The Associations between Autistic and ADHD Traits and Well-being of Secondary School Students in South Wales

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Authors' contributions

This work was carried out in collaboration among all authors. Author APS designed the study and wrote the protocol and online survey. He also conducted statistical analyses and wrote the final draft of the manuscript. Author JG contributed to the analysis and wrote initial drafts of the paper. Author AJ was responsible for the design and collection of the data. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: There has been considerable research on Autism and ADHD, which are recognized as significant special educational needs. Many studies use samples which have been diagnosed with these conditions, but there is also a growing trend to focus on these traits among community populations rather than just among the individuals diagnosed. Recent research has examined the well-being of students using the "well-being process" framework. The present study examined the association between well-being, measured by the Well-being Process Questionnaire and the Strengths and Difficulties Questionnaire, and the autistic and ADHD traits of secondary school students.

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Aims: The study first examined the associations between autistic and ADHD traits in secondary school students. The second aim was to examine the associations between well-being outcomes and these traits. Finally, analyses controlling for established predictors of well-being examined whether associations between autism and ADHD traits and well-being outcomes remained significant.

Methodology: An online survey was carried out. The participants were 155 students from a Welsh Secondary School and represented various year groups. Correlations and regressions were conducted to examine associations between variables.

Results: Autistic and ADHD traits were found to be significantly correlated. Both sets of traits were also significantly correlated with well-being outcomes. When autistic and ADHD traits were included in the same regression, ADHD was found to be associated with most outcomes, whereas autistic traits were only associated with hyperactivity, peer problems and reduced prosocial behaviour. When established predictors of well-being were also included in the model, ADHD traits were only associated with hyperactivity and autism with prosocial problems and hyperactivity. There were no significant effects on physical health.

Conclusion: Autistic and ADHD traits overlap. Univariate analyses show significant associations between these traits and well-being. However, when established predictors of well-being were included in the analyses, only hyperactivity and reduced prosocial behaviour were still associated with autistic and ADHD traits. The psychosocial profiles of autism and ADHD may help design interventions to increase well-being. For example, both autism and ADHD are associated with high stress and poor coping, both of which may be improved by training.

1. INTRODUCTION

Autism and Attention Deficit Hyperactivity Disorder (ADHD) are recognized as primary special educational needs. The present study aimed to use the well-being process framework to examine associations between autistic and ADHD traits and well-being. Such a study is important because most studies from the literature on autism, ADHD and well-being have not used a holistic approach. This is the first study using this approach, and the next section describes the well-being process model.

1.1 What is Well-being?

Well-being is a broad term encompassing a wide range of things. According to the Oxford Dictionary, well-being is "The state of being or doing well in life; happy, healthy, or prosperous condition; moral or physical welfare." Well-being is closely linked to 'health' and, as a construct, cannot be confused just with happiness. It encompasses many things, and thus well-being impacts not just the moods but an individual's overall functioning. Well-being as a construct is complex and not just limited to particular aspects of health; thus, understanding the essence of well-being is crucial [1,2]. The American Psychological Association [3] has defined well-being "as a state of happiness and contentment, with low levels of distress, overall good physical health, mental health and outlook, or good quality of life". The WHO [4] has defined positive mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the everyday stresses of life, can work productively and fruitfully, and can contribute to his or her community".

Well-being has different dimensions and thus is of various types - subjective, objective, psychological, and emotional well-being. There is an increasing demand for research in this area that extends beyond the study of children's disorders, deficits and disabilities.

1.2 The Well-being Process Model

The Well-being Process model attempted to do more than just measure the subjective well-being outcomes such as happiness, life satisfaction and positive affect [5]. It also included negative outcomes such as perceived stress, anxiety and depression because research has shown that positive and negative emotions do not reflect end points of a single continuum.

The Well-being Process Questionnaire [6,7] was developed from the DRIVE (Demands Resources Individual Effects) model [8,9]. This model was developed for use in occupational settings but

can also be applied to education. The DRIVE model was designed to allow for additional predictor and outcome variables. It focused on different factors which predict mental health mediators and outcomes, namely demands, resources (support and control), and individual factors such as coping styles. The Well-being Process Questionnaire (W.P.Q.) included more predictor variables (e.g. psychological capital) and positive outcomes (happiness, life satisfaction and positive affect).

