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A Cross-cultural Evaluation of Temperament: Japan, USA, Poland and Russia

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ABSTRACT

The present study represents an attempt to investigate early development of temperament across four cultures: Japan, United States of America (U.S), Poland, and Russia, through a cross-sectional design. Selection of these countries presented an opportunity to conduct comparisons between cultures that vary on the individualistic/collectivistic value systems. Parents responded to the Infant Behavior Questionnaire-Revised, with U.S. and Polish infants received the highest ratings for a number of Positive Affectivity/Surgency dimensions: Smiling and Laughter, High Intensity Pleasure, Perceptual Sensitivity, Approach, and Vocal Reactivity. Japanese and Russian infants were characterized as demonstrating the highest and the second highest levels of fearfulness, respectively, with U.S. and Polish infants receiving relatively lower ratings from their caregivers. Age and gender differences were observed across all four cultures. Significant gender differences emerged for High Intensity Pleasure and Approach, with males receiving higher scores than females. Older infants were perceived by their caregivers as exhibiting higher levels of Distress to Limitations and Fear compared to the younger age group.

Key words: Temperament, infancy, cross-cultural comparisons.

RESUMEN

El presente estudio representa el intento de investigar el desarrollo temprano del temperamento a través de cuatro culturas: Japón, Estados Unidos de América, Polonia y Rusia, mediante un diseño transversal. La selección de estos países presentó una oportunidad de llevar a cabo comparaciones entre culturas que varían en los sistemas de valores individualistas/colectivos. Los padres respondieron al *Infant Behavior Questionnaire-Revised*, encontrándose que los niños estadounidenses y polacos recibieron los índices más altos en varias dimensiones de afectividad positiva/extraversión: sonreír y reír, placer alto, sensibilidad perceptiva, acercamiento, y reactividad vocal. Los niños japoneses y rusos fueron caracterizados con los índices más altos en temor, respecto a los niños estadounidenses y polacos. Los resultados indican diferencias relacionadas con la edad y el sexo a través de las cuatro culturas, con diferencias estadísticamente significativas por sexos

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en placer alto y acercamiento, con los varones recibiendo puntuaciones más altas que las mujeres; los niños de mayor edad fueron percibidos por sus padres exhibiendo niveles más altos de angustia a las limitaciones y de miedo en comparación con el grupo de niños de menor edad.

Palabras clave: temperamento, infancia, comparaciones inter-culturas.

It would be difficult if not impossible to overstate the importance and advantages of cross-cultural developmental research (Harkness, Moscardino, Ríos Bermúdez, *et al.*, 2006; Harkness, Bloom, Oliva, *et al.*, 2007; Rogoff & Morelli, 1989). The process of child development cannot be separated from the child's immediate social and cultural environment; thus, children in different countries may have different formative experiences, leading to potentially notable differences in developmental processes and outcomes, and limiting the generalizability of results obtained based on work with single cultural groups. Despite these recognized advantages, the vast majority of developmental research has focused on a select group of Western cultures.

The development of temperament in childhood represents an important area of study in the domain of social-emotional functioning, which has recently been approached from a cross-cultural perspective. Temperament has been conceptualized as individual differences in reactivity and self-regulation, which are constitutionally based and influenced over time by heredity, maturation, and experience (Rothbart & Derryberry, 1981). Reactivity refers to arousability of affect, motor activity, and attentional responses (i.e., orienting), assessed by threshold, latency, intensity, time to peak intensity, and recovery time of the reaction. Self-regulation refers to processes such as behavioral inhibition and self-soothing, serving to modulate reactivity (Rothbart & Bates, 1998). In so far as these biologically-based reactive and regulatory factors are influenced by experience, cultural differences in temperament can be anticipated. These environmental effects associated with culture may play a particularly important role in infancy. Panksepp (2001), for example, argued that the emotional systems development occurring in infancy is particularly open to environment, and influential in shaping later outcomes because of the "valence tagging," a process wherein basic emotional systems imbue environmental events with values, which unfolds during this period. According to Panksepp, infants may "initially assimilate cognitive structures only in highly affective ways," with the cognitive structure over time exerting a regulatory influence upon the emotional systems. Thus, infant emotional systems and their attempts at the processing of the surrounding world not only form the basis for later affective experience, but also provide the foundation for developing self-regulation that relies on cognitive skills, and continues to advance through out childhood and beyond.

