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LONGITUDINAL ANALYSES OF THE WELL-BEING OF STUDENTS WITH DIAGNOSED ADHD AND AUTISM

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ABSTRACT

Three hundred students completed an online survey, which included the Short-Form Well-being Process Questionnaire, the Short-Form Strengths and Difficulties Scale, the Autism Spectrum Quotient (AQ10) and the ADHD Self-Report Scale (ASRS). One hundred had received a diagnosis of ADHD, 100 had a diagnosis of Autism, and 100 had no diagnosis of either ADHD or Autism. Participants repeated the survey three months later. **Results:** Cross-lagged analyses examine whether measures at time 1 were associated with the outcomes at time 2. Increased autistic characteristics predicted hyperactivity, emotional problems, conduct problems, and peer problems. Moreover, individuals with higher autistic traits at T1 tended to show lower prosocial behaviour at T2. The well-being outcomes at T2 were not predicted by the autism and ADHD measures at T1. **Conclusion:** It was observed that the ADHD/autism traits at time 1 were significantly associated with SDQ outcomes at time 2, but not well-being outcomes, which confirmed that the SDQ was more sensitive to ADHD/autism traits compared to well-being outcomes.

KEYWORDS: Well-being; Strengths and Difficulties; ADHD; Autism; University Students.

INTRODUCTION

Adolescents with ADHD and autism traits report a lower quality of life.[1, 2] The primary aim of the present study was to examine the associations between ADHD, Autism and well-being in a longitudinal study using multivariate analyses. ADHD and Autism were diagnosed, and ADHD and autistic traits were also measured.[3,4] It utilised the Well-being Process Questionnaire (WPQ) to investigate the relationships between ADHD and autistic traits and well-being.[5-50] The outcomes that represent essential features of ADHD and autistic traits were measured by the Strengths and Difficulties Questionnaire (SDQ).[51] The present study was longitudinal and collected data from students at Cardiff University. In order to create a multivariate model, the study considered the predictors of well-being as confounding variables (student stressors, social support, positive coping, negative coping, psychological capital, work–life balance, workload, rumination, and flow). The outcomes were positive well-being, negative well-being, physical health, and flourishing. One of the most essential features of the well-being process model is that one can add predictors or outcomes related to the study question. Thus, additional outcome variables have been added that are essential when examining ADHD and autistic traits, namely, SDQ outcomes (conduct problems, hyperactivity, emotional problems, peer problems, and prosocial behaviour). The present study was based on research using a cross-sectional methodology and ADHD/autistic traits.[52-56] The cross-sectional analyses of the first time point of the present study are described in another article[57], and the main results can be summarised as follows. Analyses compared the three groups (diagnosed ADHD and autism, and no diagnosis) while controlling for established predictors of well-being. No differences were found between the groups in terms of the well-being outcomes. However, the ADHD and Autism groups had higher levels of hyperactivity than the no diagnosis group. Those with a diagnosis of Autism had more emotional problems than the no diagnosis group. Analyses based on trait scores showed that ADHD and Autistic traits were associated with greater hyperactivity at both time points. Autistic traits were also associated with increased peer problems and decreased prosocial behaviour.

The present study utilised the PROLIFIC database to recruit participants, who were paid for completing the survey. The data were extracted as an SPSS file from Qualtrics, and IBM SPSS 29 was used for analyses.

A univariate analysis was conducted to examine the following hypothesis about the relationships between ADHD/autism traits and well-being outcomes.

• There will be significant correlations between ADHD traits, autism traits, and well-being and SDQ outcomes.

As previously discussed, multivariate analyses are crucial in this type of study. The following general hypothesis was tested:

• ADHD traits and autism traits will be significant predictors of well-being and SDQ outcomes after controlling for well-being predictors. The current paper investigated the longitudinal influence of ADHD/autistic traits and well-being predictors on the well-being and SDQ outcomes.

METHODS

The same dataset and study design were employed in this study as those described in a previous paper.[57]

Ethical Approval

Cardiff University's School of Psychology Ethics Committee approved this study (ethical number: EC2212136676R).

