Original Research Article

Cross-Cultural Differences in Temperament Between the United States and the People's Republic of China: A Longitudinal Comparison

ABSTRACT

Aims: The present study assessed cross-cultural differences in temperament and temperament stability between children from the United States (US) and the People's Republic of China (PRC).
Methodology: The US sample (N = 147) and PRC sample (N = 128) consisted of children whose temperament was longitudinally assessed in infancy and toddlerhood using the Infant Behavior Questionnaire-Revised Short Form (IBQ-R SF) and the Early Childhood Behavior Questionnaire Short Form (ECBQ SF). Primary analyses involved evaluating mean differences in the three temperament factors: surgency, negative affectivity, and regulation/effortful control, with additional statistical tests conducted to investigate fine-grained distinctions.
Results: Findings revealed main effects of culture for each factor with culture x time interactions indicating negative affectivity significantly differed in toddlerhood, $t(273) = -8.27$, $P < .001$, $d = 1.00$, 98.75% CI [-0.70, -0.37], and regulation in infancy, $t(273) = -5.17$, $P < .001$, $d = 0.62$, 98.75% CI [-0.62, -0.22]. Specifically, the US sample exhibited higher surgency at both time points, lower negative affectivity in toddlerhood, and lower regulation in infancy. In addition, little difference was noted in temperament stability between the US and Chinese samples.
Conclusion: Our findings support previous reports identifying cultural differences in temperament and highlight that differences are not constant across early childhood, but rather that as development unfolds, their nature is subject to change.

Keywords: temperament, infancy, toddlerhood, cross-cultural, longitudinal

1. INTRODUCTION

Individual differences labeled as personality in adulthood are typically referred to as temperament in early childhood. Rothbart and Derryberry [1] defined temperament as constitutionally based individual differences in self-regulation and reactivity, impacted by genetics, experience, and maturation. Reactivity includes change in levels of motor activity, affect, and attention; self-regulation refers to processes involved in modulating reactivity [2]. Temperament develops rapidly in early childhood [3-5], yet moderate stability is maintained [6-9].

Temperament is open to environmental influences and cross-cultural differences can be anticipated because of varying contextual factors. Distinct cultural attitudes and patterns of parenting are pervasive, and caregivers typically encourage temperament traits in children that match prevailing cultural values [10]. Child-rearing practices and the daily experiences parents provide for their children echo their culture and its priorities in terms of socialization goals [11]. Cross-cultural comparisons of parenting infants identified different soothing techniques across cultures, with Japanese caregivers using more physical contact and rocking and US parents stimulating their children to express positive emotions and directing their attention to external events more [12]. US parents also reported engaging in social and didactic interactions with their toddlers more than Italian caregivers [13].

Although cross-cultural temperament research in early childhood has become more widespread, studies comparing Eastern and Western countries (e.g., US and PRC) have rarely included longitudinal evaluations, and none to date spanned infancy to toddlerhood. Chen et al. [14] compared Chinese and Canadian toddlers on behavioral inhibition (hesitancy to approach novel people and objects), reporting that Chinese participants were more inhibited. Examining differences between the US, PRC, and Spain, Chinese infants demonstrated higher levels of activity, distress to limitations, duration of orienting, and soothability than US and Spanish infants and greater fear compared to their US counterparts [15]. US infants and toddlers presented with higher levels of surgency and regulatory capacity relative to Japanese children, as well as lower levels of negative affectivity [16], with similar patterns observed at the fine-grained level: US infants demonstrated higher approach, smiling and laughter, duration of orienting, and low intensity pleasure along with lower distress to limitations and fear; American toddlers exhibited higher sociability, soothability, inhibitory control**,** and attention focusing, but lower levels of fear, sadness, and shyness. Significant differences in effect sizes across age groups emerged, with more pronounced cross-cultural variability at younger ages for surgency and effortful control/regulation dimensions.

