

The Parent Play Questionnaire (PPQ): development of a parent questionnaire to assess parent-child play and digital media use

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Supplementary Materials

S1 Standardised factor loadings of Parent Play Questionnaire (PPQ) items, obtained from each confirmatory factor analysis model

Item number	Sample 1 <i>n=157</i>			Sample 2 <i>n=161</i>			Sample 3 <i>n=96</i>			Combined samples		
	F1	F2	F3	F1	F2	F3	F1	F2	F3	F1	F2	F3
Frequency 1	.49			.31			.47			.58		
Frequency 2	.61			.56			.59			.72		
Frequency 3	.61			.60			.71			.73		
Frequency 4	.50			.65			.79			.62		
Frequency 5	.49			.71			.67			.68		
Frequency 6	.32			.60			.46			.46		
Frequency 7	.56			.47			.54			.58		
Frequency 8	.56			.60			.49			.59		
Digital Media 1		.77			.69			.84		.72		
Digital Media 2		.89			.79			.49		.76		
Digital Media 3		.44			.54			.51		.48		
Attitude 1			-.62			-.50			-.51			-.59
Attitude 2			-.42			-.40			-.41			-.44
Attitude 3			-.44			-.22			-.58			-.36
Attitude 4			.44			.38			.44			.40
Attitude 5			-.44			-.31			-.44			-.40
Attitude 6			-.43			-.21			-.67			-.52
Attitude 7			-.43			-.57			-.43			-.54
Attitude 8			-.47			-.53			-.63			-.56
Attitude 9			.73			.68			.74			.74
Attitude 10			.63			.40			.59			.60
Attitude 11			.46			.35			.31			.41
F1,F2/F1,F3/F2,F3 †	-.08/.44*/-.28*			.09/.30*/-.05			.28*/.55*/.18			-.05/.44*/.07		

† Correlations between standardised latent factors (r, * p>.05)

S2 Variance-covariance matrices of observed variables in each confirmatory factor analysis model

Sample 1		Attitude										Frequency								Digital media			
		4	1	2	3	8	9	10	5	11	6	7	1	2	3	4	5	6	7	8	1	2	3
Attitude	4	.38																					
	1	-.12	.28																				
	2	-.06	.06	.20																			
	3	-.08	.08	.06	.34																		
	8	-.07	.09	.07	.10	.26																	
	9	.16	-.18	-.10	-.12	-.12	.51																
	10	.08	-.13	-.05	-.09	-.06	.25	.49															
	5	-.04	.08	.04	.13	.05	-.13	-.13	.38														
Frequency	11	.15	-.11	-.04	-.09	-.06	.14	.15	-.13	.49													
	6	-.06	.06	.05	.02	.03	-.13	-.19	.08	-.05	.33												
	7	.00	.07	.11	.06	.08	-.13	-.11	.04	-.06	.10	.34											
	1	-.01	-.01	.03	-.08	-.10	.03	.08	-.07	.07	.02	-.05	1.15										
	2	.04	-.02	-.02	-.08	-.11	.08	.06	-.06	.09	-.03	-.11	.46	.64									
	3	.09	-.10	-.04	-.09	-.08	.18	.12	-.10	.17	-.06	-.06	.23	.26	.75								
	4	.02	-.01	-.05	-.10	-.01	.15	.21	-.06	.11	-.09	-.07	.17	.20	.37	1.36							
	5	.00	-.05	-.01	-.05	-.04	.05	.11	-.02	.11	-.03	.00	.28	.17	.25	.37	.99						
Digital Media	6	.04	-.08	-.07	-.02	-.01	.15	.12	.00	.09	-.06	-.02	-.05	.02	.16	.35	.27	.79					
	7	.07	-.09	.00	-.02	-.07	.17	.18	-.06	.11	-.04	-.04	.36	.23	.32	.35	.32	.27	1.22				
	8	.00	-.07	-.02	-.03	-.07	.12	.13	-.06	.07	-.07	-.10	.24	.34	.23	.27	.26	.10	.34	.87			
	1	-.05	.05	.03	-.03	.03	-.16	-.18	.18	-.13	.04	.09	.03	.01	-.08	.08	-.15	-.09	-.27	-.08	1.67		
	2	-.11	.11	.07	.04	.03	-.12	-.17	.18	-.15	.02	.06	.07	.07	-.08	.01	-.10	-.12	-.19	-.03	1.07	1.42	
	3	-.06	.11	.02	-.05	.03	-.01	.02	.00	-.09	.00	.02	.00	.03	.01	.11	.02	-.04	-.10	-.11	.37	.38	.67