There is extensive literature using the Well-being Process Questionnaires with students [10-21], and this research has generally replicated the effects of the established predictors and added new predictors (e.g. workload; work-life balance; daytime sleepiness; flow) and outcomes (e.g. flourishing; physical health). In the case of a study of autism and ADHD, it was apparent that other outcomes also needed to be considered, and these were obtained using the Strengths and Difficulties Questionnaire [22].

1.3 The Strengths and Difficulties Questionnaire (S.D.Q.)

The Strengths and Difficulties Questionnaire (S.D.Q.; 22) is a 25-item behavioural screening questionnaire. The S.D.Q. covers five domains, many susceptible to autism and ADHD.

1. Emotional symptoms
2. Conduct problems
3. Hyperactivity/ Inattention
4. Peer relationship problems
5. Prosocial Behaviour

It is essential to have a multifaceted approach to well-being, and issues related to prosocial behaviour and peer relationships make up a significant part of the lives of children and adolescents with autism and ADHD. For example, 50-70% of children with ADHD experience peer relationship problems that continue into adolescence.

1.4 What is Autism?

Autism or autism spectrum disorders are a set of neurodevelopmental disorders that commonly begin at birth or in childhood. Significant impairments in social and communication behaviours and restricted activities and interests characterize autism. Autistic traits exist on a continuum, and 1 in 54 children is diagnosed with Autism every year [23]. In the last five decades,

the prevalence of autism has increased tenfold and is increasingly becoming more common. In the early 2000's approximately 1% of the population in the United Kingdom (U.K.) had an autism spectrum condition [24,25]. Recent estimates show that around 100,000 children and 1,000,000 adults in the U.K. have autism. Researchers have found [26] that 1 in 57 children have autism, a figure much higher than previous research. There are over 160,000 autistic pupils in schools across England. Over 70% are in mainstream schools, with the rest in specialist education, home educated or out of education. It was found in a study that the recorded incidence of autism witnessed a 787% increase over 20 years. The C.D.C. has also found a sharp increase in the prevalence of autism, from 1 in 150 children having autism in 2000 to 1 in 44 children with autism in 2018 [27].

1.5 Measuring Autistic Traits

Autism, a neurodevelopmental disorder, is characterized by various signs and symptoms referred to as traits. Some autistic traits may be prominent, but sometimes they may be hard to distinguish from similar traits or behaviours. Autism has always fallen into the clinical condition category; however, in recent years [28], there has been a greater focus on traits and not just clinical diagnosis. When it comes to measuring traits, specifically autistic traits, then the autism spectrum quotient (A.Q.) is commonly used in research and clinical practice. The A.Q. was designed by Baron Cohen and colleagues [29] for short and easy use. Initially, it was designed only for adults, but over time, versions were also established for children and teenagers [30]. It was developed as a self-report scale with 50 items, and then shorter versions were developed [31].

1.6 Attention Deficit Hyperactivity Disorder (ADHD)

ADHD is defined by analyzing behaviour. Those with ADHD show a constant pattern of inattention and/or hyperactivity–impulsivity that interferes with their development and day-to-day functioning. A survey of 10,438 children between the ages of 5 and 15 in the U.K. found that 0.85% of girls and 3.62% of boys had ADHD [32]. The average global prevalence of ADHD is 5%, ranging from 2-7% [33]. Different countries, organizations, and professionals have different diagnostic thresholds for ADHD, making it difficult to get a precise level of incidence.

Research in the U.K. showed a prevalence of 11% when assessing the symptoms rather than impairment. When impairment was examined, 6.7% had a moderately low impairment, 4.2% a moderate impairment, and 1.4% a severe, pervasive impairment. [34]. The gender split is approximately 4:1 boys to girls, suggesting that female ADHD could be underdiagnosed.

Examples of the behaviours that typify ADHD inattention in children and adolescents are shown below [35]:

- Failure to give close attention to detail, making careless mistakes.
- Trouble holding attention.
- Does not seem to listen when spoken to.
- Does not follow instructions and fails to finish things.
- Failure to organize tasks and activities.
- Avoids or is reluctant to do tasks that require mental effort.
- Loses things necessary for completing tasks and activities.
- Easily distracted
- Often forgetful.

