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Intellectual Profile of Sexually Abused Children in Japan: An Analysis of WISC-III Subtests Compared with Physically Abused, Neglected, and Non-Maltreated Children

Kohske Ogata
Osaka Prefectural Government Tondabayashi Child-Family Center, Tondabayashi, Japan.
Email: koh-ske@sakai.zaq.ne.jp
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In previous studies, a subtest profile of the Wechsler series test was used to characterize maltreated children. Specifically, a higher score on the Picture Completion suggested hypervigilance symptoms related to post-traumatic stress disorder (Frankel et al., 2000). The aim of this study was to replicate the previous study using Japanese children and to extend the findings by examining the types of maltreatment, especially focusing on child sexual abuse. Participants were selected retrospectively from records at a Child Guidance Center, where maltreated children were protected, assessed, and treated in Japan. Data of 12 sexually abused children, 12 physically abused, 12 neglected, and 12 non-maltreated, matched for sex and age, were collected. All children had completed the Wechsler Intelligence Scale for Children third edition Japanese version; 10 core subtests were used as dependent variables and Full Scale IQ was used as a covariate. Analysis of covariance showed significant differences on both the Picture Completion and Vocabulary subtests among groups. Post-hoc tests indicated that sexually abused children scored higher than non-maltreated comparisons on the Picture Completion test, but there were no significant differences on the Vocabulary test between sexual abuse and other groups. These findings replicate and extend the results reported in previous studies. The clinical implication of this study within the Japanese cultural context suggests that sexually abused children with higher scores on the Picture Completion test should be referred to a child psychiatrist to screen for post-traumatic symptoms.

Keywords: WISC-III, Child Sexual Abuse, Subtest Profile, Intelligence

Introduction

Frankel, Boetsch, and Harmon (2000) studied the elevated Picture Completion score of maltreated children. The researchers demonstrated that maltreated preschoolers scored significantly higher on the Picture Completion subtest of the Wechsler Preschool and Primary Scale of Intelligence Revised (WPPSI-R) compared with the children's mean scores of performance subtests and all subtests. Frankel et al. (2000) concluded from the results that a higher score on the Picture Completion test related to a hypervigilance symptom of post-traumatic stress disorder (PTSD) in maltreated children.

In Turkish literatures, Bulut and colleagues studied the PTSD in children who have experienced the natural disasters (Bulut, 2004, 2006, 2010; Bulut, Bulut, & Tayli, 2005). For example, Bulut (2010) reported from longitudinal investigations that overall PTSD rates of children gradually decreased. The research revealed the gender differences that were detected on intrusion and avoidance symptoms. Factor analyses on the sub-symptoms showed that avoidance loaded across factors, and the avoiding place behavior was associated with vigilance symptom (Bulut, 2004).

To the best of the author's knowledge, no research in Japan has yet been carried out to examine developmental effects by the form of child maltreatment; with respect to PTSD, child sexual abuse (CSA) is likely to be a more serious traumatic event (Rowan & Foy, 1993) and have tremendously detrimental effects on child development than physically abused or neglected children (Schaaf & McCanne, 1998; Sullivan, Fehon, Andres-Hyman, Lipschitz, & Grilo, 2006; Widom, 1999).

The aim of the current study is twofold: to replicate the findings of Frankel et al. (2000) using Japanese samples, hypothesizing that the Picture Completion test of Japanese maltreated groups gives scores higher than the non-maltreated group; to extend the findings by examining the differential effects of maltreatment types, particularly predicting that the score of sexually abused children, the primary focus of this study, will be highest in the present groups.

