Balance & Daily Living Skills in Autism

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Introduction

- Individuals with autism spectrum disorder (ASD) often experience difficulty performing daily living skills (DLS)[1], such as dressing, grooming, and bathing.
- Motor challenges have been observed in this population, particularly impairments in balance.[2,3,4]
- It is assumed that balance challenges affect DLS, however, previous research has only linked fine motor deficits[1,5] and motor coordination[6] to difficulties in DLS. Little evidence exists regarding the role of balance impairments across the broader autism phenotype.
- Without knowledge on the impact of balance on DLS, it is difficult to tailor motor interventions to the ASD population.

Study Purpose

The purpose of this study was to examine the association between balance and performance of DLS in children and adolescents with ASD.

Research Design & Methods

- Balance was assessed using the balance subscale of the Bruininks-Oseretsky Test of Motor Proficiency-Second Edition (BOT-2).
- DLS were measured using the Vineland Adaptive Behavior Scale–Second Edition (VABS-II) Daily Living Skills domain.
- Pearson *R* correlations between BOT-2 balance scores and VABS-II DLS scores
- A multiple regression model assessed the relation between balance and DLS using age and IQ as moderators. Variables were mean-centered to prevent multicollinearity.
- Follow-up analyses examined the role of symptom severity on the relation between balance and DLS.

Table 1. Demographics of 44 participants with ASD.

	Frequency (%)	Mean (*SD*)	Range
Age		12.38 (3.45)	6.51-17.79
IQ		103.43 (14.91)	67-135
Sex			
Male	37 (84.1)		
Female	7 (15.9)		
Ethnicity			
Caucasian	27 (61.4)		
Black/ African American	6 (13.6)		
Biracial/ Multiracial	5 (11.4)		
Asian	4 (9.1)		
Hispanic	2 (4.5)		

Results

Positive relation between balance and DLS driven by children with below-average IQ

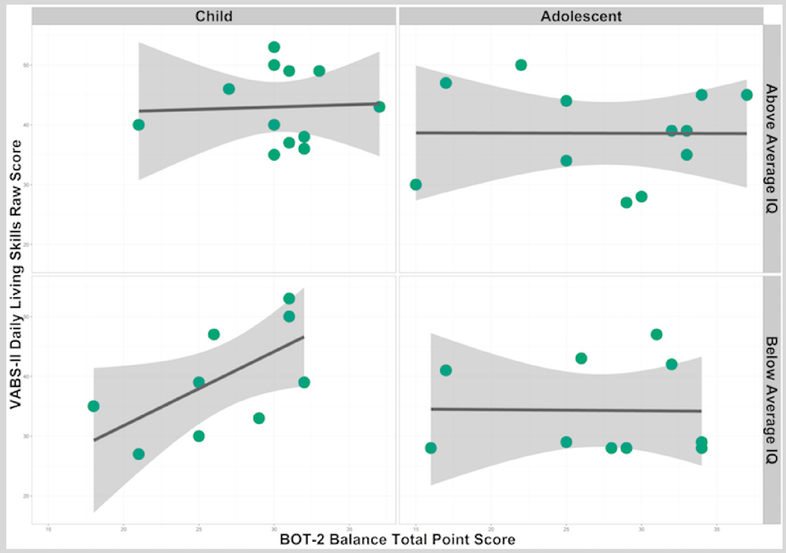

Table 2. Results of linear regression using balance scores, age, and IQ to predict DLS. The overall model was significant, $F(7,36)= 3.81$, $p = .003$, Adjusted $R^2 = .313$.

	Balance		Age		IQ		Balance X Age		Balance X IQ		Age X IQ		Balance X Age X IQ	
	β(SE)	*p-value*	*β(SE)*	*p-value*	*β(SE)*	*p-value*	*β(SE)*	*p-value*	*β(SE)*	*p-value*	*β(SE)*	*p-value*	*β(SE)*	*p-value*
DLS	0.18 (1.07)	0.39	-1.22 (0.32)	<.001	0.13 (0.08)	0.08	-0.05 (0.06)	0.41	-0.04 (0.02)	0.02	-0.01 (0.03)	0.64	0.01 (0.01)	0.07

… But children with below-average IQ also have most severe repetitive behaviors

Table 3. Descriptive statistics of symptom severity by age and IQ.