ADHD is also associated with hyperactivity/impulsivity, examples of which are shown below:

- Fidgets, taps hands or feet and squirms in their seat.
- Leaves seat when remaining seated is expected.
- Runs about when it is not appropriate.
- Unable to take part in leisure activities quietly.
- Acting as if "driven by a motor".
- Excessive talking.
- Blurts out an answer before a question has been finished.
- Has trouble waiting their turn.
- Interrupts others.

The above traits may be present at a level which does not reach the diagnostic threshold. It is always often the case that the symptoms may reflect other disorders. This point is illustrated in the next section, which covers the overlap between autistic and ADHD traits.

1.7 Possible Overlap between ADHD and AQ

ADHD and autism, apart from being neurodevelopmental conditions, also have something else in common; recent research has found that they co-occur [36-38]. The rate at which co-occurrence occurs varies between 14% and 78%. In terms of cognitive and developmental domains, similar impairments are shared by A.S.D. and ADHD [39]. Neuropsychological studies also suggested that those with A.S.D. and ADHD share common structural brain abnormalities [40]. Clinical samples have had high comorbidity rates between autism and ADHD. A study conducted on the general population showed that there is indeed an overlap between ADHD traits with autistic traits. This co-occurrence was mostly found in attention and communication skills.

1.8 Aims and Objectives

1. The first aim of this research was to evaluate the associations between autistic and ADHD traits and the well-being of secondary school students. The objectives were to carefully analyze whether different traits predict a student's level of well-being.
2. The second aim was to replicate associations between established predictors and well-being outcomes.
3. The final aim was to determine whether univariate associations between autistic and ADHD traits and well-being outcomes remain significant when established predictors of the outcomes are covaried.

2. METHODS

The study took place in July (1-10 July) 2022. An online self-report survey methodology was used, with the Qualtrics platform delivering the questionnaire.

2.1 Participants

The participants were students at a secondary school in South Wales. One hundred and fifty-five students took part in the study. The year groups and gender distribution are shown below:

Year 7- N=2
Year 8- N=19
Year 9- N=34
Year 10- N=15
Year 11- N=58
Year 12- N=12
Year 13- N=15

Males- N=90- 58.06%
Females- N=65- 41.93%

2.2 Survey

The survey created had a mix of variables to understand associations between Autistic and ADHD traits, well-being and strengths and difficulties. The predictor variables were the total scores of the AQ-10 and the sub-score from part A of the ADHQ self-report scale, work-life balance, social support, student stressors, sleepiness, positive coping, flow, rumination, negative coping and psychological capital. The dependent variables were positive well-being, negative well-being, physical health, flourishing, emotional problems, hyperactivity, conduct, peer relationships and prosocial behaviour.

2.3 Measures

The survey included the short form of the Well-being Process Questionnaire (shown in the Appendix), the Autism Spectrum Quotient (AQ10), the ADHD Self Report Scale, and the Strengths and Difficulties Questionnaire.

2.3.1 AQ-10

The autism spectrum quotient (30) is a diagnostic questionnaire designed to measure the expression of autism traits in an individual based on his/her self-assessment. It was initially a 50-item questionnaire, but shorter versions have been created. A 10-item scale was used here [41]. It consists of a 4-point Likert scale ranging from 'definitely agree' to 'definitely disagree'. Scores range from 0-10, with scores of 6 and over reflecting autistic cases.

2.3.2 ADHQ

The ADHD self-report scale, known as the ASRS, was devised in collaboration with the World Health Organization [42]. It has been used as a diagnostic tool and consists of 18 questions. The first part of the scale has six questions that stand out in terms of being the most predictive of ADHD symptoms. It uses a five-point Likert scale, and the participants were asked to answer each question by rating on the Likert scale ranging from never to very often. Part A was used here, and scores ranged from 0-6. A score of 4 or more suggests that the person has symptoms consistent with an ADHD case.

2.3.3 Strengths and Difficulties Questionnaire (S.D.Q.)

The Strengths and Difficulties Questionnaire is an abnormal behaviour screening questionnaire.

It comprises 25 items spread over five subscales- emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour. The self-report measure adolescents use contains the same items, but they are worded differently, making it easier to understand [22]. The items are based on a 3-point Likert scale ranging from untrue to undoubtedly true. Responses are dichotomized, and then the items in each subscale are added to give the score for that scale.

