

VALIDITY AND RELIABILITY EVIDENCE OF THE TOCA-C IN A SAMPLE OF GREEK STUDENTS¹

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Summary.—Validity and reliability evidence of the Teacher Observation of Classroom Adaptation-Checklist (TOCA-C) was examined in 186 Greek students through exploratory factor analysis, divergent and concurrent validity, internal consistency, and test-retest reliability. The TOCA-C showed a high internal consistency for the three factors of Concentration Problems, Disruptive/Aggressive Behaviour, and Prosocial Behaviour (α s = .89–.96), and acceptable two-week test-retest reliability. The three-factor solution explained 74.50% of the total variance. Regarding divergent validity, a significant Sex \times Disability interaction was evident for Disruptive Behaviour, with women scoring higher in ‘special’ and lower in ‘general’ schools compared to men. Main effects were significant across disability, but not across sex. Correlations with the Strengths and Difficulties Questionnaire suggested convergent and divergent validity evidence. The TOCA-C should be useful in testing Greek students with and without disabilities.

Adaptive behaviour is the general ability to ‘meet social and community expectations for personal independence, physical needs and interpersonal relationships’ (Brown & Snell, 2000, p. 68), according to one’s age and culture. Adaptive behaviours exhibit developmental progress, emphasizing more basic needs during childhood to more complex needs during adolescence and adulthood (Goldberg, Dill, Shin, & Viet Nhan, 2009). Furthermore, they are influenced by the social norms and values in the cultural context examined (Li, Xie, & Shi, 2012).

Various factors are related to adaptive behaviour, such as sex (Kellam, Brown, Poduska, Ialongo, Wang, Toyinbo, *et al.*, 2008; Koth, Bradshaw, & Leaf, 2009; Storr, Schaeffer, Petras, Ialongo, & Breslau, 2009), race (Goldberg, *et al.*, 2009; Storr, Wagner, Chen, & Anthony, 2011; Li, *et al.*, 2012), disability (García-Villamizar, Rojahn, Zaja, & Jodra, 2010; Brossard-Racine, Hall, Majnemer, Shevell, Law, Poulin, *et al.*, 2012; Kjellmer, Hedvall, Fernell, Gillberg, & Norrelgen, 2012), socioeconomic status (Fothergill, Ensminger, Green, Robertson, & Juon, 2009; Storr, *et al.*, 2011), age (de Bildt, Sytema, Kraijer, Sparrow & Minderaa, 2005; Ostrander, Crystal, & August, 2006), and education of parent (Papadopoulos, Metsiou, & Agaliotis, 2011). With respect to sex, several researchers have reported that boys in childhood

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and adolescence tend to develop more aggressive behaviour than girls (Dukarm, Byrd, Auinger, & Weitzman, 1996; Lahey, Schwab-Stone, Goodman, Waldman, Canino, Rathouz, *et al.*, 2000; Lundh, Wangby-Lundh, & Bjarehed, 2008; Koth, *et al.*, 2009). In contrast, Fothergill, *et al.* (2009) found no significant differences across sex with respect to delinquent behaviours in young adults.

With respect to disability, the researchers have mainly reported that individuals with disabilities have more difficulties in adaptive behaviour compared to individuals without disabilities (Goldberg, *et al.*, 2009). These deficiencies in adaptive behaviour were evident for individuals with a variety of disabilities, such as intellectual disability (Özer, Baran, Aktop, Nalbant, Ağlamış, & Hutzler, 2012), cerebral palsy (Brossard-Racine, *et al.*, 2012), blindness (Papadopoulos, *et al.*, 2011), Russell Silver syndrome (Shayle, 2009), and autism (Cotugno, 2009), compared to individuals without disabilities. Despite the above findings, a few researchers have also reported absence of differences in adaptive behaviour between individuals with and without a variety of disabilities (Fletcher, Brookshire, Landry, Bohan, Davidson, Francis, *et al.*, 1995; McDermott, Coker, Mani, Krishnaswami, Nagle, Barnett-Queen, *et al.*, 1996). McDermott, *et al.* (1996), for example, reported that children and adolescents with cerebral palsy are not characterized by behavioural problems. Similarly, Fletcher, *et al.* (1995) found no significant differences between children with and without hydrocephalus with respect to adaptive behaviour. Overall, the inconsistent findings with respect to disability and sex leave the area open for future research.