	Child Below Avg. IQ (*n* = 10)	Child Above Avg. IQ (*n* = 12)	Adolescent Below Avg. IQ (*n* = 10)	Adolescent Above Avg. IQ (*n* = 12)
	Mean (*SD*), Range	Mean (*SD*), Range	Mean (*SD*), Range	Mean (*SD*), Range
SRS Total Raw Score	97.3 (45.58), 30-166	91.14 (26.00), 28-132	83.6 (31.36), 36-135	103.45 (35.55), 28-147
RBS-R				
Stereotyped Behavior	5.50 (4.50), 1-13	5.75 (3.54), 0-13	2.80 (3.52), 0-12	2.08 (1.97), 0-6
Self-Injurious Behavior	4.50 (5.64), 0-16	1.67 (1.56), 0-5	2.90 (3.03), 0-8	2.33 (2.42), 0-7
Compulsive Behavior	8.70 (8.62), 0-22	5.17 (3.79), 1-11	3.70 (4.08), 0-14	2.17 (2.76), 0-8
Ritualistic Behavior	7.30 (5.74), 0-17	6.17 (3.54), 1-11	5.00 (3.74), 0-14	4.50 (4.17), 0-13
Sameness	12.40 (9.03), 0-24	7.42 (4.60), 1-14	8.10 (6.06), 1-21	8.25 (6.59), 0-22
Restricted Behavior	5.40 (5.34), 0-12	3.67 (3.34), 0-10	3.30 (2.58), 1-10	3.67 (2.81), 0-10
Overall Total	**43.80 (35.28), 2-103**	**29.83 (17.76), 5-58**	**25.80 (18.40), 8-73**	**23.00 (17.50), 0-60**
SEQ				
Seeking Total	88.30 (21.17), 54-116	82.42 (14.54), 52-102	65.89 (20.75), 50-113	75.67 (21.42), 53-119
Hypo Total	34.80 (12.66), 19-59	31.92 (7.42), 21-43	29.67 (11.61), 18-46	31.5 (9.24), 19-44
Hyper Total	91.90 (26.41), 56-128	79.75 (15.39), 51-100	73 (21.54), 43-110	91.56 (20.19), 67-129
Social Total	52.90 (11.01), 39-68	51.58 (7.13), 37-60	47.11 (13.79), 24-67	56.33 (12.33), 37-71
Non-Social Total	174.40 (50.05), 105-247	154.33 (24.85), 106-186	130.11 (36.14), 95-210	149.67 (29.76), 118-194
Enhanced Percept. Total	31.80 (9.82), 21-53	28.67 (5.76), 20-36	25.67 (9.85), 14-41	30.56 (6.50), 19-39

More severe repetitive behaviors did <u>not</u> account for relation between balance and DLS

Table 4. Results of linear regression using, balance scores and RBS-R Total score to predict daily living skills (DLS). The overall model was not significant, $F(3,40) = 1.12$, $p = .35$, Adjusted $R^2 = .009$.

	Balance Score		RBS-R		Balance X RBS-R	
	β(SE)	*p-value*	*β(SE)*	*p-value*	*β(SE)*	*p-value*
DLS	0.23 (0.38)	0.55	-0.07 (0.25)	0.77	>.001 (0.01)	0.98

Conclusions

- Contrary to assumptions in the field, we did not find that balance predicted DLS performance across all participants. Rather, the relation was only in children with lower IQ.
- This suggests that children with higher cognition and adolescents (low and high cognition) may use compensation strategies to make up for the observed balance deficits.
  - Example adaptive behaviors: using supports during DLS (i.e. sitting or holding onto stable object), communicating their needs to adults (receiving help)
- While repetitive behaviors were particularly different in the youngest group with below-average IQ, this did not predict the relation between balance and DLS.

Implications for Practice

- Balance interventions to improve DLS performance may be most appropriate for younger children with lower IQ
- Future research should focus on compensatory mechanisms for DLS challenges in children and adolescents with ASD
- There is a need to develop DLS assessments that test functional performance and account for compensation strategies

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