2.3.4 Short-Form Student W.P.Q.

The present short-form student Well-being Process Questionnaire was adapted from the original student W.P.Q. [7]. The new questionnaire is shown in the Appendix. The predictor variables were student stressors, negative coping, workload, work-life balance, daytime sleepiness, psychological capital, social support, positive coping and flow. The dependent variables were positive well-being, negative well-being, physical health and the extent to which the person was flourishing.

2.4 Analysis Strategy

Descriptive statistics of all the variables were initially calculated. The correlation between A.Q. and ADHD scores was then calculated, as were the correlations between these variables and the other predictor variables and outcomes. Regression analyses were then conducted. The first included A.Q. and ADHD as predictors. The second set of regressions included the established predictors from the W.P.Q.; finally, the regressions included A.Q., ADHD and the established predictors from the W.P.Q. to determine whether any associations between A.Q., ADHD and well-being outcomes remained significant when the established well-being predictors were covaried.

3. RESULTS

3.1 Descriptive Statistics

The descriptive statistics for the predictor variables and outcomes are shown in Table 1. The scores are comparable to previous findings and show considerable variation within each measure. The amount of missing data was also small.

3.2 Associations between the A.Q. and ADHQ Scores and the Predictors and Outcomes

The correlations between Autistic and ADHD traits and the outcome variables are shown in Table 2. As predicted, the autism and ADHD scores were significantly correlated. Both the autism and ADHD scores were correlated with many of the outcomes, the general profile being lower well-being in those with high autism and ADHD scores. Table 3 shows the correlations between autistic and ADHD traits and the well-being predictor variables. Again, autistic and ADHD were significantly correlated with established predictors of well-being. The following section addressed the issue of shared variance by including correlated predictors in the same linear regression model. The first set of analyses included autistic and ADHD traits as predictors in the same model. The results are shown in Table 4 and summarised below.

3.3 Autistic and ADHD as Predictors of Well-being Outcomes

3.3.1 Positive well-being

The regression showed that the ADHD score but not the A.Q. score was negatively associated with positive well-being.

3.3.2 Negative well-being

The ADHD score but not the A.Q. score, was positively associated with negative well-being.

3.3.3 Flourishing

The regression showed that the ADHD score but not the A.Q. score was negatively associated with flourishing.

3.3.4 Emotional Problems

The regression analysis showed that the ADHD score but not the A.Q. score was positively associated with emotional problems.

3.3.5 Conduct problems

The regression showed that the ADHD score but not the A.Q. score was positively associated with conduct problems.

3.3.6 Hyperactivity

The regression analysis showed that ADHD score was positively associated with hyperactivity. The A.Q. score was also associated with hyperactivity.

3.3.7 Peer problems

The regression analysis showed that there were significant associations between both the ADHD score and A.Q. score with peer problems.

3.3.8 Prosocial behaviour

The regression analysis showed no significant association between the ADHD score and prosocial behaviour. In contrast, the A.Q. score was negatively associated with prosocial behaviour. In summary, ADHD traits were associated with all the outcomes except prosocial behaviour. In contrast, the A.Q. scores were only associated with hyperactivity, peer problems and prosocial scores.

3.4 Associations between the Established Predictors of the Well-being Process Model and Outcomes

The next series of regressions examined associations between the established predictors of the well-being process model and well-being and Strengths and Difficulties outcomes. The results are summarised in Table 5. They largely confirm previous findings with positive well-being outcomes being positively associated with positive predictors (e.g. Psychological capital) and negatively with negative predictors (e.g. Stressful experiences; Negative coping).

The S.D.Q. outcomes showed a different profile of associations. Conduct, peer problems and prosocial behaviour were all associated with coping styles. Emotional problems showed a similar pattern to the negative well-being outcomes, and they were also more frequent in female participants. This association was also true for hyperactivity, which had associations with being sleepy during the day and reduced flow.

The next set of analyses examined whether the effects of ADHD and autistic traits remained significant when the established well-being predictors were included in the linear regression model.

3.5 Established Predictors, Autistic and ADHD Traits

3.5.1 Predictors of positive well-being

Positive well-being was negatively associated with stressful experiences (Beta = -0.235, s.e. = 0.073, t = -3.227, p = 0.002) and positively associated with psychological capital (feeling optimistic and having high self-esteem and self-efficacy: Beta =0.478, s.e. = 0.077, t = 6.23, p <0.001). Neither the A.Q. nor ADHD scores were significantly associated with positive well-being (A.Q.: p =.500; ADHD: p =0.690).