Researchers have used different scales to assess adaptive behaviour. The scales frequently reported in the literature are the Vineland Adaptive Behavior Checklist (VABS; Sparrow, Balla, & Cicchetti, 1984), the Child Behavior Checklist (CBCL; Achenbach, 1991), the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), the Teacher Observation in Classroom Adaptation (TOCA-C; Koth, *et al.*, 2009), etc. The VABS and CBCL are long scales, with 297 (Goldberg, *et al.*, 2009) and 118 items (Goodman & Scott, 1999) each, appropriate for investigation of a broad range of individual psychopathology (Giannakopoulos, Tzavara, Dimitrakaki, Kolaitis, Rotsika, & Tountas, 2009), and requiring approximately 60 to 90 min. to administer (Horvat, Block, & Kelly, 2007). The SDQ (Goodman, 1997) and TOCA-C (Koth, *et al.*, 2009), in turn, are shorter, with 25 and 21 items each, requiring substantially less time to administer. The SDQ incorporates five factors, namely hyperactivity/inattention, emotional symptoms, conduct problems, peer problems, and prosocial behaviour, is provided in separate versions for teachers, parents, and youths, has been adapted to Greek, and is considered appropriate for epidemiological studies and screening of wide samples of children from the general population (Giannakopou-

los, *et al.*, 2009). The TOCA-C, on the other hand, is administered in a face-to-face interview with a trained evaluator (usually the teacher), incorporates three factors named Concentration Problems, Disruptive / Aggressive Behaviour, and Prosocial Behaviour (Leaf, Schultz, Keys, & Ialongo, 2002), and it has not been adapted in Greek yet. Overall, the TOCA-C and SDQ require approximately the same time to administer, measure distinctive factors, and may be used in accordance for a quick and more in-depth evaluation of the student's adaptive behaviour.

In the past, researchers from different countries have used the aforementioned scales to assess behaviour. For example, the VABS was used in Vietnam (Goldberg, *et al.*, 2009), the Netherlands (de Bildt, *et al.*, 2005), Sweden (Kjellmer, *et al.*, 2012), Spain (García-Villamisar, *et al.*, 2010), Canada (Brossard-Racine, *et al.*, 2012), etc. The SDQ was used in the United Kingdom (Goodman & Scott, 1999), Italy (Di Riso, Salcuni, Chessa, Raudino, Lis, & Altoe, 2010), Japan (Iizuka, Yamashita, Nagamitsu, Yamashita, Araki, Ohya, *et al.*, 2010; Tanabe, Kashiwagi, Shimakawa, Fukui, Kadobayashi, Azumakawa, *et al.*, 2012), the Netherlands (van de Looij-Jansen, Goedhart, de Wilde, & Treffers, 2011), Greece (Giannakopoulos, *et al.*, 2009), Canada (King, Petrenchik, Law, & Hurley, 2009), etc. Moreover, the CBCL has been used in Norway (Novik, 1999), China (Leung, Kwong, Tang, Ho, Hung, Lee, *et al.*, 2006), Uganda (Bangirana, Nakasuja, Giordani, Opoka, John, Boivin, 2009) etc, while the TOCA-C was the only scale that has not been used extensively and the authors' literature review revealed few studies in the USA (Koth, *et al.*, 2009; Pas, Bradshaw, & Mitchell, 2011).

The validity and reliability of the above behavioural scales has been reported in several countries so far. With respect to the CBCL, researchers have provided evidence of predictive validity in Norway (Novik, 1999), test-retest reliability and criterion validity in China (Leung, *et al.*, 2006), internal consistency in Uganda (Bangirana, *et al.*, 2009), etc. With respect to the VABS, researchers have provided evidence of internal consistency and confirmatory factor analytic results in Vietnam (Goldberg, *et al.*, 2009) and test-retest reliability, interrater reliability, and construct validity in the USA (Ottenbacher, Msall, Lyon, Duffy, Granger, & Braun, 1999). For the SDQ, evidence of internal consistency and confirmatory factor analysis has been reported in Greece (Giannakopoulos, *et al.*, 2009), and cross validation and factorial invariance in Holland (van de Looij-Jansen, *et al.*, 2011) and Russia (Ruchkin, Kuposov, Vermeiren, & Schwab-Stone, 2012), etc. With respect to the TOCA-C, however, the validity and reliability evidence in different countries, besides the USA, has not been reported so far. Therefore, the present study was designed to examine the validity and reliability evidence of the TOCA-C in a sample of Greek adolescents. Based on the authors' literature review, the hypotheses tested were as follows: 1) There will be significant differences in TOCA-C

with respect to sex and disability (divergent validity), 2) there will be significant correlations with the factors of the SDQ (concurrent validity), and 3) the TOCA-C will have a three-factor structure (content validity) and exhibit adequate internal consistency and test-retest reliability.