Multiple investigators have focused their efforts on the study of temperament development in infancy, and as a result, normative developmental trajectories have been

documented for a variety of temperament dimensions during this period. In summary, Activity Level shows a dramatic increase during infancy (see Eaton, 1994, for a review). The expression of pleasure shows a smaller, more gradual increase during the first year of life, with positive emotionality becoming established early in infancy (Rothbart & Ahadi, 1994). A dramatic acceleration during the second half of the first year of life has been demonstrated for Fear. This developmental pattern was supported in Rothbart's (1988) investigation, wherein children were presented with familiar versus unfamiliar, highly stimulating toys, showing increases in fear with age, and more recent findings demonstrating that parent-reported fearfulness grows during the second part of the first year of life (Carranza Carnicero, Pérez López, Salinas, & Martínez Fuentes, 2000). A U-shaped trajectory has reflected the development of anger responses during the first year of life (e.g., Carranza, Pérez, González Salinas, & Martínez Fuentes, 2000; Rothbart, 1981), with changes in distress responses being associated with gains in cognitive abilities. For example, decreases in anger occurring between 2 and 6 months of age have been linked to the development of orienting attention, and greater flexibility in attention shifting (Johnson, Posner, & Rothbart, 1991). Towards the end of the first year, as the infants' capacity for goal-directed behavior develops, frustration due to blocked goals may increase. Duration of Orienting toward objects shows a U-shaped curve during the first year of life (see Ruff & Rothbart, 1996, for a review) that could be explained by the influence of two different systems. Children habituate faster to objects in familiar contexts, due to the maturation of the Orienting Attention Network in the first months of life, leading to a decrease in duration of looking at objects. Close to the first birthday, the emergence of an Executive Attention Network (Posner & Rothbart, 1992), linked to goal-oriented, planned behavior permits the child to engage and persist in interaction with objects, leading to increases in the duration of orienting reactions.

Despite these extensively documented normative changes in infant temperament, some degree of inter-individual/stability can be expected, given that development represents an organized process of change, with a previous level of organization serving as the basis for the next stage (Cairns, 1983). Investigators have generally found moderate levels of normative stability for temperament attributes during infancy (McDevitt & Carey, 1981; Peters-Martin & Wachs, 1984; Riese, 1987; Rothbart, 1986); although mean scores changed throughout infancy, individuals maintained their relative position within a group. Thus, individual differences in behavioral tendencies can be expected to persist despite significant developmental changes in early childhood. To date, however, the majority of studies addressing continuity and change in infancy have been based on North-American samples (see Rothbart & Bates, 2006, for a review).

A number of early-appearing gender differences in temperament have been documented (Dougherty, 2006; Fabes, Shepard, Guthrie, & Martin, 1997; Sanson, Smart, Prior, Oberklaid, & Pedlow, 1994; Teglasi & MacMahon, 1990; Windle, Hooker, Lerner, *et al.*, 1986). In particular, several studies have indicated that relative to girls, boys tend to be more "temperamentally difficult" (Fabes *et al.*, 1997), as well as have higher activity levels (Walker, Berthelsen, & Irving, 2001) and lower levels of attentional skills (Eisenberg, Fabes, Shepard, *et al.*, 1997; Eisenberg, Valiente, Faber, *et al.*, 2003; Murphy *et al.*, 2004; Walker *et al.*, 2001). Differences in infancy have been largely limited to

activity level and fear/behavioral inhibition. Higher activity level and approach have been reported for boys (Campbell & Eaton, 1999; Maziade, Boudreault, Thivierge, Caperaa, & Cote, 1984), with girls exhibiting greater hesitation in approaching novel objects (Martin, Wisenbaker, Baker, & Huttunen, 1997; Rothbart, 1988). Campbell and Eaton applied meta-analytic procedures to summarize 46 studies addressing activity level in infancy, estimating the size of the gender difference at .2 standard deviations. Gender differences in approach-withdrawal have been reported for cross-cultural samples (Carey & McDevitt, 1978; Hsu, Soong, Stigler, Hong, & Liang, 1981; Maziade, Boudreault, Thivierge, *et al.*, 1984), with parents rating males higher in their levels of approach. Martin, Wisenbaker, Baker, and Huttunen (1997) reported a large and significant gender difference for the Distress to Novelty dimension of temperament, with 6-month-old girls receiving higher scores than boys. More recently, Else-Quest and colleagues (2006) conducted a meta-analysis of sex differences in temperament for infants and children, demonstrating a small but a statistically significant mean effect size of gender for fearfulness ($d = -0.12$), with females demonstrating greater levels of fear.