Methods

Participants. The participants were selected from case file records at a child guidance center (CGC) in Osaka Prefecture, Japan. The total number of candidates was 705 maltreated cases: 349 child physical abuse (CPA), 29 CSA, and 327 child neglect (CN). Sample selection was conducted as follows. First, children with both a history of CSA and whose psychometric intelligence had been tested using the Wechsler Intelligence Scale for Children third edition (WISC-III) were elicited from the case files. Informed consent had been obtained from their parents or caregivers at the outset of administration of the test. Thus, 12 records of CSA cases were obtained, and they all were girls. CSA was defined in this study as attempted or actual sexual contact or interaction of any form between the participant and a caregiver or other responsible adult for purposes of the adult's sexual gratification. Sexual contact experiences

ranged from fondling, genital touching, and masturbation of or by another person to attempted or completed vaginal intercourse. Secondly, 12 CPA cases, who had been tested using the WISC-III and had no experience of other forms of maltreatment from their records, were matched for sex and age in months, which was limited to the range from one year or older to one year or younger than that of the CSA counterpart. Physical abuse consisted of bruises, burns, cuts, scratches, or bone fractures. Thirdly, 12 CN girls were selected using the same criteria as the CPA group. Neglect was composed of two subtypes: the first subtype, failure to provide, involves the failure of the caregiver or responsible adult to meet the minimum physical needs of the child; the second subtype, lack of supervision, occurs when the caregiver or responsible adult does not take sufficient, developmentally appropriate action to ensure the child's safety inside and outside the home setting. Finally, 12 girls who had neither been abused nor neglected from their records and had been tested using the WISC-III was matched for comparison (Non-Maltreated: NM group). The NM group on CGC had such alleged problems as 4 juvenile delinquency, 2 truancy, 2 low school achievement, 3 school refusal, and 1 intellectual disability. The child who was alleged by her parents to have intellectual disability was tested and the results disproved this assertion. The NM group did not experience any maltreatment, according to information in the records obtained from their parents. All CGC reports, whether substantiated or not, were considered reliable indicators of maltreatment in Japan. The sample selection in this study included only the above criteria and other clinical data were not involved. All 48 participants were girls and their mean ages ranged from 7 to 16 years, as shown in Table 1.

Procedures. A child's cognitive development was measured by the WISC-III Japanese version; the author confirmed from the case files that a trained child psychologist had administered the WISC-III to the child in a CGC. The WISC-III Japanese version has been standardized using a national sample of 1,125 children ranging in age from 5 through 16 years and 11 months. In Japan, the WISC-III was revised from the WISC-R in 1998. Psychometric traits of the WISC-III Japanese version were adequate for reliability and validity (Wechsler, 1991/1998). Reliability coefficients, based on split-half correlations, range from .64 to .85 for the 10 core subtests, and .95 for the FIQ; reliability coefficients, based on test-retest correlations, range from .54 to .89 for the 10 core subtests, and .93 for the FIQ (Wechsler, 1991/1998). Construct validity was also confirmed using factor analysis; the four factor model was adopted, which is the same as the original Wechsler model. The test comprises 10 core and 3 supplemental subtests. This study analyzed only the 10 core subtests because a large number of values were missing on the supplemental subtest scores.

Results

Mean and standard deviation of subtest scores are shown in Table 1. Results showed no differences in age ($F[3, 44] = .009$, $p = .999$) but a significant difference of the FIQ between groups; the IQ range of the NM group was 82 to 107, including no children with intellectual disabilities.

ANCOVA was performed on 10 subtests among groups. In the analyses, FIQ was related to the differences in subtest scores and therefore used as a covariate; age did not reach significance and therefore was not used as a covariate. The independent variable was group status (CSA, CPA, CN, NM) and the dependent variables were the 10 subtest scores. Due to the number of comparisons, the Bonferroni correction was employed, and alpha was set at .005 for each F test. Before the F tests of the main outcomes, three pretests were conducted to confirm the validity of applying ANCOVA to the data in this study (Table 2). Firstly, equivalent slopes of regressions, which reflected the relationship between the FIQ and each subtest score across groups, were confirmed. On all subtests, the differences of the slopes did not reach significance and therefore all regressions seemed to be parallel across groups. Secondly, it was underpinned that the regression coefficients from the FIQ to each subtest score were significant. Thirdly, the Levene tests verified the equality of variance in the groups. Finally, F tests were conducted on the basis of the results in the three pretests. In ANCOVA, significant differences were detected on the Picture Completion and the Vocabulary subtests (Table 2).