METHOD

Participants

Students.—The participants were 186 students (116 boys, 70 girls), with ($N=121$) or without disabilities ($N=65$), enrolled in either 'special' or 'general' public schools. Their mean age at the time of data collection was 16.6 yr. ($SD=2.5$; range 13–26). The most common disabilities were autism, intellectual disability, and physical disabilities (e.g., cerebral palsy). The schools were selected through a purposive sampling method (Thomas & Nelson, 2003). The students' adaptive behavior was evaluated with the TOCA-C by their teachers (3 men and 4 women). The inclusion criteria were Greek citizenship, age 12 years and above, and permission from parents. Information with respect to their ages are presented in Table 1.

TABLE 1
AGE OF PARTICIPATING STUDENTS AND TEACHERS

Variable	<i>M</i>	<i>SD</i>	Min.	Max.	<i>N</i>
Students, yr.	16.67	2.53	13	26	186
Sex					
Male	16.60	2.46	13	26	116
Female	16.78	2.65	13	24	70
Disability					
With disability	17.76	2.43	13	26	121
Male	17.53	2.39	13	26	80
Female	18.21	2.47	14	24	41
Without disability	14.60	.92	13	17	65
Male	14.55	.91	13	17	36
Female	14.66	.94	13	16	29
Teachers, yr.	43.3	6.55	33	50	7

Teachers.—The students' adaptive behavior was evaluated from seven teachers (4 women, 3 men), with a range of experience from 10 to 30 years. Their mean age at the time of data collection was 43.3 yr. ($SD=6.6$; range 33–50). The teachers who assessed the adaptive behavior of the students with and without disabilities worked at the respective 'general' and 'special' schools where the students were enrolled at the time of data collection. The only inclusion criterion was the teacher's consent to participate in the study.

Measurement Instruments

The Teacher Observation of Classroom Adaptation–Checklist (Koth, *et al.*, 2009), the Strengths and Difficulties Questionnaire (Giannakopoulos, *et al.*, 2009), and a demographic questionnaire were used.

Teacher Observation of Classroom Adaptation–Checklist (TOCA–C).—The TOCA–C (Koth, *et al.*, 2009) was used to assess the students' classroom behaviour. The scale includes 21 items, and responses are provided on a 6-point Likert scale (anchors 1: Never and 6: Almost always) to assess the three factors of Concentration Problems (estimated with seven items; e.g., *pays attention, concentrates, works hard, etc.*), Disruptive Behaviour (assessed with nine items; e.g., *breaks rules, harms property, fights, etc.*), and Prosocial Behaviour (estimated with five items; e.g., *is friendly, is liked by classmates, etc.*). Higher scores on Concentration Problems (7 items) and Disruptive Behaviour (9 items) indicate more maladaptive behaviours, and on Prosocial Behaviour (5 items) higher scores indicate more positive behaviours.

Strengths and Difficulties Questionnaire (SDQ).—The SDQ (Giannakopoulos, *et al.*, 2009) is provided in specific versions for teachers, parents, and youths. It contains 25 items, classified under the following 5 factors: hyperactivity/ inattention, emotional symptoms, conduct problems, peer problems, and prosocial behaviour. Each item uses a 3-point ordinal Likert scale (0: Not true; 1: Somewhat true; 2: Certainly true). Responses are coded 0–2 for negatively worded items and are coded inversely, 2–0, for positively worded items. Higher scores indicate more problematic attributes for the five factors and the total SDQ score. The version for youth was used in the present study. The reliability and validity of the Greek version of the SDQ has been examined by Giannakopoulos, *et al.* (2009). The validity was established through confirmatory factor analysis (CFA), while the internal consistency was examined with Cronbach's α . The α coefficient for the total difficulties score was .77, while the α s for prosocial behaviour, emotional symptoms, and hyperactivity/ inattention were .72, .73, and .63, respectively.

Demographic Questionnaire.—The demographic questionnaire collected information for sex, age, educational level, and socioeconomic status.