Participants

Data were collected from the PROLIFIC recruitment panel for three groups. The first group was students without a prior diagnosis of ADHD or autism, and the second group was students with a previous diagnosis of autism. The final group was people with a prior diagnosis of ADHD. The Prolific pre-screen selection settings were used to implement the inclusion and exclusion criteria for recruiting the participants. The inclusion criteria for the three groups were students from the United Kingdom, the United States, Australia, New Zealand, and South Africa. To select people with ADHD, the pre-screen feature was participants with a prior diagnosis of ADHD. In addition, the participants with a previous autism diagnosis were used to select the autism group. The total sample size was 300 participants (100 for each group) at T1. However, there was a decrease in the response rate during T2, three months later, in July 2023, when just 248 participants answered the survey: 92 from the no ADHD/autism group, 83 from the ADHD group, and 73 from the autism group. Table 1 shows the characteristics of the students. At T1, females accounted for 49% (n = 147) of the sample, and males accounted for 50.7% (n = 152). In contrast, at T2, females accounted for 50% (n = 124) and males 48.4% (n = 120). Regarding age, the average of the total sample was 27.6 (SD = 9.13) at T1; this value was similar to that for T2, with 28.4 (SD = 9.57). BMI was higher in people with autism (M = 28.6) compared to people with ADHD (M = 26.5). At the same time, people without ADHD or autism had the lowest BMI, with an average of 24.9 at T1. It was noted that the average BMI increased to M = 30.7 among participants in the autism group and M = 26.3 among those in the no ADHD/autism group at T2. The BMI of the individuals in the ADHD group was stable (M= 26.8) at T2.

Statistical Analyses

Cross-lagged analysis investigated the potential causal nature of the relationships between predictors at time 1 and well-being and SDQ outcomes at time 2, three months later, using multiple linear regression (Enter model) methods. The covariates included in the cross-lagged models were the same as in the cross-sectional analyses of well-being and SDQ outcomes (i.e., BMI, gender, student stressors, social support, positive coping, negative coping, psychological capital, low work–life balance, workload, low rumination, and flow). These variables were included in each multivariate cross-lagged analysis conducted in this study, and all covariates were measured at T1.

RESULTS

Cross-Lagged Analysis

A cross-lagged analysis was conducted to determine whether the predictors at Time 1 were related to the outcomes at Time 2. This part of the study was divided into two parts. The first part investigated the effect of ADHD and autism traits at T1 on the well-being outcomes at T2 in a univariate analysis, and after controlling for well-being predictors in a multivariate cross-lagged analysis. The second part investigated the association between ADHD, and autism traits at T1 on SDQ outcomes at T2 in univariate and multivariate cross-lagged analyses.

The univariate cross-lagged analysis results were similar to the cross-sectional results in the previous paper. There were statistically significant positive correlations between ADHD traits and autism traits at T1 and negative well-being, anxiety, and depression at T2. Negative correlations were observed between ADHD traits and autism traits at T1 and positive well-being, flourishing, and physical health at T2. There were positive associations between sleepiness at T1 and negative well-being, anxiety, and depression at T2 (see Table 1). In the multivariate cross-lagged analysis and after controlling for the covariates, most of the significant associations disappeared. Social support at T1 was associated with increased positive well-being and flourishing, and decreased depression at T2. In addition, psychological capital at T1 was associated with positive well-being, flourishing, and physical health at T2. Psychological capital at T1 was associated with decreased negative well-being, anxiety, and depression at T2. Moreover, a significant effect was observed between student stressors at T1 and negative well-being, anxiety, and depression at T2. Flow at T1 was associated with increased flourishing at T2. There were no significant associations between ADHD, autism traits, and well-being outcomes at T2 in the multivariate analyses (see Tables 2 and 3).

Cross-Lagged Analysis of Predictors and SDQ Outcomes

Autistic traits at T1 was positively associated with hyperactive behaviour, emotional problems, conduct problems, and peer problems at T2. While ADHD traits were correlated with hyperactive behaviours and

emotional problems. ADHD and autism traits T1 were negatively associated with prosocial behaviour at T2 (see Table 4).

In the multivariate analyses, most of the correlations observed in the univariate cross-lagged analysis disappeared after controlling for the covariates. ADHD and autistic traits at T1 remained significantly associated with hyperactive behaviour at T2 (B = 0.436, p = 0.002 and B = 0.111, p = 0.048, respectively). It was observed that autistic traits at T1 were positively associated with conduct, emotional, and peer problems and negatively related to prosocial behaviour at T2. It was observed that psychological capital at T1 was negatively associated with hyperactive behaviour and emotional problems and positively associated with prosocial behaviour at T2. In addition, negative coping at T1 was associated with increased emotional problems at T2. Flow at T1 was associated with decreased hyperactive behaviour at T2 (see Table 5). It was observed that high student stressors at T1 were associated with emotional problems at T2.