Table 1.
WISC-III subtest scores, FIQ, and age among groups.

Subtests	CSA		CPA		CN		NM		ANOVA	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	$F(3, 44)$	*p*
Picture Completion	8	3	7	2	6	3	7	2	0.910	.444
Information	5	2	7	3	4	2	8	2	5.900	.002
Coding	7	4	9	4	8	3	10	2	1.733	.174
Similarity	6	3	7	3	6	3	10	2	7.615	.000
Picture Arrangement	6	3	6	2	7	2	9	3	4.228	.010
Arithmetic	5	3	8	3	4	3	9	1	7.259	.000
Block Design	8	4	7	4	7	3	10	3	1.427	.248
Vocabulary	6	2	8	2	5	2	10	3	10.627	.000
Object Assembly	8	3	6	3	7	4	8	3	0.805	.498
Comprehension	8	3	8	2	7	3	10	2	4.495	.008
FIQ	76	17	79	14	76	13	93	8	4.352	.009

Table 2.
Results of ANCOVAs on subtest scores using FIQ as a covariate.

Subtests	Equivalent slope across the groups		Regression significance		Levene test		*F* test		
	F(3, 40)	*p*	*F*(1, 43)	*p*	*F*(3, 43)	*p*	*F*(3, 43)	*p*	η^2
Picture Completion	0.052	.984	44.651	.000	0.869	.465	5.159	.004	.265
Information	2.113	.114	29.083	.000	0.676	.571	3.079	.037	.177
Coding	1.024	.392	25.860	.000	0.483	.696	1.019	.394	.066
Similarity	0.387	.763	27.237	.000	1.751	.170	2.671	.059	.157
Picture Arrangement	1.370	.266	40.770	.000	1.466	.237	1.660	.190	.104
Arithmetic	2.183	.105	21.997	.000	0.808	.496	4.585	.007	.242
Block Design	1.357	.270	44.754	.000	0.554	.648	0.550	.651	.037
Vocabulary	1.023	.392	12.235	.001	2.360	.084	5.808	.002	.288
Object Assembly	1.177	.331	44.118	.000	0.507	.679	3.782	.017	.209
Comprehension	0.729	.541	11.183	.002	0.668	.576	1.531	.220	.097

Significant effects detected in ANCOVA were assessed using post-hoc procedures corrected by the Bonferroni method (Figure 1). Post-hoc analyses indicated that only the pair between the CSA and NM on the Picture Completion test reached significance, set at 0.00833; the CSA group had a higher score than the NM group on the Picture Completion subtest. No other comparisons were significant.

Discussion

These results are similar to Frankel and colleagues' (2000) findings in that only the Picture Completion subtest score was higher in the CSA than the NM group; however, in this study there were no difference between the other maltreated groups and the comparison group. These findings render this study a partial replication of their study with a Japanese sample. Most previous studies have used Western populations and therefore most of those findings cannot be generalized to Japanese subjects. This research has some advantages in extending the findings of Frankel et al. (2000), indicating that although limited to the CSA, generalization of the findings would be partially valid.

The present findings need to be validated from cross-cultural perspectives. Japanese culture has collectivistic characters in nature, and Turkish culture also has similar ones. Bulut et al. (2005) investigated the Turkish children who experienced the earthquake in 1999 and compared the high-impact with low-impact trauma groups on PTSD diagnosis. Results showed that there was no significant difference between high and low impact groups, suggesting that on the number of children who met the PTSD requirement was almost the same in both groups in number and severity. However, the results of another research, comparing the exposed with non-exposed group, indicated that the estimated prevalence rates of PTSD reached on a very high proportion of 73% in the earthquake exposed group whereas 9% in the non-exposed-control group (Bulut, 2006). Thus, findings obtained by Bulut and colleagues suggests that exposure to the traumatic event may suffer from PTSD in Turkish culture similar to Japanese one. The CSA as well as the natural disasters appeared to have traumatic impact on the PTSD in victim children. The current findings might have some cross-cultural validity in particular compared with Turkish literatures.