Translation and Administration Procedure

The translation validity process was used to adapt the checklist into the Greek language (Mouratidou, Barkoukis, Zahariadis, & Arampatzis, 2007). Specifically, the TOCA–C was translated into Greek from a bilingual expert holding a Ph.D. in a related academic field in an English-speaking university abroad. Then the Greek version was back-translated into English from another bilingual expert holding the same qualifications. The latest version was examined and compared with the original of Koth, *et al.*

(2009) for clarity and conceptual equivalence (Papadopoulos, *et al.*, 2011). No items exhibited ambiguous meaning and the Greek TOCA-C was considered ready to administer.

After completion of the translation validity process, a pilot study was conducted. Throughout the pilot study the primary researcher and another physical educator, both employed in separate public schools, rated 10 students. The physical educator reported that the wording of items and the overall clarity of the scale were acceptable and the agreement between the two assessors was 90% (Thomas & Nelson, 2003).

A purposive sampling selection was then used to recruit the sample of students and teachers from 'general' and 'special' schools (Thomas & Nelson, 2003). Specifically, four 'special' schools were selected, from Athens, Greece. The 'special' schools enrolled students with a variety of developmental and physical disabilities, such as intellectual disability, autism, and cerebral palsy. The 'general' schools ($N=4$) were selected from the same municipalities in Athens with the 'special' schools.

Data collection was conducted according to the University's ethics code and with permission from the Pedagogical Institute of Greece. The primary researcher also obtained permission from the participants, the parents, the teachers, and the schools' administrators. The teachers were reassured that their responses would remain confidential. After that, instructions about the completion of the checklists were given to teachers who were asked to complete the TOCA-C, the SDQ, and a demographic questionnaire for each student, separately. Each student was rated by one teacher. The completion of the two checklists and the demographic questionnaire lasted approximately 15 to 20 min.

The completion of the questionnaires was held in the presence of the primary researcher who was able to support, if needed, explain, or provide instructions to the teachers. To test the stability of the instrument, the TOCA-C was reassessed within 10 to 15 days after the first assessment, in the whole sample.

Statistical Analyses

The Statistical Package for the Social Sciences (SPSS Version 18) with three independent groups 2×2 factorial ANOVAs, exploratory factor analysis, Cronbach's α , Intraclass Correlation Coefficients (ICC), and Pearson coefficients were used for data analysis (Pedhazur & Pedhazur-Schmelkin, 1991; Hair, Anderson, Tatham, & Black, 1998; Stevens, 2002). Specifically, Cronbach's α examined the internal consistency, while the ICC examined the stability of the TOCA-C across the two assessments, 10 to 15 days apart. Pearson's r examined the concurrent validity. The correlations $<.20$ were considered low, $.20-.30$ low-moderate, $.31-.50$ moderate, and $>.50$ moderate-to-high (Cohen, 1988). The 2×2 ANOVAs examined the interac-

tion and main effects between sex and disability with respect to the three TOCA–C factors and overall the divergent validity of the scale. To evaluate the construct validity of the TOCA–C, the data from the first assessment was used for an exploratory factor analysis (EFA) with oblique rotation. Items with factor loadings above .40 with the hypothesized factor were retained, while the criteria of scree plot and eigenvalues (> 1.0) were used to retain the extracted factors. The .05 level of significance was selected to test the statistical hypotheses. The Bonferroni adjustment ($.05/3$) was introduced for the main effects divergent validity hypotheses.

RESULTS

Descriptive statistics for the three TOCA–C factors are presented in Table 2.

TABLE 2
DESCRIPTIVE STATISTICS FOR THREE TOCA–C FACTORS

Variable	Concentration Problems			Disruptive Behaviour			Prosocial Behaviour		
	M	SD	N	M	SD	n	M	SD	n
Sex									
Boys	3.76	1.11	116	2.05	0.92	116	3.66	0.92	116
Girls	4.06	1.04	70	2.02	0.87	70	3.80	3.92	70
With disability	3.59	1.00	121	2.22	0.86	121	3.49	0.92	121
Without disability	4.40	1.05	65	1.69	0.87	65	4.16	0.76	65
Boys with disability	3.55	1.03	82	2.14	0.87	81	3.46	0.90	82
Boys without disability	4.28	1.11	36	1.88	1.01	36	4.11	0.80	36
Girls with disability	3.74	0.95	42	2.39	0.85	42	3.58	0.94	43
Girls without disability	4.55	0.97	29	1.48	0.61	29	4.22	0.73	29

Construct Validity of the TOCA–C: Exploratory Factor Analysis (EFA)

