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Measurement Invariance of Discipline in Different Cultural Contexts

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Abstract

The measurement invariance of mother-reported use of 18 discipline strategies was examined in samples from 13 different ethnic/cultural groups in nine countries (China, Colombia, Italy, Jordan, Kenya, the Philippines, Sweden, Thailand, and the United States). Participants included approximately 100–120 mothers and their children aged 7 to 10 years from each group. The results of exploratory factor analyses and multigroup categorical confirmatory factor analyses (MCCFA) indicated that a seven-factor solution was feasible across the cultural groups, as shown by marginally sufficient evidence for configural and metric invariance for the mother-reported frequency on the discipline interview. This study makes a contribution on measurement invariance to the parenting literature, and establishes the mother-report aspect of the discipline interview as an instrument for use in further cross-cultural research on discipline.

Keywords

Discipline; measurement invariance; cross-cultural research

As primary socializing agents in the lives of their children, parents have the responsibility to teach children to behave in ways that are socially accepted and adaptive in their cultural context. The methods that parents use to promote good behavior and respond to misbehavior are collectively captured in the construct of discipline.

A large body of research has examined a variety of parental discipline practices, primarily in North American and Western European countries. This research suggests that discipline can be conceptualized along at least four main dimensions. The first dimension is inductive discipline, which includes behaviors such as offering explanations and reasoning with the child (Grusec & Goodnow, 1994). A second dimension is whether the discipline involves the use of physical force. Physical punishment has been defined as parents' use of physical force to cause pain, but not injury, for the purpose of correcting or controlling a child's behavior (Straus & Donnelly, 2005). A third dimension is whether the discipline involves the manipulation of privileges, which can involve either the granting of privileges to reward good behavior or the removal of privileges to punish misbehavior (e.g., time-outs; American Academy of Pediatrics [AAP], 1998). A fourth dimension involves harsh verbal discipline, which includes behaviors such as yelling at or threatening the child verbally (Patterson, Reid, & Dishion, 1992).

Although the majority of research on discipline has included North American and Western European samples, several important studies have included samples from other regions. For example, Fung's (1999; Fung & Chen 2001) research on Taiwanese families describes mothers' use of shaming, which involves several verbal and nonverbal behaviors that are intended to make children feel ashamed for their misbehavior. This form of discipline has not been commonly studied among North American or Western European families; although it may share elements with harsh verbal discipline, the key feature of shaming is that parents intend for their behaviors to induce shame in the child. Even when the forms of discipline studied are similar across countries, prevalence rates and meanings conveyed by a given

form of discipline may differ (Lansford et al., 2005). Gershoff et al. (2010) investigated the frequency with which parents used each of thirteen forms of discipline in samples from China, India, Italy, Kenya, Philippines, and Thailand, but this study treated each form of discipline individually and did not examine either the factor structure of the discipline indicators or the measurement invariance of these indicators across cultural groups.

The present study addressed two key research questions. First, do mothers' reports on a measure of use of discipline strategies provide evidence that there are five dimensions (inductive discipline, physical punishment, manipulating privileges, harsh verbal discipline, and, shaming) across diverse cultural groups? Second, to what extent does a frequency-based measure of mother report of discipline strategies show invariant measurement across cultural groups?

Method

Participants

The present study included data from mothers of 7- to 10-year-old children in 13 cultural groups within nine countries (China [two groups], Colombia, Italy [two groups], Jordan, Kenya, the Philippines, Sweden, Thailand, and the United States [three groups]) in the Parenting Across Cultures Project. Families were recruited to participate from schools that serve socioeconomically diverse populations in each participating country. To capture within-country regional, ethnic, socioeconomic, and cultural differences in China, Italy, and United States, we collected multiple samples from more than one cultural group in these countries. Girls and boys were represented approximately equally in each country subsample, and countries did not differ significantly on child gender (across samples, 51% female) or child age ($M = 8.29$, $SD = 0.66$). Sample sizes for each group are shown in Table 2. More information about the project can be found at http://www.childandfamilypolicy.duke.edu/project_detail.php?id=28.

Procedures and Measure

Interviews were conducted in participants' homes, schools, or other locations chosen by the participants. Procedures were approved by local Institutional Review Boards (IRBs) at universities in each participating country. Mothers signed statements of informed consent. Mothers were asked how frequently in the last year (1 = never, 2 = less than once a month, 3 = about once a month, 4 = about once a week, 5 = almost every day) they used each of 18 forms of discipline. In addition, a procedure of forward-and back-translation was used to ensure the linguistic and conceptual equivalence of measures across languages (Maxwell, 1996). The translators were fluent in English and the target language.