In addition to the generalization, the extension of the previous study was confirmed. Frankel et al. (2000) used various samples compounded from all types of maltreatment, and therefore no analysis was performed on the factor of maltreatment forms. The results of the present study demonstrated that only the CSA group was higher than the NM group on the Picture Completion test. These findings suggested that the type of maltreatment has diverse effects on child cognitive development, and the CSA might be different from both the CPA and CN. Given that the Picture Completion test represents a marker of the hyper-arousal symptom of PTSD, these findings showed that the CSA may influence their vigilance ability.

These findings suggest a clinical implication in the Japanese cultural context. A sexually abused child who scores higher on the Picture Completion test should be referred to a child psychiatrist for screening for traumatic symptoms for the CSA. In Japan, maltreated children are not necessarily referred for medical evaluation of their traumatic symptoms. In practice, in the CGC, a child psychologist routinely evaluates the intellectual and emotional status of children, but is not trained to conduct diagnostic evaluations. In the CGC, both a social worker and a child psychologist usually work together for maltreated children but a child psychiatrist is rarely involved; however, the CSA might be a more traumatic event and probably has exacerbating effects on a child. These findings can be used as a cue for staff at the CGC to support their decision making and to determine if more extensive medical support is needed for the child.

An alternative interpretation of the elevated Picture Completion score may involve the level of motivation for completing the intelligence test. The Picture Completion test is the first subtest in the WISC-III sequence, and might score relatively higher among all subtests if sexually abused children have a difficulty with attention–retention (Bremner, Narayan, Staib, Southwick, McGlashan, & Charney, 1999); however, difficulties with concentration were not measured in this study, and further studies are needed to clarify the association between CSA and attention–retention problems.

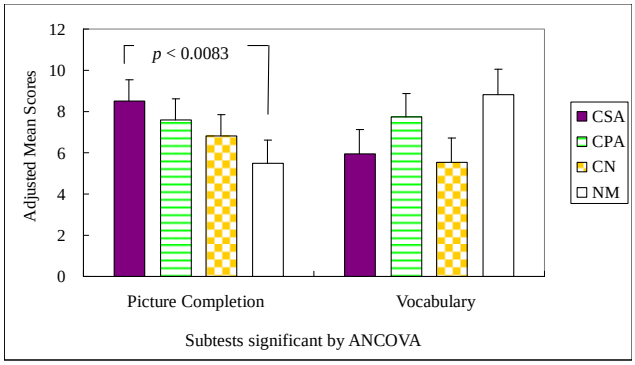

Figure 1.
Post-hoc tests on the two subtests for which ANCOVA detected significant differences. Comparisons were examined between the sexual group and the other three groups. Due to comparing 6 *pairs, Bonferroni corrected alpha was set at* 0.0083. *Mean scores were adjusted by the FIQ as a covariate; error bars indicate* 95% *confidence interval.*

There was a limitation of this study. Socioeconomic status (SES) was not measured because the FIQ was controlled directly as a covariate. Most previous research has measured the SES to reduce the environmental effect on the difference in IQ between the maltreated group and the comparison group (e.g., Perez & Widom, 1994). Nevertheless, the SES was found not to be a determinant factor in the intellectual functioning of maltreated children. Perez & Widom (1994) showed that maltreated children had a lower IQ than non-maltreated children after controlling for the SES using multivariate analysis. Thus, adjusting the FIQ by ANCOVA would increase the internal validation of the current examination to compare the subtest profile between groups; however, it is unclear whether the SES has different effects on each subtest score, and the current findings should therefore be interpreted carefully.

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