The significant Barlett's test of sphericity ($3839/70$, $p < .001$) and the criterion KMO (0.934) were in the appropriate range (Stevens, 2002). Therefore, the data were considered appropriate for EFA. The item means and standard deviations may be found in Table 3. The inter-item correlations may be found in Table 4. The results provided a three-factor solution according to the scree plot, with eigenvalues greater than 1, explaining 74.50% of the total variance. All factor loadings had values above .40 with the hypothesized factor, besides Item 6 (under Disruptive Behaviour) which was near the pre-determined criterion (.36). The seven items of the first factor, Concentration Problems, accounted for 49.97% of the total variance with an eigenvalue of 10.50. The second factor, Disruptive Behav-

TABLE 3
ITEM MEANS AND STANDARD DEVIATIONS FOR TOCA-C FACTORS (N=186)

Concentration Problems			Disruptive Behaviour			Prosocial Behaviour		
Item	M	SD	Item	M	SD	Item	M	SD
1	4.03	1.43	4	2.30	1.38	2	4.83	1.24
3	4.12	1.46	6	2.18	1.17	5	4.38	1.32
7	4.06	1.53	8	2.00	1.20	9	3.72	1.69
11	3.96	1.56	10	2.76	1.30	14	4.87	1.17
13	3.70	1.50	12	2.09	1.26	17	3.56	1.72
19	3.88	1.52	15	1.88	0.96			
21	3.80	1.55	16	1.62	1.00			
			18	1.61	0.94			
			20	1.94	1.20			

our, accounted for 17.37% of the variance and the respective eigenvalue was 3.65. The third factor, Prosocial Behaviour, accounted for 7.16% of the variance and the eigenvalue was 1.50. The results of the EFA, with respective factor loadings $>.40$, eigenvalues, percentages of explained variability, and Cronbach's α indexes may be found in Table 5.

Divergent Validity

The three 2×2 ANOVAs examining the interaction effect between sex and disability were not significant for Concentration Problems ($F=0.06$, $p=.81$, $\eta^2=0.00$) or Prosocial Behaviour ($F=0.00$, $p=.99$, $\eta^2=0.00$), but significant for Disruptive Behaviour ($F=5.83$, $p=.02$, $\eta^2=0.03$). With respect to Disruptive Behaviour, the t parameter estimates were used as a simple main effect test and examined sex differences separately for the 'special' and 'general' schools. The results indicated a small effect for the 'special' schools ($t=-1.51$, $p=.13$, $\eta^2=0.03$) and a medium effect size for the 'general' schools ($t=1.89$, $p=.06$, $\eta^2=0.05$). Examination of the respective mean scores (Table 2) suggested that the group of girls scored higher in 'special' and lower in 'general' schools, compared to their male counterparts. The above findings are shown in Fig. 1. Accordingly, the main effect hypotheses were examined for Concentration Problems and Prosocial Behaviour, separate for disability and sex.

Differences across disability.—There were significant ($p<.05/3$) differences for the three factors of Concentration Problems ($F=23.13$, $p<.001$, $\eta^2=0.11$), Disruptive Behaviour ($F=18.76$, $p<.001$, $\eta^2=0.09$), and Prosocial Behaviour ($F=22.58$, $p<.001$, $\eta^2=0.11$) between students with and without disabilities. Examination of the mean scores revealed that students with disabilities scored significantly higher in the second (Disruptive Behaviour) and lower in the first (Concentration Problems) and third factors (Prosocial Behaviour), compared to students without disabilities.

AQ:1

TABLE 4
INTER-ITEM CORRELATIONS*

Item	Concentration Problems							Disruptive Behaviour										Prosocial Behaviour					
	1	3	7	11	13	19	21	4	6	8	10	12	15	16	18	20	2	5	9	14	17		
1	.93	.90	.84	.92	.62	.84	.83																
3		.92	.83	.90	.62	.84	.81																
7			.94	.86	.49	.85	.87																
11				.94	.63	.86	.85																
13					.49	.57	.55																
19						.92	.84																
21							.92																
4								.78	.55	.68	.48	.55	.56	.49	.62	.50							
6									.65	.52	.45	.44	.42	.34	.46	.38							
8										.88	.55	.75	.67	.63	.62	.74							
10											.73	.68	.61	.43	.37	.49							
12												.87	.74	.65	.55	.69							
15													.83	.69	.47	.73							
16														.75	.42	.68							
18															.71	.51							
20																.81							
2																	.81	.74	.69	.60	.63		
5																		.84	.73	.67	.69		
9																				.91	.48	.74	
14																						.47	.52
17																							.88

*Item-total correlations in the diagonal (bold characters)

Differences across sex.—There were no significant ($p > .05/3$) differences for the three factors of Concentration Problems ($F = 0.06$, $p = .81$, $\eta^2 = 0.00$), Disruptive Behaviour ($F = 0.34$, $p = .56$, $\eta^2 = 0.002$), and Prosocial Behaviour ($F = 0.67$, $p = .41$, $\eta^2 = 0.004$), between boys and girls.