Although cross-cultural temperament research has not been widespread, especially during the infancy period, a number of studies have reported differences as well as similarities in the levels of temperament attributes across cultures, primarily on the basis of parent-report methodologies, with limited use of laboratory observations. For example, significant differences between American and Taiwanese infants were noted, with parents reporting lower levels of regularity, activity, approach, adaptability, distractibility, and threshold of responsiveness, as well as higher levels of negative mood, and intensity for Taiwanese infants (Hsu, Soong, Stigler, Hong, & Liang, 1981). Kagan, Arcus, Snidman, *et al.* (1994) compared Chinese, Irish, and American 4 month-olds, in an observation study, finding that American infants displayed more motor activity and more distress than Irish infants who, in turn, were more active and more fretful than Chinese infants. However, no significant differences were found for smiling. Japanese preschoolers were rated as more active in sleep, more withdrawal-oriented, less flexible, expressing less positive affect, and as less regular than U.S. children (Windle, Iwawaki, & Lerner, 1988). Interestingly, school-age Japanese children also rated themselves as significantly lower on approach, mood quality, and flexibility, and higher on the rhythmicity factor (Windle, Iwawaki, & Lerner, 1987), relative to their U.S. counterparts. A recent investigation of cross-cultural differences between Russian and U.S. infants demonstrated a number of significant mean differences, consistent in the direction of the effect: the U.S. parents reported more frequent manifestations of positive emotions in their infants, whereas report of the Russian participants indicated a greater frequency of negative affect manifestations (Gartstein, Slobodskaya, & Kinsht, 2003).

Cross-cultural differences in the development of temperament could be attributed to genetic differences between populations (Bates, 1989; Zawadzki, Strelau, Oniszczenko, Roemann, & Angleitner, 2001); however, environmental factors are also likely to exert an influence. That is, development of certain temperament characteristics is likely facilitated by environmental factors, such as parent-child interactions. Although some universal patterns of parent-child interaction have been found, variability in parenting has also been identified and attributed, among other sources, to the impact of cultural differences

(e.g., Bornstein, Tal, & Tamis-LeMonda, 1991). Research conducted with predominantly Western cultures has demonstrated differences in “parental ethnotheories”, or culturally derived belief systems regarding children, family, and parenthood (Harkness & Super, 1995), which in turn are likely to be reflected in different approaches to parenting, and variability in child characteristics. The influence of such cultural differences in parental ethnotheories can also be expected to translate into variability in parental perceptions of child behavior. For example, behavioral and emotional tendencies considered challenging to manage in one country may not be perceived as equally difficult in another (Harkness & Super, 1996).

It should be noted that the contribution of genetic and environmental/cultural factors to temperament trait variability was deemed equivalent across different countries in a study conducted by Zawadzki, Strelau, Oniszczenko, *et al.*, (2001) study, wherein self-report and peer-ratings from 1500 pairs of twins in Poland and Germany were obtained. Thus, we anticipate that the environmental and genetic influences on the development of temperament impact these traits to the same extent, accounting for similar proportions of the variance in these attributes, across different cultures examined in this study.