Studies comparing temperament between the US and PRC for older children noted a number of differences. US parents rated their 4–6-year-old children as more emotional than their Chinese counterparts, and Chinese fathers rated their children as more active [17] than those in the US. Higher surgency and effortful control were reported for US 6–7-year-olds, relative to negative affectivity, whereas Chinese counterparts exhibited relatively higher negative affectivity than surgency and effortful control [18]. Chinese children in third to sixth grades were rated higher on smiling and laughter, attention focusing, and inhibitory control [19] than US children. Examining four bipolar temperament qualities (introversion-extroversion, imaginative-practical, feeling-thinking, and flexible-organized) for Chinese and American children ranging in age from 9 to 15, Chinese participants adopted practical, thinking, and organized styles [20].

Temperament stability has also been examined cross-culturally, albeit not frequently. US infants had more stability in their smiling/laughter scores than those from Spain and greater stability in distress to limitations and duration of orienting than PRC infants [15], with greater stability in fear also observed for the Chinese than the Spanish sample. US participants exhibited greater stability in negative affectivity from infancy to toddlerhood than Russian children [21], and vocal reactivity and smiling and laughter were more stable in US compared to Dutch infants [22].

1.1 Current Study This study was designed to examine cross-cultural differences between children in the US and the PRC longitudinally in infancy and toddlerhood. Specifically, the goals of this project were to (1) examine temperament differences for surgency, negative affectivity, regulation/effortful control; (2) conduct fine-grained comparisons for factors demonstrating significant cross-cultural differences; (3)

compare temperament stability from infancy to toddlerhood. US participants were hypothesized to exhibit higher surgency and lower negative affectivity and regulation/effortful control, with parallel differences reflected in fine-grained dimensions. Age- and stability-related analyses should be considered exploratory.

2. METHODOLOGY

2.1 Participants

2.1.1 US sample US data were collected from two community samples: one from Eugene-Springfield, Oregon (OR) and the second one from Pullman, Washington (WA). The sample consisted of 147 mothers of infants (78 male, 69 female) who were 20-28 weeks old (*M* = 24.32, *SD* = 2.33) and were then reassessed during toddlerhood (Range: 79-143 weeks, *M* = 96.75, *SD* = 12.48). The participating mothers ranged in age from 20 to 43 years old (*M* = 29.50, *SD* = 5.04) and had a broad range of educational backgrounds (Range: 9.00-20.00 years in education, *M* = 15.36, *SD* = 2.45).

This sample was selected based on mothers who completed the IBQ-R when their children were 20-28 weeks to mirror the infant age range in the PRC sample, because of the particularly rapid rate of development during this period.

2.1.1.1 OR sample Eugene, OR participants (n = 388) were parents of children 3-12 months old who were recruited with phone calls made on the basis of birth announcements in local newspapers. Parents were asked to complete temperament questionnaires for their infant, then again in toddlerhood. From the original sample, 76 mothers (37 of female children) completed the IBQ-R when their child was 20-28 weeks (*M* = 23.09, *SD* = 2.35) and the ECBQ at 79-140 weeks (*M* = 95.82, *SD* = 10.92) respectively. The participants (*M* = 29.49 years old at recruitment, *SD* = 4.95) were primarily Caucasian, reflecting the racial homogeneity in Eugene-Springfield, OR. They were also primarily well educated (total years in education: *M* = 14.31, *SD* = 2.28), married (88.16%), and living in households with annual income of at least $30,000 (56.58%).

2.1.1.2 WA sample Pullman, WA participants (*n* = 148) were eligible for the initial study if they had a healthy 4-month-old infant (i.e., no significant birth or medical complications). They were recruited from the surrounding communities in Eastern Washington and Northern Idaho through a primary prevention program called *First Steps* and with birth announcements published in a local newspaper. Out of the initially recruited sample, 71 (32 of female children) completed the IBQ-R when their child was 20-28 weeks (*M* = 25.63, *SD* = 1.32) and the ECBQ at 82-143 weeks (*M* = 97.76, *SD* = 13.98). These mothers (*M* = 29.51 years old at recruitment, *SD* = 5.15) were primarily Caucasian, married (91.55%), well educated (total years in education: *M* = 16.24, *SD* = 2.24), and lived in households earning more than $30,000 annually (70.42%).