3.5.2 Predictors of negative well-being

Negative well-being was negatively associated with psychological capital (feeling optimistic and having high self-esteem and self-efficacy: Beta = -0.400, s.e = 0.081, t = -4.904, p < 0.001) and positively associated with negative coping (Beta = 0.166. s.e = 0.075, t = 2.227, p = 0.028). Neither ADHD nor A.Q. scores were significantly associated with negative well-being (A.Q.: p = 0.780, ADHD: p = 0.233).

3.5.3 Predictors of flourishing

Flourishing was positively associated with psychological capital (Beta = 0.437, s.e = 0.079, t = 5.564, p < 0.001) and being immersed in study (Beta = 0.256, s.e = 0.082, t = 3.142, p = 0.002)

and negatively associated with exposure to stressors (Beta = -0.243, s.e = 0.075, t = -3.260, p = 0.001). Neither A.Q. nor ADHD scores were significantly associated with flourishing (A.Q.: p = 0.796, ADHD: p = 0.812).

3.5.4 Predictors of emotional problems

Emotional problems were positively associated with negative coping (Beta = 0.326, s.e = 0.084, t = 3.898, p< 0.001) and negatively associated with psychological capital (Beta = - 0.292, s.e = 0.089, t = - 3.283, p = 0.001). Neither ADHD nor A.Q. scores were significantly associated with emotional problems (ADHD: p = 0.492, A.Q.: p = 0.601).

3.5.5 Predictors of conduct problems

Conduct problems were negatively associated with positive coping (Beta = - o.204, s.e = 0.057, t = - 3.583, p< 0.001). A.Q. scores were associated with conduct, but ADHD scores were not (A.Q.: p <0.05 1-tail, ADHD: p = 0.821).

3.5.6 Predictors of hyperactivity

Hyperactivity was not significantly associated with any predictors from the W.P.Q. A.Q. scores were significantly associated with hyperactivity (A.Q.: p < 0.05, 1-tail). ADHD scores were also significantly associated with hyperactivity (ADHD: p < 0.001).

Table 1. Descriptive statistics

	N	Mean	Std. Error	Std. Deviation
Positive well-being	154	5.98	.202	2.501
Negative well-being	152	5.07	.233	2.879
Stressful experiences	154	5.21	.229	2.837
Social Support	154	6.35	.232	2.885
Positive coping	153	5.82	.211	2.614
Negative Coping	152	5.77	.220	2.712
Psychological Capital	153	5.95	.200	2.472
Work-Life Balance	151	5.10	.234	2.877
Workload	152	5.55	.217	2.681
Sleepy during the day	152	6.46	.218	2.686
Physical Health	150	5.91	.177	2.167
Flow	149	5.50	.177	2.158
Flourishing	151	5.65	.195	2.395
Rumination	149	4.52	.214	2.606
Total ADHD score	155	2.90	.143	1.777
Total A.Q. score	155	4.38	.161	2.004
Conduct	146	2.60	.122	1.469
Hyperactivity	145	5.21	.204	2.453
Emotional problems	147	4.65	.230	2.789
Peer problems	147	2.96	.165	2.001
Prosocial behaviour	148	7.18	.162	1.965

Table 2. Correlation between Autistic and ADHD traits and Outcome measures

	Autistic Traits	ADHD traits
ADHD traits	0.407**	
Conduct	0.245**	0.159
Hyperactivity	0.386**	0.614**
Emotional problems	0.244**	0.416**
Peer problems	0.345**	0.329**
Prosocial behaviour	-0.186*	-0.038
Positive well-being	-0.191*	-0.366**
Negative well-being	0.141	0.401**
Flourishing	-0.195*	-0.322**
Physical health	-0.103	-0.159

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

Table 3. Correlation between autistic and ADHD traits and predictor variables

	Autistic traits	ADHD traits
Stressors	0.200*	0.357**
Social support	-0.053	-0.106
Positive coping	-0.261	-0.242**
Negative coping	0.064	0.466**
Psychological capital	-0.222**	-0.357**
Work-life balance	0.096	0.205*
Sleepiness	0.187*	0.348**
Flow	-0.174*	-0.294**
Rumination	0.035	-0.151