The theoretical framework for cross-cultural research addressing differences in social-emotional development was provided by Super and Harkness (1986), who conceptualized the interface between a child and his/her culture as a “developmental niche”, that was described as a function of (1) customs (especially those related to child rearing), (2) settings available to the child, and (3) caregiver psychosocial characteristics, all factors influenced by culture. According to these authors, each of the three factors that shape the developmental niche interact differently with other features of the larger ecology, yet operate in a coordinated manner. In addition, the organism (i.e., the child) and the niche are mutually adaptive. This theoretical conceptualization has been successfully applied in understanding relationships between customs, settings, parents’ attitudes, child rearing practices, and perceptions of child temperament. Although most applications of the developmental niche theory have involved vastly different societies (e.g., rural East African communities and Western/industrialized countries), there are some notable exceptions of its generalization to more similar cultures (Super, Axia, Harkness, *et al.*, in press). In the latter study, McDevitt and Carey’s Behavioral Style Questionnaire (1978) was utilized with parents of 299 children (ages 3 to 8 years), across 7 countries: Australia, Italy, the Netherlands, Poland, Spain, Sweden, and the United States. This study resulted in a number of cross-cultural differences in the associations between the BSQ scales and a global child difficulty rating provided by parents. For example, the Italian sample emerged as significantly different from all other samples in that the correlation between Mood and Difficulty was essentially non-existent. Other temperament dimensions were related to Difficulty in some but not all samples: Activity in four of the 7 and Persistence in three of the 7 countries.

The study of cultural influences on temperament has also focused on comparisons among vastly different cultures, such as those with Eastern/Collectivistic and Western/Individualistic values (Ho, 1986; Ho & Kang, 1984; Hsu, Soong, Stigler, Hong, & Liang, 1981; Markus & Kitayma, 1994). There has been little systematic study of Russian children’s temperament from the cross-cultural perspective (Digman & Shme-

lyov, 1996; Slobodskaya, 1995), especially in infancy (Kolpakov et al., 1984; 1987), despite the fact that research in cultures with mixed values, such as Russia, can provide important information regarding cultural influences. Historically, the Slavic people emerged in Central Europe, the cross roads of Europe and Asia, which has shaped their communities, culture, and customs related to child rearing (Marganoff & Folwarski, 1996). Russians are considered to be Eastern Slavs, and have historically experienced more Eastern influences than the other Slavic groups, Western (e.g., Czechs, Poles) and Southern (e.g., Bulgarians, Croats) Slavs (Kerr, 1996). The Russian culture is similar to the East in stressing the importance of communal over individual values (Triandis, 1995), but unlike the Eastern cultures, children in Russia are not discouraged from independent activities, assertiveness and competition. The Poles find themselves culturally more West oriented, in majority ascribing to the Catholic religious denomination, unlike mostly Orthodox Russians. Both nations have similar patterns of emotion expression, languages and share the heritage of a communist past.

Selection of samples from Japan, U.S., Poland, and Russia provided an opportunity to evaluate differences and similarities in temperament for cultures reflecting a range of Individualistic/Collectivistic orientations. Triandis (1988) contrasted individualism and collectivism, noting that the former includes beliefs that (1) the views, needs, and goals of the self are most important; (2) behavior can be explained by the pleasure principle and the computation of personal profits and losses; (3) emphasis on features that distinguish the individual from the in-group, allowing for an autonomous entity; (4) social behavior is independent of and emotionally detached from the collective; whereas the latter emphasizes (1) views, needs, and goals of some collective; (2) explanations for behavior that focus on norms and duties imposed by the collective; (3) shared beliefs that the individual and the collective have in common; (4) social behavior that is dependent, emotionally attached, and involved with the collective, as well as cooperative and even self-sacrificing toward in-group members, but indifferent, possibly hostile, toward out-group members. Not surprisingly, systematic differences in parenting between individualistic and collectivistic societies have been demonstrated. Socialization contexts in infancy occurring in collectivistic cultures have been described as focusing on emotional warmth/proximity that foster acceptance of the group's norms and values (Keller, 2002; Keller et al., 2004). Caregivers in collectivistic societies often respond to their infants' needs in an anticipatory manner, blurring the self-other distinction. On the other hand, caregivers in individualistic cultures tend to use eye contact, object play, and contingency, encouraging the expression of positive emotions. The initiation of an individualistic developmental pathway also leads caregivers to focus on early self-regulation during infancy (Greenfield, Keller, Fuligni, & Maynard, 2003; Keller, 2002; Keller, Yovsi, Borke, *et al.*, 2004). In the present study, Japanese parents were expected to exhibit more collectivistic and fewer individualistic tendencies relative to the Slavic groups, which were expected to be roughly equivalent, whereas parents from the U.S. were anticipated to present with least collectivistic and most individualistic views. This degree of individualism/collectivism observed across the different cultures was expected to be reflected in different approaches to socialization and parent-infant interactions. Although the latter were not directly addressed in the present study, we

anticipated culturally influenced differences in socialization to translate into variability in temperament development, which was examined in the present investigation.