Chinese sample: Chinese data (*n* = 215) were also collected as part of a larger temperament study. From this initial sample, 128 mothers (63 of female children) completed surveys when their children were infants and toddlers. The children were 24-32 weeks (*M* = 26.69, *SD* = 1.42) when data were first collected and 100-124 weeks (*M* = 107.20, *SD* = 4.15) when reassessed in toddlerhood. The mothers (*M* = 32.00 years old at recruitment, *SD* = 3.88) in this sample were Chinese, reflecting the racial composition of Beijing. The average amount of education was high, with most of the mothers having at least a bachelor's degree (96.09%), and the mothers' monthly income was generally equal to or above ¥3,000 (83.59%).

As indicated above, Chinese mothers were older than US mothers at recruitment. An independent-samples *t*-test was conducted to examine if maternal age significantly differed between cultures, and it was significantly higher for the Chinese sample, $t(234.57) = -4.41$, $P < .001$, 95% CI [-3.62, -1.39]. Therefore, maternal age was used as a covariate in subsequent analyses.

2.2 Measures

2.2.1 Infant Behavior Questionnaire-Revised Short Form (IBQ-R SF) [23]: This 91-item questionnaire relies on caregiver report of temperament wherein respondents endorse the frequency of infant behaviors occurring within a set time frame (the past week or 2). The IBQ-R SF provides three overarching factors consisting of 14 scales: (1) Positive Affectivity/Surgency including approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level, and perceptual sensitivity; (2) Negative Affectivity containing sadness, distress to limitations, fear, and falling reactivity; and (3) Orienting/Regulatory Capacity containing soothability, low intensity pleasure, cuddliness, and duration of orienting scales. The validity and reliability of the IBQ-R has been supported with high Cronbach's alpha coefficients for samples from various cultures ranging from .77 to .96 [24-28], and the IBQ-R SF has Cronbach's alphas of at least .70 on 90% of the subscales [23].

The OR sample was administered a preliminary version of the IBQ-R that included additional items, not subsequently retained, and an alternative soothability scale, which was consequently eliminated from all analyses.

2.2.2 Early Childhood Behavior Questionnaire Short Form (ECBQ SF) [29]: This 107-item parent-report questionnaire requires respondents to endorse the frequency of toddler behaviors occurring within a set time frame (the past week or 2). The ECBQ SF was designed for use with children 18 to 36 months of age. Similar to the IBQ-R SF, there are three overarching factors consisting of 18 scales—(1) Surgency/Extraversion including impulsivity, activity level, high intensity pleasure, sociability, and positive anticipation; (2) Negative Affectivity containing discomfort, fear, motor activation, sadness, perceptual sensitivity, shyness, soothability, and frustration; and (3) Effortful Control including inhibitory control, attention shifting, low intensity pleasure, cuddliness, and attention focusing. These three factors correspond with the three factors of the IBQ-R SF, and 10 of the ECBQ and IBQ-R subscales map onto the same temperament attribute (see table 6). Cronbach's alphas for all the subscales of at least .65 have been reported, with the average criterion validity (calculated with corrected standard-to-short form correlations) of .76, supporting reliability and validity for this measure. Additionally, internal consistency of the ECBQ has been supported for multiple cultures with alpha coefficients ranging from .57 to .94 [21, 30, 28, 31]. The ECBQ administered to the OR sample was similarly preliminary in nature, with additional items that were trimmed because of failure to contribute to their respective scales.

2.3 Procedures Participants agreed to take part in longitudinal assessments of their child's temperament in infancy and toddlerhood. When their infant was around 6 months of age, mothers were asked to complete the IBQ-R SF, and later in toddlerhood, they were asked to complete the ECBQ SF. Before data collection began, both measures were translated into Chinese and then back translated to ensure the forms were congruent. These methods were approved by the Institutional Review Boards (IRB) at the corresponding universities/colleges, and all participants received and returned a signed consent form along with the questionnaires to take part in the study.

