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

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. ~~cases.~~ 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.

Aims: The study first examined the associations between autistic and ADHD traits in secondary school students. The second aim was to examine the associations betweenwell-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-beingwere 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.

Keywords: Autistic Traits; ADHD Traits; Well-being Process Questionnaire; Strengths and Difficulties Questionnaire; Welsh secondary school students.

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 ~~the~~ most studies fromliterature on autism, ADHD and well-being haves ~~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 health or a particular aspect; thus, understanding the essence of well-being is crucial(1,2).TheAmerican 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 TheWell-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 (WPQ)included more predictor variables (e.g. psychological capital) and positive outcomes (happiness, positive affect 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 (SDQ)

TheStrengths and Difficulties Questionnaire (SDQ) is a 25-item behavioural screening questionnaire. The SDQ covers five domains, many susceptible to autism and ADHD.

1. Emotional systems
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

Comment [PK1]: Particular aspect of? Perhaps '..not just limited to particular aspects of health' will be better

Comment [PK2]: This description of SDQ requires the appropriate in text citation, any of the works by Goodman (1997) and later.

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 CDC 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 (AQ)is commonly used in research and clinical practice. TheAQ was designed by Baron-Cohenand colleagues (29) forshort 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 ADHD

ADHD is defined by analyzing behaviour. Those with ADHD show a constant pattern of inattention and/orhyperactivity–impulsivity that interferes with their developmentand 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 boyshad ADHD (32). The average global prevalence of ADHD is 5%, ranging from2-7% (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 UK showed a prevalence of 11% when ~~asking about the~~assessing 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.
- Doesnot seem to listen when spoken to.
- Does not follow instructions and fails to finish things.
- Failureto 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.

Comment [PK3]: Provide full form in the first mention of ADHD

- 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.

1.7PossibleOverlap betweenADHD and AQ

ADHDand 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 occursvaries between 14% and 78%. In terms of cognitive and developmental domains, similar impairments are shared by ASD and ADHD (39). Neuropsychological studies also suggested that those with ASD 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. Thisco-occurrence was mostly found in attention and communication skills.

1.8Aims 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 (1-10July) 2022. An online survey methodology was used, with the Qualtrics platform delivering the questionnaire. The research was carried out with the informed consent of the participants and the approval of the Ethics Committee, School of Psychology, CardiffUniversity.(EC20.03.10.5987R2A3). Thequestionnaire included a consent form describing the study and informing participants that it was entirely up to them to participate.

Comment [PK4]: This does not match the disclaimer given at the end of the manuscript describing the study taking place during COVID lockdowns in 2020.

Comment [PK5]: Please also indicate that the survey was entirely self report

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=59
Year 12- N=12
Year 13- N=15

Comment [PK6]: Wouldn't years 10 and later be part of 'High School' and not 'Secondary School'?

Males- N=91- 58.33%
Females- N=65- 41.66%

Comment [PK7]: In both these distributions, the frequencies add up to 156 and not 155.

2.2 Survey

The survey created had a mix of variables to understand associations betweenAutistic and ADHD traits, well-being and strengths and difficulties. The predictor variables were the total scores of the AQ-10 and the ~~total~~ subscores~~scores~~ 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, physicalhealth, flourishing, emotional problems, hyperactivity, conduct, peer relationships and prosocial behaviour.

2.3 Measures

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

2.3.1AQ-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 (41l). It consists of a 4-pointLikert 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 by the World Health Organization. It has been used as a diagnostic tool andconsists of 18 questions. The first part of the scale has six questionsthatstand 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 (SDQ)

The Strengths and Difficulties Questionnaire is an abnormalbehaviour 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 usecontains the same items but they areworded differently, making it easier to understand. (22). The items are based on a 3-pointLikert 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 WPQ

The present short-form student Well-being Process Questionnairewas adapted from the original student WPQ (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

Comment [PK8]: This part needs relevant citations

Descriptive statistics of all the variables were initially calculated. The correlation between AQ 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 AQ and ADHD as predictors. The second set of regressions included the established predictors from the WPQ Finally, the regressions included AQ, ADHD and the established predictors from the WPQ to

determine whether any associations between AQ, 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 AQ 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.