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

Table 4. Significant predictors in regressions with Autistic (A.Q.) and ADHD predictor variables and Well-being and S.D.Q. outcomes

Outcome	Predictors	Beta	p-value
Positive well-being	ADHD	-0.486	<0.001
Negative well-being	ADHD	0.663	<0.001
Flourishing	ADHD	-0.397	0.001
Strengths and Difficulties Outcomes			
Conduct	ADHD	0.169	<0.05
Hyperactivity	ADHD	0.782	<0.001
	AQ	0.277	<0.005
Emotional Problems	ADHD	0.611	<0.001
Peer problems	ADHD	0.282	<0.005
	AQ	0.284	<0.005
Prosocial behaviour	AQ	-0.205	<0.05

3.5.7 Predictors of peer problems

Peer problems were negatively associated with positive coping (Beta = - 0.140, s.e = 0.070, t = -1.989, p = 0.049) and positively associated with negative coping (Beta = 0.141, s.e = 0.072, t = 1.967, p = 0.051). Neither A.Q. nor ADHD scores were significantly associated with peer problems (A.Q.: p = 0.780, ADHD: p = 0.233).

3.5.8 Predictors of prosocial behaviour

Prosocial behaviour was predicted by being female (Beta =0.727, s.e. = 0.338, t=2.153 p =0.033) and negative coping (Beta =0.191, s.e. = 0.079, t=2.413 p =0.017). AQ scores but not ADHD scores were significantly negatively associated with prosocial behaviour (A.Q.: p <0.05, 1-tail, ADHD: p =0.927).

Table 5. Predictors of well-being and strengths and difficulties outcomes

Outcome	Predictors	Beta	p-value
Positive well-being	Stressful experiences	-0.229	0.002
	Psychological capital	0.476	<0.001
Negative well-being	Stressful experiences	0.371	<0.001
	Negative coping	0.193	0.007
	Rumination	-0.153	0.018
Flourishing	Stressful experiences	-0.238	0.001
	Psychological capital	0.433	<0.001
	Flow	0.251	0.002
Strengths and Difficulties Outcomes			
Conduct	Positive coping	-0.219	<0.001
Hyperactivity	Positive coping	-0.163	0.046
	Negative coping	0.188	0.021
	Sleepy during the day	0.178	0.015
	Flow	-0.199	0.035
Emotional Problems	Gender	1.044	0.004
	Social Support	-0.145	0.032
	Negative Coping	0.344	<0.001
	Psychological capital	-0.299	0.001
Peer problems	Stressful experiences	0.147	0.046
	Positive coping	-0.167	0.019
	Negative coping	0.148	0.031
Prosocial behaviour	Gender	0.747	0.029
	Negative coping	0.195	0.009

4. DISCUSSION

The present study examined associations between autistic and ADHD traits and well-being. Previous research has usually investigated those with a diagnosis of autism or ADHD. However, many children and adolescents may have these characteristics but have not been formally diagnosed. It may also be the case that levels of these traits below the diagnostic threshold may have behavioural effects. Initial correlational analyses showed that these traits were associated with well-being and S.D.Q. outcomes, with the general profile being that they were related to increased negative well-being (lower positive well-being).

These initial analyses also confirmed that autistic and ADHD traits are significantly correlated. When the two factors were included in the same regression, it was found that ADHD traits were associated with all the outcomes except prosocial behaviour. In contrast, the A.Q. scores were only associated with hyperactivity, peer problem and prosocial scores.

The autistic and ADHD traits were also associated with factors which predicted well-being and S.D.Q. outcomes. This association meant that results attributed to autistic or ADHD could reflect their shared variance with established predictors such as stressors, psychological capital and coping. Regression analyses showed the usual significant effects of the established well-being predictors on the well-being outcomes. The S.D.Q. outcomes were also significantly associated with the established predictors, especially coping skills.

Further analyses included the established predictors in regressions, which also had autistic and ADHD traits in the model. These analyses revealed no significant effects of autistic and ADHD traits on the well-being outcomes. However, the analyses of the S.D.Q. outcomes showed significant associations between ADHD traits and conduct problems and hyperactivity. Autistic traits were associated with conduct problems, hyperactivity and poor prosocial behaviour.