Results

Preliminary analyses (see Table 1) indicated that almost all of the items had their mode at the ceiling or floor of the response scale. Therefore, we dichotomized all items – either at the ceiling (or floor) or not – and conducted the analyses for dichotomous indicators, using the software *Mplus* (v6.0, Muthén & Muthén, 2010). Three items (“How frequently do you spank, slap, or hit your child?”, “How frequently do you throw something at your child?”, and “How frequently do you tell your child you won’t love him/her if she/he acts that way again?”) showed zero variance in one or more of the cultural groups and so were omitted from multiple-group analyses.

In the first step, we conducted a multi-group confirmatory factor analysis based on the five theoretical dimensions. However, the model fit was poor, $\chi^2(3278, N = 1,417) = 7238.30$, $p < .000$, CFI = 0.260, TLI = 0.240, RMSEA = 0.109. We next examined the mothers' reports

of the frequency of given discipline strategies separately for each cultural group using exploratory factor analysis (EFA). EFAs with oblique rotation were used to empirically determine the number of dimensions in each group. Visual inspection of the results, focusing on factor loadings, suggested seven factors, approximately mapping on to the conceptually designated *a priori* expectations, but with more refinement in the fourth dimension of harsh verbal discipline. We conducted this analysis separately in each group; however, for the sake of brevity, we show factor loadings in Table 2 for a simplified analysis using the total sample. These seven emerging factors were labeled as inductive discipline (2 items), physical punishment (1 item), manipulating privileges (4 items), harsh verbal discipline (2 items), argument (3 items), shaming (2 items), and ignoring (1 item); *verbatim* items appear in the Appendix. We evaluated this seven-factor structure via confirmatory factor analysis (CFA) in each culture group individually before testing invariance. Fit statistics are in Table 3.

We then conducted a multi-group categorical confirmatory factor analysis (MCCFA) for the 13 cultural groups. Robust Weighted Least Squares (WLSMV) estimation and theta parameterization were used throughout. Previous research has indicated that WLSMV estimation is more stable and accurate for CFA than adjusted WLS or maximum likelihood estimation, especially with small samples (Millsap & Yun-Tein, 2004; Kim & Yoon, 2011).

The measurement invariance testing included fitting a series of nested sequential measurement models to the thirteen samples (per Meade & Bauer, 2007). First, we examined the configural invariance model, which tests whether the items load on the same factors across groups. The results indicated that, although this model had relatively poor absolute fit (χ^2) and incremental fit indices (CFI and TLI), the estimated RMSEA was in the acceptable range, χ^2 (416, $N = 1,417$) = 723.39, $p < .001$, CFI = 0.875, TLI = 0.872, RMSEA = 0.082, WRMR = 3.329 (criteria based on Chen, Curran, Bollen, Kirby, & Paxton, 2008). Given the complexity of the dataset and model, we considered this level of fit to indicate that the model was worth keeping in consideration.

The second stage of invariance, metric equivalence (Horn & McArdle, 1992), tests that the indicator loadings are equal across groups. The results indicated levels of fit similar to the configural invariance model, χ^2 (1084, $N = 1,417$) = 1623.8, $p < .001$, CFI = 0.874, TLI = 0.841, RMSEA = 0.068, WRMR = 3.704. Even though the likelihood ratio test contrasting the models was significant, L.R. χ^2 (96) = 167.5, $p < .001$, we still considered this level of fit worth keeping in consideration. Thus, we continued to the third step of testing measurement invariance, the scalar invariance model. The thresholds in categorical modeling for different groups are constrained to be equal. This model fit poorly by all criteria, χ^2 (1264, $N = 1,417$) = 3277.6, $p < .001$, CFI = 0.530, TLI = 0.493, RMSEA = 0.121, WRMR = 5.707. Thus, the scalar invariance hypothesis was rejected.

In sum, the results of these analyses indicated that configural and metric invariance were tenable. However, scalar invariance was not established across groups. A conclusion of strong factorial invariance requires all components (Meredith, 1993). Our results showing a lack of scalar invariance therefore render the comparison of means across groups ambiguous (Cheung & Rensvold, 2002). However, to the extent a researcher is willing to accept the fit of the metric invariance model, structural coefficients to and from the discipline factors in a latent variable framework can still be interpreted across groups.