2.4 Analytic Strategy Analyses were conducted in IBM SPSS Statistics 27. Bivariate correlations between the independent (culture, child sex) and dependent variables (three temperament factors measured in infancy and toddlerhood), as well as a potential covariate (maternal age), were computed. Independent-sample *t*-tests comparing US and China were also conducted to further consider maternal age as a covariate for remaining analyses, given significant correlations. Maternal age was considered as a potential covariate because previous cross-cultural research has included this demographic variable in analyses [32, 33, 22].

Next, analyses of covariance (ANCOVAs) were performed for each temperament factor (surgency, negative affectivity, and regulation/effortful control) to examine the effects of culture, time, and child sex, with maternal age included as a covariate, as needed. Culture and time were the primary focus of this study, given our longitudinal design, and infant sex was also examined as in prior cross-cultural studies [15, 33, 31]. Since maternal age was only significant for surgency, subsequent analyses for negative affectivity and regulation/effortful control excluded the covariate. Follow-up independent sample *t*-tests were conducted to examine any significant culture x time interactions to identify significant cultural differences between the US and PRC in infancy and toddlerhood. MANOVAs/MANCOVAs were also performed given significant factor-level results to investigate cross-cultural differences in the

corresponding IBQ-R and ECBQ subscales. Finally, stability of temperament characteristics across infancy and toddlerhood within each sample was analyzed by computing bivariate correlations among IBQ-R and ECBQ scores, with Fisher's *r*-to-*z* transformations performed to identify stability differences between the US and PRC.

3. RESULTS AND DISCUSSION

3.1 Internal consistency Internal consistency was evaluated for the US and PRC samples by calculating Cronbach's alphas. Several subscales in both samples initially yielded low alpha values (activity level and falling reactivity for the IBQ-R SF and attention shifting, impulsivity, and sociability for the ECBQ SF), so items 33 and 71 were eliminated from the IBQ-R SF and items 96 and 100 were deleted from the ECBQ SF to increase internal consistency. The ECBQ SF impulsivity scale was not considered, as the low alpha in the PRC sample could not be improved by removing specific items. It should be noted that impulsivity items were retained in computing the surgency factor, and considered in related analyses, to maintain consistency with existing research [34]. These adjustments resulted in improved internal consistency for both samples: US alphas (*M* = .71 Range: .52-.87) and PRC alphas (*M* = .70, Range: .52-.87) were generally satisfactory.

3.2 Cultural Comparisons Descriptive statistics for United States (Table 1) and China (Table 2) were computed first, followed by group comparison analyses.

Table 1. Descriptive Statistics for US Sample

Variable	*n*	*Range*	*M*	*SD*	*α*
Maternal Age	126	20.00-43.00	29.50	5.04	
Surgency in Infancy	147	2.54-6.26	4.51	0.71	.87
Approach	147	1.00-6.83	4.68	1.22	.76
Vocal Reactivity	147	1.71-6.86	4.75	1.01	.77
High Intensity Pleasure	146	3.25-7.00	5.75	0.86	.78
Smiling & Laughter	147	2.00-6.71	4.44	1.01	.69
Activity Level	147	1.50-6.57	4.00	1.01	.70
Perceptual Sensitivity	147	0.67-6.50	3.47	1.28	.80
Surgency in Toddlerhood	147	2.23-6.39	4.64	0.78	.81
Activity Level	147	2.86-6.38	4.64	0.81	.67
High Intensity Pleasure	147	1.50-7.00	4.80	1.11	.69
Sociability	145	0.00-7.00	4.85	1.63	.70
Positive Anticipation	146	0.20-7.00	4.61	1.39	.77
Negative Affectivity in Infancy	147	1.47-4.98	3.23	0.63	.67
Sadness	147	1.40-6.40	3.60	1.03	.69
Distress to Limitations	147	1.43-6.14	3.68	0.86	.61
Fear	147	1.00-5.83	2.20	1.05	.82
Falling Reactivity	147	2.60-6.80	4.57	1.10	.54
Negative Affectivity in Toddlerhood	147	1.71-4.33	2.91	0.48	.76
Discomfort	147	0.71-6.00	2.35	0.87	.52
Fear	147	0.63-4.00	2.14	0.74	.60
Motor Activation	147	0.83-4.33	2.20	0.84	.62
Sadness	147	1.00-5.00	2.54	0.83	.71
Perceptual Sensitivity	147	1.33-7.00	4.07	1.21	.71
Shyness	147	0.60-6.40	3.37	1.28	.78
Soothability	147	2.80-6.80	5.09	0.76	.68
Frustration	147	1.33-6.50	3.72	1.00	.78
Regulation in Infancy	147	3.06-6.42	4.52	0.71	.68
Low Intensity Pleasure	147	2.86-7.00	5.16	0.92	.71
Cuddliness	147	2.50-7.00	4.51	1.34	.80