Sample 2		Attitude										Frequency								Digital media			
		4	1	2	3	8	9	10	5	11	6	7	1	2	3	4	5	6	7	8	1	2	3
Attitude	4	.51																					
	1	-.03	.25																				
	2	-.04	.05	.24																			
	3	-.02	.06	.02	.26																		
	8	-.07	.09	.08	.03	.31																	
	9	.17	-.12	-.07	-.02	-.15	.50																
	10	.07	-.02	-.01	-.02	-.04	.14	.22															
	5	-.05	.04	.06	.01	.04	-.05	-.03	.33														
Frequency	11	.15	-.04	-.04	.01	-.06	.15	.04	-.08	.51													
	6	.01	.05	.02	.01	-.05	-.03	.02	.01	.20													
	7	-.05	.11	.10	.06	.10	-.13	-.05	.09	-.06	.04	.34											
	1	-.02	-.03	.03	-.07	.02	.02	.03	-.08	-.03	.08	-.07	1.31										
	2	.06	.00	-.01	-.10	-.02	.11	.05	-.05	.03	.01	-.05	.25	.58									
	3	.02	-.05	-.01	-.15	-.02	.07	-.01	.01	.06	-.02	-.09	.24	.27	.65								
	4	.03	-.05	-.02	-.18	-.02	.05	-.05	-.06	.11	.04	-.06	.18	.25	.39	1.23							
	5	.10	-.07	-.02	-.06	-.06	.18	.02	-.03	.17	.05	-.07	.24	.27	.31	.54	1.00						
Digital Media	6	.14	-.03	-.01	-.09	-.01	.22	.10	-.09	.14	.06	-.09	.10	.29	.31	.59	.63	1.63					
	7	.17	-.01	-.05	-.04	-.02	.10	.08	-.08	.12	.08	-.03	.30	.35	.32	.24	.32	.47	1.50				
	8	.02	.00	.01	-.13	.06	.07	.04	-.10	.08	.05	.00	.25	.27	.24	.62	.50	.54	.52	1.37			
	1	-.05	.04	.02	-.08	.08	-.07	.06	-.01	-.02	.04	.09	.29	.13	.03	.05	.22	.07	.16	.24	2.21		
	2	-.01	.07	-.01	.03	.02	.06	.12	.04	.01	-.01	.03	.10	.02	-.05	-.14	.11	-.07	.08	.13	1.17	2.09	
	3	.00	.12	.04	-.02	.06	-.05	.11	.00	-.05	.00	.02	.00	-.01	.01	.09	.05	.08	-.16	.08	.83	.99	2.48

Sample 3		Attitude											Frequency								Digital media			
		4	1	2	3	8	9	10	5	11	6	7	1	2	3	4	5	6	7	8	1	2	3	
Attitude	4	.35																						
	1	-.09	.35																					
	2	-.08	.04	.24																				
	3	-.07	.11	.09	.25																			
	8	-.09	.17	.08	.12	.35																		
	9	.18	-.18	-.10	-.15	-.24	.68																	
	10	.07	-.11	-.06	-.08	-.15	.24	.43																
	5	-.04	.05	.03	.07	.10	-.12	-.15	.33															
	11	.10	.00	-.04	-.09	-.01	.12	.12	-.11	.49														
	6	-.10	.11	.08	.10	.16	-.24	-.16	.11	-.09	.35													
	7	-.02	.05	.08	.08	.02	-.20	-.16	.15	-.08	.17	.47												
Frequency	1	.14	-.19	-.03	-.19	-.21	.34	.10	-.08	.07	-.13	-.08	1.53											
	2	.12	-.12	-.06	-.12	-.13	.32	.15	-.04	.13	-.09	-.05	.62	.84										
	3	.16	-.07	-.08	-.12	-.12	.24	.10	-.03	.13	-.14	-.08	.30	.39	.76									
	4	.14	-.10	-.08	-.11	-.08	.17	.08	-.03	.11	-.10	-.02	.33	.35	.44	.73								
	5	.21	-.15	-.04	-.21	-.10	.32	.23	-.11	.20	-.14	-.08	.27	.37	.42	.48	1.05							
	6	.13	.00	-.14	-.16	-.07	.18	.06	-.02	.07	-.11	.02	.10	.18	.27	.23	.30	.86						
	7	.18	-.02	-.02	-.14	-.08	.16	.07	-.09	.12	-.13	.05	.51	.18	.28	.44	.37	.34	1.18					
	8	.05	-.02	-.07	-.14	-.05	.12	.07	-.09	.06	-.08	.03	.14	.10	.21	.35	.23	.41	.45	.79				
Digital Media	1	.08	-.07	-.05	-.05	-.13	.30	.01	-.03	.09	-.02	.02	.40	.17	.25	.15	.41	.00	.14	.06	2.21			
	2	-.05	-.13	.06	.04	-.15	.09	.02	-.08	-.12	-.07	.07	.15	.15	.14	.29	.26	.07	.07	.20	.89	2.22		
	3	.08	-.03	-.04	.01	.02	-.05	.11	-.11	.05	-.01	.00	.04	-.05	-.01	.07	.29	.08	.23	.27	.92	.50	1.96	