Finally, given the large number of factors relative to the item pool, we were concerned about reliability of the measures. We calculated maximal reliability (Raykov & Penev, 2006) of each factor in each group. As shown in Table 4, reliability for factors with two or more

indicators ranged from .51 to .72; the median across group and factor was .61 (maximal reliability for a single-item factor is trivially .50).

Discussion

The first purpose of this study was to examine how many dimensions existed in mother-reported discipline strategies across thirteen cultural groups. From a theoretical perspective, we expected to identify at least five dimensions of parental discipline practices, which are whether the discipline involved inductive reasoning, physical force, manipulation of privileges, harsh verbal discipline, or shaming (Grusec & Goodnow, 1994; Lansford et al., 2005; Oburu & Palmérus, 2003; Straus & Donnelly, 2005). The results of exploratory factor analyses in the current study suggested seven factors across this international sample. Based on previous research (e.g., AAP, 1998; Fung, 1999; Fung & Chen, 2001; Grusec & Goodnow, 1994; Lansford et al., 2005; Oburu & Palmérus, 2003; Straus & Donnelly, 2005), we labeled these seven factors as inductive discipline, physical punishment, manipulation of privileges, harsh verbal discipline, argument, shaming, and ignoring. The current study thus provides novel evidence of patterns of parental discipline strategies cross-culturally.

The second aim of this study was to examine to what extent the mother-reported frequency of discipline strategies could be measured similarly across cultures. First, our results suggested that models assuming configural and metric invariance may be tenable across the thirteen groups. It appears likely that the mother-reported frequency of discipline strategies scores represent the same construct over the different cultural groups. Given metric invariance (i.e., equality of factor loadings), the unit of measurement is identical, and predictive relations can be compared across groups. However, lack of scalar invariance in the current study suggests that factor means cannot be meaningfully compared (Chen, 2008; Widaman & Reise, 1997). Thus, we cannot be certain whether group differences on factor means are due to valid group differences or measurement artifacts.

Given the stringency of tests of scalar invariance, the result was not unexpected. To our knowledge, it is very common to find lack of measurement invariance in cross-cultural research due to the comparative nature of studies, especially when researchers use an instrument developed for one culture in other cultures. For example, physical punishment and shaming are more widely used in African and Asian cultures, but are not common discipline strategies in some European and American cultures. Factors such as translation flaws, inappropriate item coverage, and cultural differences can influence individuals' interpretations of measurement scales (e.g., Chen, 2008; Cheung & Rensvold, 2000; Van de Vijver & Leung, 2000).

Various limitations in the current study should be noted. First, the nature of the sampling – predominantly convenience samples in cultures selected for a combination of theoretical and practical reasons and small within-group sample size -- poses limitations on the generalizability of our findings. Second, three out of the thirteen samples share English as the modal first language, while most other samples required translation, a potential source of noninvariance. A third limitation was the potential for differential impact of the use of personal interviewing about a delicate topic – a possible methodological artifact.

Even considering these limitations, our study is drawn from one of the largest and most diverse samples studying parenting and family processes. The key finding that mothers' use of specific discipline techniques may yield similar patterns in measurement can undergird future research on parenting with this and other cross-national samples.

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Appendix

Inductive Discipline

- 1 How frequently do you teach your child about good & bad behavior? Like it's not nice to hit, or it's polite to say thank you.
- 2 How frequently do you get your child to apologize or make amends?

Manipulating Privileges

- 3 How frequently do you give your child a time out or send him/her to his/her room?
- 4 How frequently do you take away privileges? (e.g., no TV after dinner because of misbehavior)
- 6 How frequently do you give your child extra chores?
- 16 How frequently do you promise a treat or privilege to your child for good behavior?

Physical Punishment

- 7 How frequently do you grab or shake your child?

Argument

- 8 How frequently do you throw something at your child?
- 13 How frequently do you threaten to leave your child?
- 15 How frequently do you threaten your child with some punishment?

Harsh Verbal Discipline

- 17 How frequently do you threaten to leave your child?
- 18 How frequently do you try to scare your child into behaving (e.g., by threatening to call the police, tell the teacher, etc.)?

Shaming

- 9 How frequently do you say you are disappointed with your child, or say that his/her misbehavior hurt your feelings?
- 10 How frequently do you tell your child s/he should be ashamed of her/himself?

Ignoring

- 11 How frequently do you ignore your child?