Table 1: Univariate cross-lagged associations between HRBs, ADHD, autism traits, and well-being outcomes.
Note: **Pearson's matrix (two-tailed) is used for all correlations.**

Predictors	Positive well-being T2		Flourishing T2		Physical health T2		Negative well-being T2		Anxiety T2		Depression T2	
	r	p	r	p	r	p	r	p	r	p	r	p
BMI T1	-.078	.223	-.216	.001	-.254	.001	.158	.013	.180	.005	.132	.038
Sex T1	-.002	.970	-.010	.871	-.162	.011	.161	.012	.229	.001	.107	.093
Student stressors T1	-.215	.001	-.168	.008	-.177	.006	.362	.001	.433	.001	.402	.001
Social support T1	.331	.001	.498	.001	.260	.001	-.335	.001	-.341	.001	-.404	.001
Positive coping T1	.268	.001	.354	.001	.312	.001	-.189	.003	-.227	.001	-.317	.001
Negative coping T1	-.257	.001	-.297	.001	-.275	.001	.301	.001	.396	.001	.370	.001
Psychological capital T1	.396	.001	.484	.001	.373	.001	-.397	.001	-.449	.001	-.472	.001
Low work–life balance T1	-.034	.596	-.080	.215	-.087	.177	.208	.001	.224	.001	.175	.006
Academic stress T1	-.132	.039	-.044	.489	-.123	.055	.185	.004	.226	.001	.236	.001
Flow T1	.192	.002	.307	.001	.211	.001	-.165	.010	-.175	.006	-.154	.015
Low rumination T1	.084	.190	.171	.007	.081	.206	-.022	.729	-.099	.123	-.069	.277
Sleepiness T1	-.218	.001	-.256	.001	-.231	.001	.228	.001	.317	.001	.350	.001
ADHD T1	-.259	.001	-.330	.001	-.215	.001	.316	.001	.303	.001	.240	.001
Autism T1	-.270	.001	-.268	.001	-.320	.001	.319	.001	.303	.001	.261	.001

Table 2: Multivariate cross-lagged associations between predictors and well-being outcomes.
Note: The values of beta (□) are standardised.

The predictors	Negative well-being T2		Anxiety T2		Depression T2	
	□	p	□	p	□	p
BMI T1	.072	.233	.083	.143	.058	.322
Sex T1	.088	.139	**.113**	**.042**	.019	.742
Student stressors T1	**.209**	**.005**	**.233**	**<.001**	**.144**	**.045**
Social support T1	-.135	.056	-.109	.100	**-.163**	**.018**
Positive coping T1	.028	.697	.016	.809	-.066	.350
Negative coping T1	.029	.699	.097	.172	.032	.669
Psychological capital T1	**-.172**	**.024**	**-.205**	**.004**	**-.236**	**.001**
Low work–life balance T1	.095	.148	.094	.125	.032	.610
Academic stress T1	-.044	.556	-.033	.639	.073	.314
Flow T1	-.059	.376	-.011	.856	-.010	.877
Rumination T1	**.128**	**.039**	.072	.217	.082	.174
Sleepiness T1	-.037	.579	.013	.836	.101	.125
ADHD traits T1	.136	.060	.083	.217	-.019	.788
Autism traits T1	.121	.072	.054	.393	.038	.565
The model fit	F = 5.48, p <.001 R^2 =.301		F = 8.12, p <.001 R^2 =.390		F = 6.56, p <.001 R^2 =.340	

Table 3: Multivariate cross-lagged associations between predictors and well-being outcomes.
Note: The values of beta (□) are standardised.

The predictors	Positive well-being T2		Flourishing T2		Physical health T2	
	□	p	□	p	□	p
BMI T1	-.019	.760	**-.121**	**.032**	**-.186**	**.001**
Sex T1	.048	.436	.043	.435	-.064	.246
Student stressors T1	-.015	.847	.098	.152	.062	.362
Social support T1	**.150**	**.042**	**.313**	**<.001**	.044	.499
Positive coping T1	.038	.614	.038	.576	.065	.332
Negative coping T1	.013	.869	-.021	.763	.013	.857
Psychological capital T1	**.202**	**.011**	**.215**	**.002**	**.177**	**.012**
Low work–life balance T1	.097	.153	.015	.803	.033	.579
Academic stress T1	-.112	.152	-.013	.849	-.128	.064
Flow T1	.071	.308	**.150**	**.016**	.070	.256
Low rumination T1	-.058	.368	-.026	.651	-.070	.219
Sleepiness T1	-.011	.872	-.033	.602	-.029	.646
ADHD traits T1	-.088	.240	-.112	.094	.039	.555
Autism traits T1	-.068	.332	-.020	.753	-.094	.130
The model fit	F = 4.01, p <.001 R^2=.240		F = 8.37, p <.001 R^2=.397		F = 8.63, p <.001 R^2=.404	

