	.272**	.245**	.242**	.283**	.270**	1

Note: STAIT-5 = 5-Item Trait Anxiety Scale, CDS = Cambridge Depersonalisation Scale, ČEFSA = Černis Felt Sense of Anomaly Scale, CAD-P = Cognitive Appraisals of Dissociation in Psychosis Scale, PTQ = Perseverative Thinking Questionnaire, BVS = Body Vigilance Scale.

** = correlation is significant at the 0.01 level (2-tailed).

Table 4*Summary of Hierarchical Regression Analysis for Variables Predicting CDS Score*

Variable	Model 1			Model 2			Model 3			Model 4		
	β	t	p	β	t	p	β	t	p	β	t	p
STAIT-5 Score	.428	40.4	<.001	.047	2.17	.030	-.021	-0.75	.456	-.025	-.920	.358
CAD-P Score				.737	33.9	<.001	.690	28.2	<.001	.686	27.8	<.001
PTQ Score							.125	4.05	<.001	.125	4.03	<.001
BVS Score										.024	1.25	.212
Adjusted R ²		.183			.581			.587			.587	

Note: STAIT-5 = 5-Item Trait Anxiety Scale, CDS = Cambridge Depersonalisation Scale, CAD-P = Cognitive Appraisals of Dissociation in Psychosis Scale, PTQ = Perseverative Thinking Questionnaire, BVS = Body Vigilance Scale.

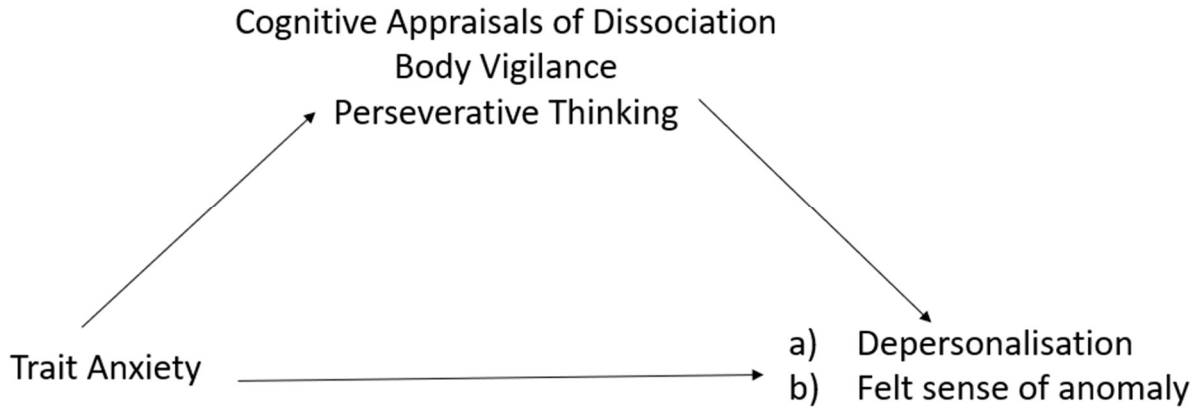
Table 5*Summary of Hierarchical Regression Analysis for Variables Predicting ČEFSA Score*

Variable	Model 1			Model 2			Model 3			Model 4		
	β	t	p	β	t	p	β	t	p	β	t	p
STAIT-5	.432	16.4	<.001	.015	.768	.443	-.073	-3.03	.003	-.076	-3.13	.002
Score												
CAD-P Score				.813	42.2	<.001	.754	35.1	<.001	.753	34.7	<.001
PTQ Score							.161	5.90	<.001	.162	5.92	<.001
BVS Score										.007	.422	.673
Adjusted R ²		.186			.674			.683			.684	

Note: STAIT-5 = 5-Item Trait Anxiety Scale, ČEFSA = Černis Felt Sense of Anomaly Scale, CAD-P = Cognitive Appraisals of Dissociation in Psychosis Scale, PTQ = Perseverative Thinking Questionnaire, BVS = Body Vigilance Scale.

Figure 1

The Proposed Theoretical Model



Note: The proposed theoretical model being tested in the present study, whereby trait anxiety is proposed to have a significant relationship with depersonalisation and felt sense of anomaly, and cognitive appraisals of dissociation, perseverative thinking, and body vigilance are proposed to mediate this relationship.