Table 1

Descriptive Statistics by Cultural Group

Items	United States (European American)		United States (African American)		United States (Hispanic)		Sweden		Italy (Rome)		Italy (Naples)		China(Jinan)		China(Shanghai)		Philippines		Kenya		Thailand		Columbia		Jordan	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	4.65	0.65	4.65	0.72	4.80	0.48	4.32	0.78	4.42	0.96	4.54	0.92	4.44	0.66	4.26	0.88	4.73	0.60	4.59	0.74	4.44	0.97	4.72	0.67	4.43	0.87
2	3.96	0.97	3.98	1.04	3.78	1.27	3.88	0.89	3.89	1.04	3.97	1.14	2.79	1.07	2.53	1.05	4.29	1.00	3.91	1.15	4.50	0.81	4.08	1.08	4.27	0.86
3	2.99	1.11	3.12	1.24	3.12	1.27	2.37	1.06	3.07	1.33	3.14	1.47	1.66	1.05	1.79	2.35	2.84	1.38	2.71	1.44	1.86	1.04	2.48	1.56	2.90	1.17
4	3.03	0.98	3.14	1.05	3.31	1.09	2.30	0.93	2.83	1.16	2.64	1.35	2.21	1.12	1.78	0.87	3.48	1.21	2.78	1.36	2.53	1.13	3.44	1.17	3.09	1.08
5	1.50	0.72	2.35	1.00	1.76	0.95	1.03	0.17	2.12	1.03	2.33	1.28	1.91	0.95	2.18	1.17	2.36	1.19	3.36	0.86	1.80	0.92	2.08	1.15	2.55	1.21
6	2.38	1.13	2.55	1.33	2.51	1.45	2.08	1.24	1.92	1.10	2.14	1.40	1.81	1.15	1.35	0.65	2.44	1.40	2.76	1.84	2.01	1.07	3.20	1.55	3.04	1.18
7	1.30	0.62	1.18	0.54	1.46	0.89	1.39	0.65	1.89	1.08	2.28	1.29	1.46	0.79	2.41	0.65	1.79	1.06	1.84	1.12	1.25	0.52	1.92	1.12	2.39	1.46
8	3.35	1.79	2.66	1.52	3.14	1.40	3.57	1.03	3.77	1.22	4.24	1.02	2.75	1.23	2.41	1.20	3.22	1.44	3.30	1.24	2.71	1.29	3.46	1.40	4.12	1.21
9	2.43	1.04	2.33	1.14	1.99	1.27	2.16	0.88	3.19	1.34	2.83	1.17	2.00	0.96	2.03	0.90	3.34	1.30	3.06	1.35	2.39	1.03	1.87	1.09	2.35	1.27
10	1.44	0.67	1.76	1.05	2.06	1.24	1.44	0.68	2.57	1.38	2.54	1.26	1.49	0.83	1.36	0.61	2.70	1.47	2.55	1.27	1.71	0.95	1.95	1.40	2.83	1.38
11	1.92	0.67	1.51	1.00	1.69	1.07	1.41	0.69	2.44	1.49	2.29	1.23	1.65	0.79	1.55	0.76	2.28	1.21	1.50	0.99	2.11	1.04	1.84	1.19	1.95	1.27
12	1.02	0.13	1.08	0.37	1.04	0.25	1.01	0.09	1.21	0.58	1.08	0.30	1.28	0.60	1.27	0.52	1.41	0.75	1.62	1.03	1.32	0.69	1.26	0.65	1.81	1.18
13	3.56	1.08	3.14	1.32	3.48	1.26	2.73	1.09	4.16	0.96	4.46	0.74	2.73	1.09	2.84	1.10	3.58	1.24	3.33	1.23	2.99	1.11	3.98	0.94	3.86	1.17
14	1.00	0.00	1.00	0.00	1.27	0.66	1.94	0.96	1.33	0.79	2.12	1.47	1.94	0.96	1.69	0.92	1.75	1.23	2.15	1.18	2.45	1.15	1.24	0.77	2.71	1.49
15	3.35	1.17	2.78	1.35	2.80	1.34	1.78	0.99	3.22	1.28	3.51	1.26	1.78	0.99	1.83	0.98	3.03	1.30	3.56	1.21	3.16	1.09	3.20	1.32	3.46	1.25
16	3.38	1.14	3.73	1.03	3.48	1.23	2.69	1.10	2.91	1.19	3.63	1.15	2.69	1.11	2.74	1.03	3.39	1.39	3.65	0.94	3.27	1.04	3.12	1.27	4.35	0.91
17	1.01	0.09	1.13	0.49	1.05	0.34	1.09	0.40	1.23	0.58	1.48	1.02	1.39	0.65	1.54	0.79	1.84	1.16	1.22	0.71	1.54	0.79	1.30	0.78	1.34	0.78
18	1.17	0.54	1.34	0.72	1.57	1.05	1.20	0.45	1.56	0.88	2.03	1.30	1.77	0.86	2.20	1.14	1.91	1.17	2.61	1.16	2.20	1.14	1.62	1.04	1.84	1.27

Note: see Appendix for list of items.