Table 4 Univariate cross-lagged associations between ADHD, autism traits, and SDQ outcomes. ***Note:*** **Pearson's matrix (two-tailed) is used for all correlations.**

The predictors	Conduct problems T2		Hyperactive behaviour T2		Emotional problems T2		Peer problems T2		Prosocial behaviour T2	
	r	p	r	p	r	p	r	p	r	p
BMI T1	.103	.109	.177	.006	.174	.001	.014	.832	-.173	.007
Sex T1	.117	.068	.015	.815	.360	.001	.272	.001	-.372	.001
Student stressors T1	.072	.264	.298	.001	.441	.021	.104	.104	-.181	.005
Social support T1	-.188	.003	-.293	.001	-.353	.014	-.077	.236	.068	.292
Positive coping T1	-.160	.013	-.291	.001	-.276	.004	-.007	.919	-.138	.031
Negative coping T1	.097	.131	.384	.001	.496	.001	-.216	.001	.122	.056
Psychological capital T1	-.054	.402	-.459	.001	-.533	.001	.100	.119	-.079	.219
Low work-life balance T1	.056	.384	.208	.001	.170	.009	.091	.158	.075	.245
Workload T1	.091	.158	.220	.001	.231	.001	.024	.710	-.010	.875
Flow T1	-.082	.200	-.374	.001	-.154	.017	.021	.745	.124	.053
RuminationT1	.041	.520	-.184	.004	-.162	.012	-.047	.465	.039	.538
Sleepiness T1	.100	.119	.350	.001	.389	.001	.100	.119	-.079	.219
ADHD T1	.112	.082	.645	.001	.365	.001	.014	.832	-.173	.007
Autism T1	.205	.001	.444	.001	.398	.001	.272	.001	-.372	.001

Table 5: Multivariate cross-lagged associations between predictors and SDQ outcomes.
Note: The values of beta (□) are standardised.

The predictors	Conduct problems T2		Hyperactive behaviour T2		Emotional problems T2		Peer problems T2		Prosocial behaviour T2	
	□	p	□	p	□	p	□	p	□	p
BMI T1	.066	.331	.053	.295	.021	.684	.009	.888	**.164**	**.011**
Sex T1	.112	.094	-.020	.680	**.265**	**<.001**	.041	.498	.048	.444
Student stressors T1	-.053	.521	.038	.531	**.147**	**.020**	.108	.148	.033	.672
Social support T1	-.177	.027	.015	.792	-.049	.413	**-.295**	**<.001**	.061	.411
Positive coping T1	-.072	.376	-.021	.729	.008	.895	.066	.373	.029	.704
Negative coping T1	-.017	.838	.025	.698	**.172**	**.008**	.135	.080	.032	.686
Psychological capital T1	.125	.142	**-.185**	**.004**	**-.239**	**<.001**	-.099	.197	**.171**	**.034**
Low work–life balance T1	-.023	.751	.044	.419	.019	.729	.089	.180	.106	.127
Academic stress T1	.082	.329	-.013	.832	-.044	.490	-.097	.202	.001	.992
Flow T1	-.092	.220	**-.142**	**.011**	.045	.424	.109	.109	.044	.537
Low rumination T1	.094	.180	.012	.821	-.008	.873	-.005	.937	-.043	.515

Sleepiness T1	.044	.561	.048	.388	.053	.354	-.087	.206	.053	.457
ADHD traits T1	-.050	.534	**.436**	**<.001**	.112	.067	**-.190**	**.010**	-.013	.866
Autism traits T1	**.183**	**.016**	**.111**	**.048**	**.123**	**.032**	**.222**	**.001**	**-.297**	**<.001**
The model fit	F = 1.61, p <.057 R^2=.113		F = 13.64, p <.001 R^2=.517		F = 12.52, p <.001 R^2=.496		F = 4.96, p <.001 R^2=.281		F = 3.53, p <.001 R^2=.217	

DISCUSSION

The first aim of this study was to investigate the influence of well-being predictors measured at T1 on well-being and SDQ outcomes measured at T2. Moreover, increased hyperactive behaviour has been observed among individuals with ADHD traits**.** People with ADHD traits also had low peer problems. Increased autistic characteristics predicted hyperactivity, emotional problems, conduct problems, and peer problems. Moreover, individuals with higher autistic traits at T1 tended to show lower prosocial behaviour at T2.

CONCLUSION

It was observed that the ADHD/autism traits at time 1 were significantly associated with SDQ outcomes at time 2, but not well-being outcomes, which confirmed that the SDQ was more sensitive to ADHD/autism traits compared to well-being outcomes.

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