Duration of Orienting	146	1.17-7.00`	3.69	1.17	.70
Effortful Control in Toddlerhood	147	3.06-5.61	4.52	0.53	.82
Inhibitory Control	147	1.33-6.00	3.89	0.86	.60
Attention Shifting	147	2.29-6.25	4.53	0.69	.57
Low Intensity Pleasure	147	2.00-7.00	4.69	0.95	.68
Cuddliness	147	2.67-6.83	4.96	0.92	.84
Attention Focusing	147	2.33-6.33	4.52	0.80	.71

Table 2. Descriptive Statistics for Chinese Sample

Variable	***n***	***Range***	***M***	***SD***	***α***
Maternal Age	125	22.70-40.88	32.00	3.88	
Surgency in Infancy	128	2.35-5.90	4.09	0.74	.87
Approach	128	1.80-6.83	4.96	1.16	.67
Vocal Reactivity	128	1.14-7.00	3.63	1.01	.73
High Intensity Pleasure	128	2.00-7.00	5.23	1.25	.74
Smiling & Laughter	128	1.43-7.00	3.72	1.16	.74
Activity Level	128	1.33-7.00	4.15	1.04	.59
Perceptual Sensitivity	128	0.33-7.00	2.86	1.32	.71
Surgency in Toddlerhood	128	2.00-6.19	4.44	0.62	.75
Activity Level	128	2.00-6.63	4.45	0.79	.58
High Intensity Pleasure	128	1.50-6.33	4.12	1.05	.74
Sociability	127	0.00-7.00	4.19	1.39	.59
Positive Anticipation	127	2.80-7.00	5.33	0.87	.67
Negative Affectivity in Infancy	128	1.32-5.23	3.17	0.75	.72
Sadness	128	0.00-6.17	2.73	1.00	.62
Distress to Limitations	128	2.00-6.29	3.97	1.03	.66
Fear	128	0.67-6.17	2.75	1.24	.77
Falling Reactivity	128	1.60-7.00	4.76	1.02	.69
Negative Affectivity in Toddlerhood	128	2.00-4.96	3.45	0.59	.87
Discomfort	128	1.43-6.43	3.53	0.97	.69
Fear	127	1.00-6.00	3.03	1.02	.81
Motor Activation	128	1.00-4.83	2.51	0.82	.71
Sadness	127	1.00-5.17	3.18	0.80	.63
Perceptual Sensitivity	128	2.00-7.00	4.85	0.91	.54
Shyness	128	1.20-6.80	3.78	1.15	.77
Soothability	127	2.80-6.80	4.72	0.83	.69
Frustration	128	1.33-5.17	3.44	0.91	.73
Regulation in Infancy	128	3.62-6.93	4.94	0.62	.83
Low Intensity Pleasure	128	1.57-7.00	4.72	1.14	.70
Cuddliness	128	3.50-7.17	5.87	0.74	.70
Duration of Orienting	128	1.17-7.00	3.78	1.25	.72
Effortful Control in Toddlerhood	128	2.00-6.34	4.65	0.54	.83
Inhibitory Control	127	2.00-5.83	3.87	0.69	.52
Attention Shifting	128	2.00-7.14	4.76	0.69	.61
Low Intensity Pleasure	128	2.00-6.83	4.54	0.80	.61
Cuddliness	127	3.67-7.00	5.43	0.76	.71
Attention Focusing	127	1.00-7.67	4.70	1.00	.83