This work aims to investigate the commonalities as well as the idiosyncratic aspects of early development of temperament in four different cultures: Japan, the United States of America (U.S.), Poland, and Russia, through a cross-sectional design, addressing temperament from 3- to 12-months of age. In each country, parents from urban locations filled out the Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003), translated into each of the four languages. Significant cross-cultural differences in infant development were expected for the four countries represented in this study. Specifically, significant differences between Japan and U.S. were hypothesized. Whereas relatively similar patterns of results were anticipated for Poland and Russia, these cultures were expected to be significantly different from the other two groups. Hypotheses regarding developmental changes were also generated, including anticipated increases in Activity Level, Distress to Limitations, and Fear in the first year of life. Specific hypotheses regarding culture-by-age and culture-by-gender interactions were not generated, deeming these analyses primarily exploratory in nature.

METHOD

Participants

Polish sample. Fifty-nine parents of infants residing in Warsaw, Poland agreed to take part in a study of infant temperament, and represent a convenience sample of caregivers. Parents of infants between 3 and 12 months of age were recruited in daycare centers throughout Warsaw, the capital city of Poland. All respondents were mothers, most likely Catholic Poles, given the nature of the population residing in this region. This sample was about equally distributed in terms of gender (32 males and 27 females) and included infants across the desired age range (17-48 weeks; $M = 38.39$, $SD = 8.16$). The age and gender distributions associated with the Polish sample were operationalized as a "standard" in a matching procedure utilized with the remaining three cultures because being the smallest in terms of the number of participants, it was necessarily the most restricted in these parameters, vital to account for in the study of temperament development.

Japanese sample. Two hundred and eighty four parents of infants between 3 and 12 months of age residing in Nagoya, Japan took part in a temperament study. Nagoya, which is Japan's third largest industrial metropolis, is located near the center of Japan. Four hundred and fifty five parents, visiting public health centers for routine 3-month medical examinations, were initially recruited to take part in the temperament investigation and divided into three age groups. IBQ-R forms were handed to the parents of the 3 to 6 month old group during the visits, and were mailed to the homes at the appropriate time for the participants included in the 6 to 9 and 9 to 12 month age groups. In addition, eighty four mothers whose babies were between 3 and 12 months of age were disseminated the IBQ-R forms through the local nursery, and asked to respond to

the temperament related questions. Of these 539 parents, two hundred and eighty four or 53% (all mothers) completed the questionnaires. This Japanese sample ($N= 284$) was screened for age/gender criteria, that is, to be roughly equivalent to the Polish sample in terms of these distributions (utilizing age in weeks for greater precision), and the most closely matching set of participants ($N= 59$) was selected.

Russian sample. Mothers of infants ($N= 202$) were asked to respond to the temperament questionnaires when their infants were between 3 and 12 months of age. Fifty-nine participants were again selected based on the match for age-in-weeks and gender with the Polish sample. Participants were recruited while visiting a healthy child clinic in Novosibirsk, Russia. Novosibirsk is the third biggest city in Russia with a population of 1.6 million and is considered the business center of Siberia. Of those parents initially contacted, 9% refused to participate. Thus, about 91% of the contacted families participated in this work, and data for one infant was later excluded due to the missing gender. The respondents were mostly mothers (94.5%). In terms of income about half of the families earned less than the living wage standard (estimated at \$50.0 per person per month), which is consistent with published reports regarding this population (Rybinsky, 1996). A group of caregivers ($N=59$) was selected from this Russian sample ($N=202$), in order to match the Polish sample in terms of the infants' age and gender.