Concurrent Validity

Pearson's r was used to estimate the concurrent validity of the TOCA-C. Specifically, the correlations among the three factors of the TOCA-C and the five factors and total score of the SDQ were evaluated. The results revealed coefficients ranging from $-.30$ to $.87$ and are presented in Table 6.

Reliability of TOCA-C

The TOCA-C was administered twice to the total sample of students with and without disabilities (test-retest method), with a time interval of

TABLE 5
RESULTS OF EXPLORATORY FACTOR ANALYSIS OF TOCA-C

AQ:2

Item and Factor	Factor Loadings			h^2
	Concentration Problems	Disruptive Behaviour	Prosocial Behaviour	
Concentration Problems				
Item 1	.89			.93
Item 3	.87			.92
Item 7	.77			.88
Item 11	.87			.95
Item 13	.85			.74
Item 19	.87			.91
Item 21	.82			.90
Disruptive Behaviour				
Item 4		.55		.70
Item 6		.36		.52
Item 8		.80		.86
Item 10		.72		.72
Item 12		.90		.89
Item 15		.89		.87
Item 16		.81		.80
Item 18		.52		.64
Item 20		.86		.85
Prosocial Behaviour				
Item 2			-.69	.83
Item 5			-.77	.87
Item 9			-.55	.76
Item 14			-.75	.78
Item 17			-.73	.80
Eigenvalues	10.50	3.65	1.50	
% Explained Variance	49.97	17.37	7.16	
Cronbach's α	.96	.92	.89	

Note.— h^2 = communalities.

10–15 days between the two assessments. The intraclass coefficients were .92 for Concentration Problems, .85 for Disruptive Behaviour, and .85 for Prosocial Behaviour.

DISCUSSION

The present study examined the validity and reliability of the TOCA-C in a Greek sample of students with and without disabilities. The explor-

TABLE 6
CORRELATIONS AMONG TOCA-C AND SDQ FACTORS

Scale and Subscale	2	3	4	5	6	7	8	9
TOCA-C								
1. Concentration Problems	.75	-.41	-.31	-.51	.74	-.58	.73	-.70
2. Prosocial Behaviour		-.37	-.30	-.40	-.57	-.76	.82	-.65
3. Disruptive/Aggressive Behaviour			.55	.84	.57	.32	-.29	.71
SDQ								
4. Emotional Symptoms				.60	.53	.43	-.18	.80
5. Conduct Problems					.64	.35	-.36	.80
6. Hyperactivity/Inattention						.50	-.57	.87
7. Peer Problems							-.65	.70
8. Prosocial Behaviour								-.60
9. Total Difficulties								

Note.—All correlations were statistically significant at $p < .01$.

atory factor analysis revealed that the 21 items in three factors, according to the suggested statistical criteria explained 74.50% of the total variance. This is considered satisfactory (Pedhazur & Pedhazur-Schmelkin, 1991; Hair, *et al.*, 1998; Stevens, 2002). Specifically, Hair, *et al.* (1998) reported that in the social sciences a percentage of 60%, with respect to the interpreted dispersion is satisfactory. Pedhazur and Pedhazur-Schmelkin (1991) stated that it is satisfactory for the first two or three factors to cover more than 50% of the variance. In the present study, the first two factors (Concentration Problems and Disruptive Behaviour) explained 67.35% of the variance, which is in accordance to the recommendations above (Pedhazur & Pedhazur-Schmelkin, 1991; Hair, *et al.*, 1998; Stevens, 2002).

The Disruptive Behaviour scores of male and female students with and without disabilities differed, therefore providing initial evidence of divergent validity. Specifically, boys in general schools had higher mean scores in Disruptive Behaviour compared to girls, while the opposite was evident in special schools. Similarly, Crick and Grotpeter (1995) found that girls exhibited more relational aggression during adolescence, compared to boys, in general schools. On the other hand, Lahey, *et al.* (2000) examined the aggressive behaviour of children and adolescents and found that aggression was more common in boys. Similarly, Fothergill, *et al.* (2009), found no significant sex differences with respect to the onset of delinquent behaviour during early adulthood.