Table 1: Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Positive well-being	154	9	1	10	5.98	.202	2.501
Negative well-being	152	9	1	10	5.07	.233	2.879
Stressful experiences	154	9	1	10	5.21	.229	2.837
Social Support	154	9	1	10	6.35	.232	2.885
Positive coping	153	9	1	10	5.82	.211	2.614
Negative Coping	152	9	1	10	5.77	.220	2.712
Psychological Capital	153	9	1	10	5.95	.200	2.472
Work-Life Balance	151	9	1	10	5.10	.234	2.877
Workload	152	9	1	10	5.55	.217	2.681
Sleepy during the day	152	9	1	10	6.46	.218	2.686
Physical Health	150	10	1	11	5.91	.177	2.167
Flow	149	9	1	10	5.50	.177	2.158
Flourishing	151	9	1	10	5.65	.195	2.395
Rumination	149	9	1	10	4.52	.214	2.606
Total ADHD score	155	6.00	.00	6.00	2.8968	.14274	1.77711
Total AQ score	155	9.00	.00	9.00	4.3806	.16097	2.00412
Conduct	146	7.00	.00	7.00	2.6027	.12159	1.46913
Hyperactivity	145	10.00	.00	10.00	5.2138	.20370	2.45285
Emotional problems	147	10.00	.00	10.00	4.6463	.23003	2.78893
Peer problems	147	10.00	.00	10.00	2.9524	.16505	2.00114
Prosocial behaviour	148	10.00	.00	10.00	7.1757	.16150	1.96471

Comment [PK9]: The columns of Range, Maximum and Minimum are not needed if Standard Deviation has been given. Also, limit all statistics to 2 or 3 decimal places consistently

Table 2: Correlations between Autistic and ADHD Traits and outcomes

		AQ	AD	Cond	Hyper	Emo	Peer	Prosoc	PosWB
AQ	Pearson Correlation	1	.407**	.245**	.386**	.244**	.345**	-.186*	-.191*
	Sig. (2-tailed)		.000	.003	.000	.003	.000	.023	.018
	N	155	155	146	145	147	147	148	154
AD	Pearson Correlation	.407**	1	.159	.614**	.416**	.329**	-.038	-.366**
	Sig. (2-tailed)	.000		.055	.000	.000	.000	.644	.000
	N	155	155	146	145	147	147	148	154
Cond	Pearson Correlation	.245**	.159	1	.464**	.184*	.246**	-.221**	-.189*
	Sig. (2-tailed)	.003	.055		.000	.026	.003	.007	.022
	N	146	146	146	144	146	146	146	146

Comment [PK10]: This table also needs to be reworked as N is not needed for each row (can have a single total N for entire table). Also, it is generally accepted to only retain values from one side of the diagonal of the matrix to avoid repetition.

Hyper	Pearson Correlation	.386**	.614**	.464**	1	.508**	.286**	-.024	-.366**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.776	.000
	N	145	145	144	145	145	145	145	145
Emo	Pearson Correlation	.244**	.416**	.184*	.508**	1	.428**	.159	-.626**
	Sig. (2-tailed)	.003	.000	.026	.000		.000	.054	.000
	N	147	147	146	145	147	147	147	147
Peer	Pearson Correlation	.345**	.329**	.246**	.286**	.428**	1	-.043	-.393**
	Sig. (2-tailed)	.000	.000	.003	.000	.000		.604	.000
	N	147	147	146	145	147	147	147	147
Prosoc	Pearson Correlation	-.186*	-.038	-.221**	-.024	.159	-.043	1	.041
	Sig. (2-tailed)	.023	.644	.007	.776	.054	.604		.625
	N	148	148	146	145	147	147	148	148
PosWB	Pearson Correlation	-.191*	-.366**	-.189*	-.366**	-.626**	-.393**	.041	1
	Sig. (2-tailed)	.018	.000	.022	.000	.000	.000	.625	
	N	154	154	146	145	147	147	148	154
NegWB	Pearson Correlation	.141	.401**	.070	.351**	.601**	.248**	-.053	-.691**
	Sig. (2-tailed)	.083	.000	.404	.000	.000	.003	.523	.000
	N	152	152	144	143	145	145	146	152
PhysH	Pearson Correlation	-.103	-.159	-.138	-.177*	-.272**	-.337**	.082	.340**
	Sig. (2-tailed)	.212	.052	.100	.034	.001	.000	.328	.000
	N	150	150	144	143	145	145	146	150
Flour	Pearson Correlation	-.195*	-.322**	-.160	-.282**	-.491**	-.315**	.099	.688**
	Sig. (2-tailed)	.017	.000	.055	.001	.000	.000	.234	.000
	N	151	151	145	144	146	146	147	151