U.S. sample. U.S. data were collected at two different locations: Eugene-Springfield, Oregon, and San Francisco Bay area, California, from a total 500 primary caregivers of infants between 3 and 12 months of age. The first community sample of 360 primary caregivers of infants between 3 and 12 months of age was recruited at the Eugene-Springfield location, completing the IBQ-R. Participants were recruited by telephone on the basis of birth announcements published in the local paper for Eugene-Springfield, OR. Of the initially contacted caregivers, 9.7% refused to participate, and an additional 14.5% did not complete the assessment. Thus, about 76% of the contacted families participated in this work, the majority of respondents being mothers (90%). An evaluation of the SES data for this sample indicated that the primary caregivers were mostly employed in service oriented professions.

A slightly different approach was utilized in recruiting the San Francisco bay area sample. Only parents of infants who were three, six, nine, or twelve months of age (plus or minus two weeks) were invited to take part in this work. A sample of 140 families was recruited in this manner. All of the eligible families were contacted by telephone, on the basis of birth announcements published in the local San Francisco bay area papers. These phone calls were timed to allow the parents at least one week (usually two weeks) to respond to the questionnaires before the infant matured beyond the two weeks deemed acceptable for his/her age group (e.g., before an infant was older than 3 months and 2 weeks, when s/he was being recruited for the 3 month old age group). Three hundred sixty two parents were initially contacted by telephone, and invited to participate in this research, with 84% of families agreeing to participate. Questionnaires were returned in a timely manner (i.e., within 2 weeks of the desirable age) by 151 families, due to the fact that the others parents were not able to complete the materials before their infant was too mature for a particular age group. Complete temperament data were obtained from 140 caregivers who were mostly mothers (91%),

with occupations primarily in the areas of administrative support, marketing/advertising, and engineering. A group of caregivers ($N=59$) was ultimately selected from the overall U.S. sample ($N=500$), in order to parallel the Polish sample in terms of the infants' age and gender distributions. We also made sure that the data were matched in terms of the caregiver responding to the IBQ-R (i.e., only mother-report was utilized in an effort to maintain consistency with the Polish sample).

Measures

Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003). The IBQ-R represents a rationally derived, fine-grained assessment tool, based on the definition of temperament proposed by Rothbart and Derryberry (1981), work with the Child Behavior Questionnaire (Rothbart, Ahadi, & Hershey, 1994), comparative studies, as well as other developmental research that had identified significant dimensions and associated behavioral tendencies. This 191 item parent-report instrument yields 14 scales that have been demonstrated to form three over-arching factors: Positive Emotionality/Surgency (Activity Level, Smiling and Laughter, Vocal Reactivity, Approach, High Intensity Pleasure, and Perceptual Sensitivity), Negative Affectivity (Fear, Distress to Limitations, Sadness, and negatively loading Falling Reactivity), and Regulatory Capacity/Orienting (Duration of Orienting, Soothability, Cuddliness/Affiliation, and Low Intensity Pleasure). Reliability and validity of the IBQ-R has been supported for samples from different cultures, with Cronbach's alpha's ranging from .77 to .96 (Gartstein & Rothbart, 2003; Gartstein *et al.*, 2003; Gartstein *et al.*, 2005).

Procedure

After the participating parents agreed to take part in this investigation, they were asked to complete the IBQ-R. The completion of this paper-and-pencil measure generally takes about 45 minutes. This research was approved by the respective Institutional Review Boards of the different investigators, and participants provided informed consent prior to completing the temperament instrument.

Analytic Strategy

Mean differences between cultures, culture-by-age, and culture-by-gender interactions. Mean differences between the four cultures (U.S., Russia, Poland, and Japan), as well as culture-by-age, and culture-by-gender interactions, were evaluated in the context of three-way between groups 4 (Culture) \times 2 (Age) \times 2 (Gender) MANOVA's. The two levels of the age factor were created on the basis of the median split. The MANOVA approach was utilized initially with the three overarching temperament factors as dependent variables in order to limit the overall number of analyses. Significant effects were evaluated further through univariate statistical tests (i.e., ANOVA's), examining each overarching dimension of temperament individually. Significant results obtained on the level of individual overarching factors triggered a more fine-grained level of analysis,

aimed at evaluating differences for individual subscales. MANOVA's were again utilized in analyzing groups of IBQ-R subscales, consistent with the factors producing statistically significant differences, in order to limit the overall number of comparisons. For example, if the univariate analysis of the Positive Affectivity/Surgency factor produced statistically significant results, subscales contributing to this factor (e.g., Smiling/Laughter, Activity, etc.) would be evaluated via a MANOVA. Again, these multivariate analyses were followed by univariate tests, to hone in on specific subscales leading to overall significant effects. Significant main effects of culture were subsequently followed by simple contrasts, comparing the different cultural groups. Follow-up analyses of significant age-by-culture and gender-by-culture interactions were considered exploratory, because a priori hypotheses were not developed for this set of effects, due to insufficient prior research and theoretical directives.