Results revealed significant main effects of culture for each factor as well as culture x time interactions for negative affectivity and regulation/effortful control (Table 3). The main effects indicate that US children presented with higher surgency, lower negative affectivity and regulation/effortful control relative to their Chinese counterparts. There was also a significant covariate effect of maternal age for surgency. No

significant main effects for infant sex or any interaction effects involving infant sex, time of assessment, maternal age, or culture were noted.

Independent sample *t*-tests were conducted to follow-up significant *culture x time interactions*, and results indicated there are significant effects of culture for negative affectivity in toddlerhood, $t(273) = -8.27$, $P < .001$, $d = 1.00$, 98.75% CI [-0.70, -0.37], and regulation in infancy, $t(273) = -5.17$, $P < .001$, $d = 0.62$, 98.75% CI [-0.62, -0.22]. Specifically, US participants had significantly lower levels of negative affectivity than Chinese participants in toddlerhood and lower levels of regulation in infancy.

Table 3. Effects of Culture, Time, and Maternal Age on Surgency, Negative Affectivity, and Regulation/Effortful Control

Measure	Effect Type	*F*(1, 246)	η^2
Surgency	Culture	10.67***	.04
	Culture x Time	2.63	.01
	Maternal Age	7.24**	.03
Negative Affectivity	Culture	15.48***	.06
	Culture x Time	39.40***	.14
Regulation/ Effortful Control	Culture	18.14***	.07
	Culture x Time	6.29**	.02

**$P \leq .01$ ***$P \leq .001$

Covariate Maternal Age only included for surgency because of non-significant effects for other factors.

Additionally, four MANCOVAs/MANOVAs—two for surgency, one for negative affectivity in toddlerhood, and one for regulation in infancy—were conducted to examine which IBQ-R and ECBQ subscales contributed to the *culture main effects* (Table 4). Results also indicated that maternal age only had a significant effect for surgency in infancy, Wilk's $\lambda = 0.94$, $F(6, 242) = 2.60$, $P = .02$, $\eta^2 = .06$.

Table 4. Effects of Culture on Significant IBQ-R and ECBQ subscales

Measure	λ	F	*df*	η^2
Surgency in Infancy	0.68	18.99***	6, 242	.32
Surgency in Toddlerhood	0.77	14.23***	5, 240	.23
Negative Affectivity in Toddlerhood	.56	26.01***	8, 265	.44
Regulation in Infancy	.69	40.08***	3, 270	.31

*$P < .05$ ***$P \leq .001$

Finally, follow-up between-subjects ANCOVAs and ANOVAs were conducted for subscales associated with significant multivariate effects (Table 5). Analyses revealed significant effects of culture for the IBQ-R surgency subscales of approach, vocal reactivity, high intensity pleasure, smiling and laughter, and perceptual sensitivity and ECBQ surgency subscales of high intensity pleasure, sociability, and positive anticipation. All ECBQ negative affectivity subscales and the IBQ-R regulation subscales of low intensity pleasure and cuddliness also revealed significant effects of culture. Specifically, US children were higher than Chinese participants on IBQ-R surgency subscales including vocal reactivity, high intensity pleasure, smiling and laughter, and perceptual sensitivity, as well as ECBQ surgency subscales of high intensity pleasure and sociability. US participants scored lower than Chinese participants on discomfort, fear, motor activation, sadness, perceptual sensitivity, and shyness. Mothers of US participants indicated higher levels of IBQ-R regulation-related low intensity pleasure and lower levels of cuddliness than Chinese mothers. The covariate effect of maternal age was significant for the IBQ-R subscales approach, $F(1, 245) = 5.06$, $P = .03$, $\eta^2 = .02$, and activity level $F(1, 245) = 12.24$, $P = .001$, $\eta^2 = .05$.