The main effect differences across disability supported the divergent validity evidence, since students with disabilities scored higher on Disruptive Behaviour and lower on Concentration Problems and Prosocial Behav-

ious, compared to their counterparts without disabilities. This finding is in agreement with Shayle (2009), Vles, Hendriksen, Vles, Kessels, and Hendriksen (2012), King, *et al.* (2009), Goldberg, *et al.* (2009), Ozer, *et al.* (2012), Cotugno (2009) and Brossard-Racine, *et al.* (2012). Specifically, Shayle (2009) assessed the long-term cognitive, behavioral, and psychosocial consequences for children with Russell Silver Syndrome (RSS) and found that children with RSS had more behavioral problems compared to children without RSS syndrome. Vles, *et al.* (2012) examined the psychosocial adjustment in children with cerebral palsy from Denmark and found that children with cerebral palsy showed lower psychosocial adjustment compared to 'typical' children. Similarly, King, *et al.* (2009) found that children with physical disabilities showed lower perceived competence and efficiency compared to children from the 'general' population. Goldberg, *et al.* (2009) and Ozer, *et al.* (2012) found that people with intellectual disabilities had more difficulties in adaptive behavior compared to individuals without disabilities. Cotugno (2009) found that children with autism were characterized by significant deficiencies in social interaction, have difficulty developing friendships, and lack interest and participation in social activities. Similarly, Brossard-Racine, *et al.* (2012) found that children with cerebral palsy showed more behavioural problems compared to children without cerebral palsy. In contrast, McDermott, *et al.* (1996) examined children and adolescents with cerebral palsy and found that they were not characterized by behavioural problems. Fletcher, *et al.* (1995) assessed the adaptive behaviour in children with hydrocephalus and children from the 'general' population and found no significant differences between the two groups. The differences in the present study and the studies of McDermott, *et al.* (1996) and Fletcher, *et al.* (1995) may be due to the absence of a specific disability type in the current sample of Greek students, compared to the studies abroad.

Regarding the absence of sex differences in TOCA-C scores, this finding is in agreement with Vrijmoeth, Monbaliu, Lagast, and Prinzie (2012), Fothergill, *et al.* (2009), and Anderson, Gillberg, and Miniscalco (2013). In particular, Vrijmoeth, *et al.* (2012) examined behavioural problems in children with motor and intellectual disabilities and found that behavioural problems were not related to sex. Also, Fothergill, *et al.* (2009) found no significant differences according to sex for the onset of delinquent behaviour during early adulthood. Anderson, *et al.* (2013) assessed the developmental, social, and linguistic characteristics in children with autism and found no statistically significant differences between the two sexes. Finally, Crick and Grotpeter (1995) found that girls exhibited more relational aggression during adolescence and less during childhood, compared to boys.

In contrast, Koth, *et al.* (2009) found that girls tended to be rated as having fewer behaviour problems and exhibited higher prosocial behav-

our than boys. Lahey, *et al.* (2000) found that boys are more likely than girls to display disruptive behaviour at school. Bernedo, Salas, García-Martín, and Fuentes (2012) assessed the adaptive behaviour in children in foster care and found that boys showed more behaviour problems than girls. Also, Dukarm, *et al.* (1996) found that boys exhibited more delinquent behaviour than girls during adolescence. Storr, *et al.* (2009) found that boys displayed more disruptive behavior than girls in early childhood. Similarly, Lundh, *et al.* (2008) examined the emotional and behavioural problems of adolescents and found that girls reported more prosocial behaviour and fewer conduct problems than boys.

Concurrent validity evidence was provided through the associations between the TOCA-C and the SDQ subscales, according to the criteria of Cohen (1988). The correlations were stronger between the TOCA-C Disruptive Behaviour and the SDQ Conduct Problems and Total Difficulties, compared to the other two TOCA-C subscales. Similar findings were reported by Pas, *et al.* (2011) and Morgan-D'Atrio, Northrup, LaFleur, and Spera (1996), who found that fewer students were rated by teachers as displaying attention problems than were rated as aggressive or delinquent. Moreover, SDQ Prosocial Behaviour was correlated moderately with TOCA-C Prosocial Behaviour, while TOCA-C Disruptive Behaviour correlated highly with the SDQ Conduct Problems and Total Difficulties subscales, respectively. SDQ Total Difficulties correlated moderately with TOCA-C Concentration Problems.