		NegWB	PhysH	Flour
AQ	Pearson Correlation	.141	-.103	-.195*
	Sig. (2-tailed)	.083	.212	.017
	N	152	150	151
AD	Pearson Correlation	.401**	-.159	-.322**
	Sig. (2-tailed)	.000	.052	.000
	N	152	150	151
Conduct	Pearson Correlation	.070	-.138	-.160
	Sig. (2-tailed)	.404	.100	.055
	N	144	144	145
Hyper	Pearson Correlation	.351**	-.177*	-.282**
	Sig. (2-tailed)	.000	.034	.001
	N	143	143	144
Emo	Pearson Correlation	.601**	-.272**	-.491**
	Sig. (2-tailed)	.000	.001	.000
	N	145	145	146
Peer	Pearson Correlation	.248**	-.337**	-.315**
	Sig. (2-tailed)	.003	.000	.000
	N	145	145	146
Prosoc	Pearson Correlation	-.053	.082	.099
	Sig. (2-tailed)	.523	.328	.234
	N	146	146	147
PosWB	Pearson Correlation	-.691**	.340**	.688**
	Sig. (2-tailed)	.000	.000	.000
	N	152	150	151
NegWB	Pearson Correlation	1	-.160	-.530**
	Sig. (2-tailed)		.052	.000
	N	152	148	149
PhysH	Pearson Correlation	-.160	1	.354**
	Sig. (2-tailed)	.052		.000
	N	148	150	149
Flour	Pearson Correlation	-.530**	.354**	1
	Sig. (2-tailed)	.000	.000	
	N	149	149	151

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

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

AQ = autistic traits; A.D. = ADHD traits; Cond = conduct problems; Hyper = hyperactivity; Emo = emotional problems; Peer = peer problems Prosoc = prosocial behaviour; PosWB =

positive well-being; NegWB = negative well-being; PhysH = physical health; Flour = flourishing.

Table 3: Correlations between autistic and ADHD traits and predictors of well-being

		AQ	AD	Stress	Social	+Cope	-Cope	PsyCap	WLB
AQ	Pearson Correlation	1	.407**	.200*	-.053	-.261**	.064	-.222**	.096
	Sig. (2-tailed)		.000	.013	.516	.001	.430	.006	.240
	N	155	155	154	154	153	152	153	151
AD	Pearson Correlation	.407**	1	.357**	-.106	-.242**	.466**	-.357**	.205*
	Sig. (2-tailed)	.000		.000	.192	.003	.000	.000	.012
	N	155	155	154	154	153	152	153	151
Stress	Pearson Correlation	.200*	.357**	1	-.129	-.214**	.415**	-.370**	.471**
	Sig. (2-tailed)	.013	.000		.111	.008	.000	.000	.000
	N	154	154	154	154	153	152	153	151
Social	Pearson Correlation	-.053	-.106	-.129	1	.338**	.061	.198*	-.156
	Sig. (2-tailed)	.516	.192	.111		.000	.459	.014	.055
	N	154	154	154	154	153	152	153	151
+Cope	Pearson Correlation	-.261**	-.242**	-.214**	.338**	1	-.172*	.504**	-.222**
	Sig. (2-tailed)	.001	.003	.008	.000		.034	.000	.006
	N	153	153	153	153	153	151	152	150
-Cope	Pearson Correlation	.064	.466**	.415**	.061	-.172*	1	-.343**	.180*
	Sig. (2-tailed)	.430	.000	.000	.459	.034		.000	.028
	N	152	152	152	152	151	152	151	149
PsyCap	Pearson Correlation	-.222**	-.357**	-.370**	.198*	.504**	-.343**	1	-.282**
	Sig. (2-tailed)	.006	.000	.000	.014	.000	.000		.000
	N	153	153	153	153	152	151	153	151
WLB	Pearson Correlation	.096	.205*	.471**	-.156	-.222**	.180*	-.282**	1
	Sig. (2-tailed)	.240	.012	.000	.055	.006	.028	.000	
	N	151	151	151	151	150	149	151	151
WLoad	Pearson Correlation	.044	.266**	.502**	.037	-.091	.319**	-.249**	.559**
	Sig. (2-tailed)	.591	.001	.000	.653	.269	.000	.002	.000
	N	152	152	152	152	151	150	152	151

Comment [PK11]: Same comments for this table as for Table 2

Sleepy	Pearson Correlation	.187*	.348**	.290**	-.016	-.306**	.292**	-.331**	.243**
	Sig. (2-tailed)	.021	.000	.000	.840	.000	.000	.000	.003
	N	152	152	152	152	151	150	152	151
Flow	Pearson Correlation	-.174*	-.294**	-.034	.070	.216**	-.236**	.215**	-.106
	Sig. (2-tailed)	.034	.000	.677	.393	.008	.004	.009	.198
	N	149	149	149	149	148	147	149	149
Rumin	Pearson Correlation	.035	-.151	-.126	.002	.152	.000	.104	-.137
	Sig. (2-tailed)	.668	.067	.125	.978	.065	.996	.207	.095
	N	149	149	149	149	148	147	149	149