Intercorrelations between Fine-grained IBQ-R Indicators across Different Cultures. Potential differences in the interrelations between the domains of temperament represented by the IBQ-R scales were evaluated for the cultural groups included in this study. Specifically, correlations between the fourteen IBQ-R scales were computed, and subsequently examined, for the U.S., Russian, Polish, and Japanese samples.

RESULTS

Mean Differences between Cultures. Significant multivariate main effects emerged for culture (Wilk's Lambda .86, $p < .001$), age (Wilk's Lambda .94, $p < .01$), and gender (Wilk's Lambda .96, $p < .05$). These effects were subsequently followed-up by univariate tests, addressing each IBQ-R factor individually. Significant effects of culture were observed for Positive Emotionality/Surgency ($F(3, 220) = 5.66$, $p < .01$) and Negative Affectivity ($F(3, 220) = 4.62$, $p < .01$), whereas the significant effect of gender was noted for Positive Emotionality/Surgency only ($F(1, 220) = 8.01$, $p < .01$). Age was also associated with significant effects for Positive Emotionality/Surgency ($F(1, 220) = 6.81$, $p < .01$) and Negative Affectivity ($F(1, 220) = 4.61$, $p < .05$). These significant differences for the overarching IBQ-R factors were evaluated further, addressing individual IBQ-R scales associated with significant findings. No significant interaction effects involving culture, age, or gender, were observed.

MANOVAs were utilized, addressing scales associated with each of the two factors as a set. Significant multivariate main effects emerged for culture (Wilk's Lambda .80, $p < .001$) and gender (Wilk's Lambda .94, $p < .05$) in the analysis of Positive Emotionality/Surgency. Subsequently performed ANOVA's yielded significant results for Smiling and Laughter ($F(3, 220) = 7.40$, $p < .001$), High Intensity Pleasure ($F(3, 220) = 5.71$, $p < .01$), Perceptual Sensitivity ($F(3, 220) = 2.69$, $p < .05$), Approach ($F(3, 220) = 3.06$, $p < .05$), and Vocal Reactivity ($F(3, 220) = 5.24$, $p < .01$). Follow-up contrasts were performed to identify pair-wise cultural differences (Table 1).

Significant differences between U.S. and Poland, Russia and Poland, as well as Poland and Japan for Smiling and Laughter (Figure 1) and High Intensity Pleasure (Figure 2) were observed. In addition, the U.S. sample was significantly different from the Russian and Japanese samples on Vocal Reactivity (Figure 3).

Table 1. Cross-Cultural Follow-up Comparisons for IBQ-R Subscales: US, Japan, Russia, and Poland.

Temperament Variable	U.S.	Japan	Russia	Poland	F ^a
	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	
Activity Level	4.45 (.12)	4.45 (.12)	4.44 (.11)	4.25 (.12)	.746
Smiling & Laughter	4.66 ^b (.13)	4.35 ^b (.13)	4.47 ^b (.13)	5.15 ^{cde} (.13)	7.17**
Vocal Reactivity	4.80 ^{de} (.11)	4.27 ^c (.11)	4.39 ^c (.11)	4.65 (.11)	5.24**
Approach	5.30 (.15)	4.78 (.15)	5.31 (.15)	5.26 (.15)	3.06*
High Intensity Pleasure	6.05 ^d (.09)	5.72 ^{bc} (.09)	5.84 ^b (.09)	6.16 ^{de} (.09)	5.71**
Perceptual Sensitivity	4.34 (.14)	3.90 (.14)	3.95 (.14)	4.30 (.14)	2.69
Fear	2.55 ^{de} (.16)	3.62 ^{bc} (.16)	3.21 ^c (.15)	2.75 ^d (.16)	9.80**
Distress to Limitations	3.90 (.12)	4.35 (.12)	4.00 (.12)	3.92 (.12)	2.92*
Sadness	3.69 (.13)	3.59 (.13)	3.77 (.13)	3.64 (.13)	.365
Falling Reactivity	5.22 (.16)	4.67 (.16)	4.71 (.16)	4.71 (.16)	2.65*