Table 5. Effects of Culture on IBQ-R and ECBQ Subscales

Measure	*Scale*	*F*	*df*	η^2
Approach	IBQ-R	6.54**	1, 247	.03
Vocal Reactivity	IBQ-R	69.42***	1, 247	.22

High Intensity Pleasure	IBQ-R	9.27**	1, 247	.04
Smiling & Laughter	IBQ-R	16.14***	1, 247	.06
Activity Level	IBQ-R	2.76	1, 247	.01
Perceptual Sensitivity	IBQ-R	8.60**	1, 247	.03
Activity Level	ECBQ	0.80	1, 244	.003
High Intensity Pleasure	ECBQ	16.22***	1, 244	.06
Sociability	ECBQ	9.90**	1, 244	.04
Positive Anticipation	ECBQ	24.39***	1, 244	.09
Discomfort	ECBQ	116.04***	1, 245	.30
Fear	ECBQ	69.54***	1, 245	.20
Motor Activation	ECBQ	9.69**	1, 245	.03
Sadness	ECBQ	41.95***	1, 245	.13
Perceptual Sensitivity	ECBQ	38.88***	1, 245	.13
Shyness	ECBQ	8.29**	1, 245	.03
Soothability	ECBQ	14.24***	1, 245	.05
Frustration	ECBQ	5.56*	1, 245	.02
Low Intensity Pleasure	IBQ-R	13.26***	1, 272	.05
Cuddliness	IBQ-R	104.20***	1, 272	.28
Duration of Orienting	IBQ-R	0.42	1, 272	.002

*$P < .05$ **$P \leq .01$ ***$P \leq .001$

3.2.1 Cross-cultural Differences in the Stability of Temperament Additional analyses were conducted to examine the stability of temperament characteristics from infancy to toddlerhood. Pearson's product-moment correlations were computed for the three temperament factors as well as any subscales that were present in parallel forms across the IBQ-R and ECBQ, even if subscale names varied slightly between these instruments (e.g., duration of orienting and attention focusing; Table 6). These correlations were then compared using Fisher's *r*-to-*z* transformations to determine if stability differed for the US and Chinese samples. Results indicated significant differences in stability for low intensity pleasure and cuddliness, with the US sample being more stable for low intensity pleasure and less stable for cuddliness than the PRC sample.

Table 6. Comparing Temperament Factor Stability Between US and Chinese Participants

	US Sample	***PRC Sample***	
Variables	*r*	*r*	*z*
Act-Act	.21**	.29***	-0.67
Fear-Fear	.26***	.18*	0.71
Dura-Atf	.20**	.09	0.97
HIP-HIP	.28***	.13	1.34
LIP-LIP	.45***	.09	3.21***
Cudd-Cudd	.09	.43***	-2.99**
Perc-Perc	.29***	.16	1.07
Dist-Fru	.32***	.22**	0.82
Sad-Sad	.15	.15	-0.02
App-App	.20**	.17	0.30
Sur-Sur	.34***	.20*	1.22
Neg-Neg	.26***	.31***	-0.44
Reg-EffCo	.23**	.28***	-0.39

**$P \leq .01$ ***$P \leq .001$

Act = Activity level, Dura = Duration of Orienting, Atf = Attention Focusing, HIP = High Intensity Pleasure, LIP = Low Intensity Pleasure, Cudd = Cuddliness, Perc = Perceptual Sensitivity, Dist = Distress to Limitations, Fru = Frustration, Sad = Sadness, App = Approach (also called Positive Anticipation in ECBQ), Sur = Surgency, Neg = Negative Affectivity, Reg = Regulation, EffCo = Effortful Control

3.3 General Discussion The present study examined differences in temperament between US and PRC samples across infancy and toddlerhood. Significant culture effects emerged for all three temperament factors with minimal differences in stability. The US sample was generally higher on surgency and lower in negative affectivity, relative to the Chinese counterparts, with more nuanced differences for regulation-related attributes.