Combined Samples		Attitude											Frequency								Digital media		
		4	1	2	3	8	9	10	5	11	6	7	1	2	3	4	5	6	7	8	1	2	3
Attitude	4	.43																					
	1	-.09	.32																				
	2	-.06	.07	.23																			
	3	-.06	.08	.05	.29																		
	8	-.08	.13	.09	.08	.32																	
	9	.18	-.19	-.11	-.09	-.19	.58																
	10	.08	-.11	-.05	-.06	-.10	.23	.40															
	5	-.05	.07	.05	.07	.06	-.11	-.11	.35														
	11	.14	-.08	-.05	-.05	-.07	.16	.12	-.11	.52													
	6	-.05	.10	.06	.04	.08	-.16	-.15	.07	-.06	.32												
	7	-.03	.11	.11	.07	.10	-.18	-.13	.10	-.09	.13	.41											
Frequency	1	.03	-.10	-.02	-.08	-.11	.17	.12	-.11	.08	-.05	-.13	1.65										
	2	.07	-.07	-.06	-.08	-.10	.21	.12	-.08	.12	-.07	-.13	.71	.91									
	3	.08	-.11	-.07	-.10	-.09	.20	.11	-.06	.16	-.11	-.12	.50	.51	.90								
	4	.06	-.08	-.07	-.12	-.05	.16	.11	-.07	.15	-.08	-.10	.38	.40	.52	1.25							
	5	.09	-.11	-.05	-.08	-.09	.22	.14	-.07	.20	-.07	-.10	.51	.46	.50	.59	1.19						
	6	.08	-.01	-.06	-.06	-.01	.16	.07	-.04	.09	.00	-.02	.17	.27	.33	.45	.50	1.26					
	7	.14	-.08	-.06	-.05	-.08	.20	.16	-.10	.16	-.07	-.07	.60	.46	.47	.45	.50	.42	1.48				
	8	.01	-.03	-.04	-.08	-.02	.12	.09	-.09	.08	-.04	-.05	.43	.43	.38	.51	.49	.46	.56	1.20			
Digital Media	1	-.01	.01	.01	-.06	.01	-.01	-.04	.06	-.04	.02	.07	.13	.02	-.02	.05	.06	-.08	-.05	.00	2.06		
	2	-.05	.03	.04	.04	-.02	.00	-.01	.06	-.08	-.02	.05	.12	.08	.00	.03	.08	-.05	-.01	.10	1.07	1.87	
	3	.00	.07	.00	-.02	.03	-.02	.08	-.03	-.03	-.01	.00	.10	.07	.08	.13	.16	.08	.01	.12	.65	.65	1.71

S3 Test for invariance of parameters across samples in a confirmatory factor analysis comparing groups †

	‡ Chi2	P	§ Wald Chi2	p
Frequency 1	7.88	.02	4.15	.13
Frequency 2	5.54	.06	3.98	.14
Frequency 3	.78	.68	1.95	.38
Frequency 4	7.23	.03	35.41	.00
Frequency 5	1.59	.45	1.76	.42
Frequency 6	5.14	.08	15.97	.00
Frequency 7	3.53	.17	2.81	.25
Frequency 8	1.89	.39	8.81	.01
Digital Media 1 ¶	3.96	.14	5.45	.07
Digital Media 2	6.05	.05	15.33	.00
Digital Media 3	8.98	.01	48.97	.00
Attitude 1	3.05	.22	3.68	.16
Attitude 2	.99	.61	2.29	.32
Attitude 3	15.64	.00	4.07	.13
Attitude 4	.57	.75	6.82	.03
Attitude 5	1.17	.56	.98	.61
Attitude 6	3.35	.19	3.18	.20
Attitude 7	10.87	.00	4.00	.14
Attitude 8	2.53	.28	.87	.65
Attitude 9	.19	.91	1.26	.53
Attitude 10	5.52	.06	10.79	.00
Attitude 11	2.61	.27	.80	.67
var(Frequency)			1.76	.41
var(Digital media)			1.27	.53
var(Attitude)			6.05	.05
cov(Frequency, Digital media)			5.41	.07
cov(Frequency, Attitude)			5.44	.07
cov(Digital media, Attitude)			5.70	.06

† CFI=.76, RMSEA=.07

‡ Observed parameters were constrained to be equal across the three samples. Null hypothesis is that the constraint is valid. Five tests reject the constraint, indicating that these coefficients differed across samples ($p < .05$, $df=2$).

§ Variance of the errors for each parameter is estimated separately for each sample. Null hypothesis is that a constraint across samples would be valid. Results suggest that constraining variance and covariance of latent factors across samples would be valid ($p > .05$, $df=2$).

¶ Digital Media items were reported on a five-point scale in *Sample 1*, edited to six-point scale in *Sample 2* and *3*.