Table 2

Factor loadings For Exploratory Factor Analysis ($N=1,417$)

Items	Inductive Discipline	Physical Punishment	Manipulating Privileges	Harsh verbal Discipline	Argument	Shaming	Ignoring
1	.268	.455	.280	.394	.291	-.306	.233
2	.407	.493	.250	.278	-.109	-.107	.212
3	.491	.454	.052	-.077	.234	.191	-.266
4	.529	.419	.134	-.046	.091	.266	-.287
5	.636	-.165	.154	-.199	.228	-.283	-.231
6	.301	.283	.448	-.485	-.162	.275	.091
7	.572	-.173	.121	-.337	.246	-.045	.320
8	.607	.116	-.475	-.176	-.123	-.068	.237
9	.660	-.050	-.149	.205	.013	-.105	-.268
10	.644	-.114	-.153	.127	.126	-.061	-.206
11	.498	-.137	-.215	.158	.130	.593	.088
12	.434	-.415	.198	.307	.185	-.253	.026
13	.647	.109	-.473	.100	.000	-.056	.201
14	.471	-.476	.266	-.122	-.251	.152	.037
15	.697	.080	-.205	.055	-.197	-.083	.035
16	.511	.134	.173	-.004	-.591	-.095	.032
17	.389	-.420	.244	.346	.192	.236	.280
18	.480	-.357	.150	.186	-.233	-.085	-.243

Note: see Appendix for list of items.

Table 3

Fit Indices for Individual Confirmatory Factor Analysis

	N	χ^2	df	p	CFI	TLI	RMSEA
United States (European American)	110	67.711	32	.000	.827	.832	.101
United States (African American)	102	38.177	29	.095	.959	.959	.060
United States (Hispanic)	98	47.701	23	.001	.777	.738	.105
Sweden	103	38.063	28	.001	.934	.959	.059
Italy (Naples)	100	50.783	33	.024	.849	.853	.073
Italy (Rome)	104	52.926	35	.026	.887	.887	.070
China (Shanghai)	122	56.231	34	.009	.806	.783	.073
China (Jinan)	120	68.510	30	.000	.857	.842	.103
Kenya	100	48.848	35	.061	.831	.812	.063
Thailand	120	83.984	37	.000	.827	.845	.103
Philippines	120	71.420	39	.001	.821	.839	.083
Jordan	114	72.745	76	.584	1.000	1.008	.000
Colombia	108	164.858	76	.000	.609	.460	.104

Table 4

Reliability for 7 Factors by Cultural Groups

	Inductive Discipline	Physical Punishment	Manipulating Privileges	Harsh verbal Discipline	Argument	Shaming	Ignoring
United States (European American)	0.54	0.68	0.50	0.69	0.63	0.59	0.50
United States (African American)	0.61	0.67	0.50	0.72	0.60	0.60	0.50
United States (Hispanic)	0.54	0.64	0.50	0.68	0.63	0.60	0.50
Sweden	0.59	0.67	0.50	0.69	0.66	0.61	0.50
Italy (Naples)	0.52	0.65	0.50	0.73	0.58	0.56	0.50
Italy (Rome)	0.59	0.67	0.50	0.70	0.57	0.56	0.50
China (Shanghai)	0.60	0.63	0.50	0.64	0.54	0.56	0.50
China (Jinan)	0.54	0.67	0.50	0.71	0.60	0.59	0.50
Kenya	0.61	0.65	0.50	0.64	0.52	0.58	0.50
Thailand	0.63	0.70	0.50	0.68	0.60	0.59	0.50
Philippines	0.59	0.66	0.50	0.65	0.62	0.55	0.50
Jordan	0.58	0.63	0.50	0.70	0.58	0.58	0.50
Colombia	0.58	0.64	0.50	0.70	0.58	0.57	0.50