Eastern cultures previously exhibited higher negative affectivity, also correlated with Collectivism [15, 35, 36]. Collectivistic cultures emphasize how personal actions impact the entire group [37-38], whereas individualistic cultures prioritize individual interests, motivations, actions, and fulfillment of personal needs. As such, emotions in collectivist cultures may be viewed on a relational basis, grounded in one's relationships with others [39]. Collectivism's emphasis on the entire group and friendly relations may strengthen individual negative affectivity that accompanies deferring to needs of others and social reticence [14, 40]. Elevated fear and shyness in the PRC sample are consistent with earlier results [15], including greater behavioral inhibition/shyness, reflecting hesitancy in the face of novelty, especially in the social context [41, 14, 42]. As shyness has been associated with parental and peer acceptance in school-age Chinese populations [41, 14, 42], elevated levels of shyness in our PRC sample can be considered culturally adaptive [43-44]. Fearfulness in infancy may represent a precursor to this adaptation, with additional research needed for a conclusive interpretation. Importantly, related effects appear to extend past toddlerhood, as participants from Asian countries including China reported higher levels of neuroticism in adulthood relative to the US [35]. Additionally, significant differences in negative affectivity were exclusively found in toddlerhood. Since negative emotionality increases from infancy to toddlerhood [45], our findings could reflect the US and Chinese samples experience emotional development at difference rates, so that Chinese participants have significantly greater negative affectivity in toddlerhood than US participants.

Results of this study further support research wherein East Asian cultures, particularly China, were described as relatively low in surgency [46]. Individualism and value placed on social initiative in Western cultures [47] likely contribute to this pattern of results. At a fine-grained level, US toddlers exhibited greater high intensity pleasure and sociability, and lower positive anticipation than a South Korean sample [46], which parallels our findings. Previous research also suggests that Chinese infants are more active than US children [15], which was not supported in the current study. Importantly, our findings align with the adult personality literature consistently linking individualism and extraversion [48].

Previous studies comparing regulatory capacity between East Asian cultures and the US produced mixed results. US infants and toddlers were better regulated than Japanese [16], but not South Korean children [46]. Our results indicate lower overall regulation and cuddliness for US infants than their Chinese counterparts, alongside greater low intensity pleasure. The latter may be a function of positive affectivity involved in displays of pleasure in the context of less stimulating activities. These fine-grained results parallel previous literature comparing US to Japanese infants and South Korean toddlers [46, 16]. However, Chinese infants in this study did not display greater duration of orienting as indicated in previous research [15]. Mean differences between US and Chinese participants were only present during infancy for the current study, suggesting that regulation differences in infancy may be more biologically based and are reduced with socialization and parenting practices as children age.

The primary limitation of the present study is our exclusive reliance on parent-report measures, and other approaches including behavioral observations and physiological markers should be considered in the future. In addition, the two samples are representative of the communities from which they were drawn, but do not reflect the diversity of their respective countries. Future research should address this limitation by considering multiple sites within each country, also investigating additional time points during infancy and toddlerhood, which would enable comparisons of growth trajectories. Additional cultures that represent a spectrum of Individualism/Collectivism, and other relevant cultural values, should also be included.

4. CONCLUSION

This study expands the current literature on cross-cultural temperament differences by longitudinally examining temperament differences between US and Chinese children in infancy and toddlerhood. Minimal differences in temperament stability emerged; however, US children received higher scores on surgency, lower negative affectivity scores (in toddlerhood only) and lower regulation scores (in infancy only) than PRC participants, as anticipated from previous research. Thus, our factor and subscale level findings further support existing cross-cultural research [15, 20, 17, 35, 19] demonstrating considerable temperament differences between US and Chinese samples. The present study contributes to the literature in demonstrating that such differences are not constant across early childhood, but rather that as development unfolds their nature is subject to change.

COMPETING INTERESTS

The authors involved in this study and manuscript development do not have any financial, personal, or other relational conflicts of interest.

CONSENT

All participants received and returned a signed consent form to take part in this study. A copy of the written informed consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

All authors hereby declare that this study has been examined and approved by the appropriate ethics committee and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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