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

AQ = autistic traits; A.D. = ADHD traits; Stress = stressful experiences; Social = social support; + Cope = positive coping; - Cope = negative coping; Psy Cap = psychological capital; W.L.B. = work-life balance; Wload = workload; Sleepy = feel sleepy during the day; Flow = feel immersed and completely engaged; Rumin = rumination.

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 regression model. The first set of analyses included autistic and ADHD traits in the same model.

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 AQ score was negatively associated with positive well-being (Beta = -0.486 s.e. = 0.116 t = -4.177 p < 0.001).

3.3.2 Negative well-being

The ADHD score but not the AQ score, was positively associated with negative well-being (Beta = 0.663s.e. = 0.132 t = 5.009 p < 0.001).

3.3.3 Flourishing

The regression showedthat the ADHD score but not the AQ score was negativity associated with flourishing (Beta = -0.397, s.e. = 0.114, t = -3.485, p < 0.001).

3.3.4 Emotional Problems

The regression analysis showed that the ADHD score but not the AQ score was positively associated with emotional problems. (Beta = 0.611, s.e. = 0.129, t = 4.739, p < 0.001).

3.3.5 Conduct problems

The regression showed that the ADHD score but not the AQ score was positively associated with conduct problems (Beta = 0.169, s.e.= 0.067, t = 2.53, p <0.05).

3.3.6 Hyperactive

The regression analysis showed that ADHD score was positively associated with hyperactivity (Beta = 0.782, s.e. = 0.097, t = 8.061, p < 0.001). The AQ score was also associated with hyperactivity (Beta = 0.277 s.e. 0.089 t = 3.09 p < 0.005).

3.3.7 Peer problems

The regression analysis showed that there were significant associations between both the ADHD score and AQ score with peer problems (ADHD: Beta = 0.282, s.e. = 0.093, t = 3.021, p = 0.003; AQ: Beta =0.284, s.e. = 0.086, t =3.318, p =0.001).

3.3.8. Prosocial behaviour

The regression analysis showed no significant association between the ADHD score andprosocial behaviour (Beta = 0.030, s.e. = 0.098, t = 0.302, p = 0.763). In contrast, the AQ score was negatively associated with prosocial behaviour (Beta = -0.205, s.e. = 0.091, t = -2.256, p <0.05).

In summary, ADHD traits were associated with all the outcomes except prosocial behaviour. In contrast, the AQ scores were only associated with hyperactivity, peer problem 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 4. 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).

Comment [PK12]: It would be better to have a table to demonstrate this result if they are referring to the same Regression model. If multiple regression models have been used, then that needs to be specified at some points and also defined in terms of what kind of regressions they are.

Table 4: 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

The negative well-being outcome showed the reverse pattern, positively associated with negative predictors and negatively associated with positive predictors.

The SDQ 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 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 AQ nor ADHD scores were significantly associated with positive well-being (AQ: 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 AQ scores were significantly associated with negative well-being(AQ: 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 AQ nor ADHD scores were significantly associated with flourishing (AQ: 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 AQ scores were significantly associated with emotional problems (ADHD: p = 0.492, AQ: p = 0.601).

3.5.5 Predictors of Conduct Problems

Conduct problems were negatively associated with positive coping (Beta = -0~~0~~.204, s.e = 0.057, t = - 3.583, p< 0.001). AQscores were associated with conduct, but ADHD scores were not(AQ: 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 WPQAQ scores weresignificantly associated with hyperactivity(AQ: p < 0.05, 1-tail). ADHD scores were also significantly associated with hyperactivity(ADHD: p < 0.001).

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 AQ nor ADHD scores were significantly associated with peer problems (AQ: 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 (AQ: p <0.05, 1-tail, ADHD: p = 0.927).

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 SDQ 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 AQ 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 SDQ 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 SDQ 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 SDQ 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). 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 (44) suggest that outcomes measured by the SDQ 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 SDQ 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 thathad 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 described here was carried out with the approval of the School of Psychology, Cardiff University, Ethics Committee, and the informed consent of the participants. Anonymous data were collected at the end of the UK lockdown in July 2020 using the Qualtrics platform for online surveys

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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