The current approach to well-being uses a holistic model with positive and negative outcomes and predictors. This approach has advantages over approaches which only consider well-being in terms of positive outcomes such as happiness [43,44]. The significance of the established predictors of well-being also gives one more confidence in the absence of effects of autistic and ADHD traits.

The well-being process model allows for the addition of other predictors and outcomes. Previous studies [45] suggest that outcomes measured by the S.D.Q. are more typical of the behaviour of those with autism and ADHD, and they were included in the present study. The results showed that hyperactivity, conduct and prosocial behaviours are sensitive measures when investigating autistic and ADHD traits.

The associations between autistic and ADHD traits and the established predictors of well-being have implications for prevention and management. For example, stress management and training in developing coping skills are well established and could plausibly be used to reduce autistic or ADHD traits.

The present research can now be extended to address other issues in this area. For example, autistic and ADHD traits can make individuals more susceptible to mental health problems. Future surveys should, therefore, include an assessment of anxiety and depression. The role of possible mediators, such as perceived stress and life satisfaction, also needs to be addressed in future research. The present study also focused on secondary school students, and it is essential to examine whether the present findings are observed in younger (primary school children) and older (university students and adults) groups.

5. CONCLUSIONS

The present study examined the associations between autistic and ADHD traits, well-being and S.D.Q. outcomes. Both autistic and ADHD traits were initially correlated with the outcomes and predictors of well-being. Autistic and ADHD traits were also significantly correlated. When autistic and ADHD traits were included in the same analyses, it was the ADHD traits that had significant associations. Established predictors of well-being were found to have their usual associations with outcomes. When the established predictors and the autistic and ADHD traits were included in the same analyses, ADHD was associated with conduct problems and hyperactivity. Autistic traits were associated with conduct problems, hyperactivity and poor prosocial behaviour.

CONSENT AND ETHICAL APPROVAL

The research was carried out with the informed consent of the participants and the approval of

the Ethics Committee, School of Psychology, Cardiff University. (EC20.03.10.5987R2A3).

The questionnaire included a consent form describing the study and informing participants that it was entirely up to them to participate.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

The Short Form Student Well-being Questionnaire

STUDENT WPQ SHORT-FORM
1.   Year of study:

2.   Gender: Male [1]
                              Female [2]

Please answer the following questions about how you have felt and behaved in the last six weeks:

3.   I have been experiencing positive feelings (e.g. feeling happy, satisfied with life, in good spirits; feeling good about relationships; being able to relax; and feeling energetic and interested).

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

4.   I have been experiencing negative feelings (e.g. feeling stressed; feeling anxious or depressed; feeling physically or mentally tired, and feeling emotionally drained).

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

5.   I have had stressful experiences (e.g. time pressure; academic dissatisfaction; loneliness; and friendship problems).

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

6.   I feel that I have the social support I need (e.g. people to talk to, support for financial needs, friendship, and someone to discuss problems with).

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

7.   When I'm in a stressful situation, I try and solve the problem or look for support from others.

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

8.   When I am in a stressful situation, I blame myself or wish for things to improve or avoid the problem.

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

9.   I am optimistic, confident in my ability to solve problems, and I am generally satisfied with myself.

Rated on a scale from 1=Strongly Disagree to 10=Strongly agree

10.   Does life outside of school interfere with your school work, and school interferes with other aspects of your life?

Rated on a scale from 1=Not at all to 10=Definitely Yes

11.   Do you have a high workload that makes you feel stressed and could affect how efficiently you do your work?

Rated on a scale from 1=Not at all to 10=Definitely Yes

12.   How often do you feel sleepy during the day?

Rated on a scale from 1=Never to 10=All the time

13.   In general, how would you rate your physical health?

Rated on a scale from 1=Extremely poor to 10=Extremely good

14.   To what extent do you feel immersed in your academic work and have full involvement and engagement in your studies?

Rated on a scale from 1=Not at all to 10=Very much so

15.   To what extent do you feel you are thriving or flourishing (e.g. being successful, feeling that life is going well, and having a sense of belonging)?

Rated on a scale from 1=Not at all to 10=Very much so

16.   If you think about school work in your free time does it have a negative effect (e.g. makes you tense and troubled), or does it help to solve problems?

Rated on a scale from 1=Negative effect to 10=Positive effect

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