Previous studies have reported similar associations between several questionnaires reporting behaviour (Muris, Meesters, & van den Berg, 2003; Ruchkin, *et al.*, 2012). For example, the most substantial correlations emerged between scales that tapped similar domains of psychopathological symptoms, e.g., between SDQ emotional symptoms and CBCL internalising ($r = .70$); SDQ conduct problems and CBCL externalising ($r = .60$); and SDQ hyperactivity-inattention and CBCL attentional problems ($r = .65$) (Muris, *et al.*, 2003). Similarly, Ruchkin, *et al.* (2012) found significant associations between the SDQ Conduct Problems and Swanson, Nolan, and Pelham's (SNAP-IV) Oppositional Defiant Disorder ($r = .68$) and SNAP-IV Conduct Disorder subscales ($r = .55$).

Interestingly, TOCA-C Concentration Problems correlated moderately and positively with the Prosocial Behaviour scales of both the TOCA-C and the SDQ. TOCA-C Concentration Problems items are negatively worded, meaning that the higher scores are associated with less concentration difficulties. On the other hand, the Prosocial Behaviour of both the TOCA-C and the SDQ are positively worded, meaning that the higher scores are associated with more prosocial behaviour. For example, the Concentration Problems consist of items such as 'pays attention,' 'concentrates,' 'works hard.' TOCA-C Prosocial Behaviour has items such as 'is friendly,' 'is liked by classmates,'

while the SDQ Prosocial Behaviour has items such as 'I usually share with others,' 'I am kind to younger children.' The wording of the above items explains the positive correlations among the respective subscales. Moreover, 12 correlations between the TOCA-C and SDQ scales were strong. These correlations suggested that the SDQ was a properly selected criterion and the concurrent validity evidence for the TOCA-C is robust.

Regarding the internal consistency of the TOCA-C, Cronbach's α s ranged from .89 to .96 and were all in the appropriate range ($>.70$; Hair, *et al.*, 1998; Langdridge & Butt, 2004). The results of the present study are in agreement with Koth, *et al.* (2009). Specifically, Koth, *et al.* (2009) reported α coefficients of .95 to .97, .87 to .93, and .88 to .92 for Concentration Problems, Disruptive Behaviour, and Prosocial Behaviour, respectively. With respect to the test-retest reliability, the present findings are in agreement with Storr, *et al.* (2009), who reported Pearson coefficients of .60 and above. The results also agree with Werthamer-Larsson, Kellam, & Wheeler (1991), who reported coefficients ranging from .75 to .94.

Conclusively, the present findings provide initial construct validity evidence for the TOCA-C (Thomas & Nelson, 2003) in a sample of Greek students with and without disabilities. Specifically, the questionnaire successfully separated students according to disability (with and without disabilities), while no differences were found across sex. Further, satisfying intercorrelations were evident between the TOCA-C factors and the SDQ, while the exploratory factor analysis revealed that the three factors explained adequate variance (Stevens, 2002). The scales had satisfactory test-retest reliability evidence. The TOCA-C, therefore, can be used to assess students' adaptive behaviour as a viable alternative to other commonly used teacher-reported measures of children's behavior in Greece.

Certain limitations may have influenced the present findings, and the results may not be generalized without caution. These limitations are the purposive sampling selection, the small number of participants ($N=186$), the heterogeneity of the sample with respect to disability, and the multicollinearity among the seven items of the Concentration Problems scale. Specifically, the correlations among the seven Concentration Problems items ranged from .92 to .49, with 3 bivariate indexes above .90. This multicollinearity evidence suggested that this factor requires cross-cultural adaptation, with certain items modified according to the sociocultural context (Marsh, Asci & Tomas, 2002; Marsh, Marco & Abcy, 2002).

Another limitation is the absence of information on the socioeconomic status of parents. In particular, the authors had no access to the student files within the schools where the study was held, and established no contact with parents during the period of data collection. For the purposes of the study, general and special schools were selected from the same geo-

graphic area, in an attempt to control for the socioeconomic variables of students either with or without disability. Finally, there was an attempt to control for the assumption of independent observations through the agreement between assessors in the pilot study and the standardized instructions provided to the teachers before data collection.

Future researchers may replicate the study and overcome the above limitations, provide further validity and reliability evidence through confirmatory factor analysis, with a more representative sample of students, and examine the invariance of the TOCA-C across sex and disability.

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Author Query

AQ1: Where is Fig. 1?

AQ2: Please add the rest of the factor loadings for comparisons in future research.