* $p < .05$, ** $p < .01$. All two-tailed tests; F a value for the contrast ($df = 3, 220$); ^b Significantly different from Poland; ^c Significantly different from US; ^d Significantly different from Japan; ^e Significantly different from Russia.

Significant gender differences emerged for High Intensity Pleasure ($F(1, 220) = 7.85, p < .01$) and Approach ($F(1, 220) = 7.68, p < .01$), with males (High Intensity Pleasure: $M = 6.07$; $SE = .06$; Approach: $M = 5.37$; $SE = .10$) receiving higher scores than females (High Intensity Pleasure: $M = 5.83$; $SE = .06$; Approach: $M = 4.96$; $SE = .11$) on both scales. Significant culture (Wilk's Lambda .80, $p < .001$) and age (Wilk's Lambda .94, $p < .05$) effects emerged for the Negative Affectivity factor. ANOVA's provided evidence of statistically significant cultural differences for Distress to Limitations ($F(3, 220) = 2.92, p < .05$), Fear ($F(3, 220) = 9.80, p < .001$), and Falling Reactivity ($F(3, 220) = 2.65, p < .05$), and age differences for Distress to Limitations ($F(1, 220) = 6.54, p < .05$), and Fear ($F(1, 220) = 8.41, p < .01$). Follow-up contrasts (Table 1) indicated significant differences between U.S. and Russia, as well as U.S. and Japan, and between Poland and Japan for the Fear scale (Figure 4).

Older infants were perceived by their caregivers as exhibiting higher levels of Distress to Limitations and Fear (Distress to Limitations: $M = 4.20$, $SE = .08$; Fear: $M = 3.26$, $SE = .11$), compared to the younger age group (Distress to Limitations: $M = 3.89$, $SE = .09$; Fear: $M = 2.81$; $SE = .11$).

Intercorrelations between Fine-grained IBQ-R Indicators across Different Cultures: U.S., Japan, Russia and Poland. Overall, low to moderate correlations between IBQ-R subscales were observed across all 4 cultures included in this study (Tables 2 and 3). In addition, inter-relationships between the IBQ-R subscales consistent with the previously observed overarching factors, namely Negative Emotionality, Positive Affectivity/Surgency, and Regulatory Capacity/Orienting, were noted for the participating cultural groups. Thus, although a formal comparison of cross-cultural structural equivalence via factor analyses was not attempted due to a relatively small sample size of each cultural group, our examination of correlation coefficients reflecting relationships between narrow band domains of temperament supports the previously demonstrated three factor structure.



Figure 1. Smiling/Laughter: Comparisons between US, Russia, Poland, and Japan.

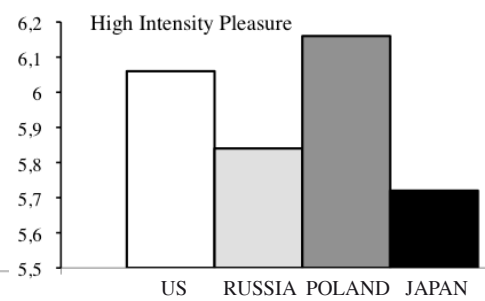


Figure 2. High Intensity Pleasure: Comparisons between US, Russia, Poland, Japan.

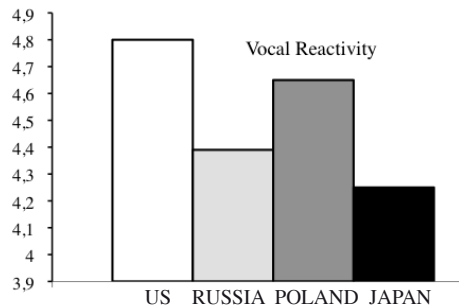


Figure 3. Vocal Reactivity: Comparisons between US, Russia, Poland, and Japan.

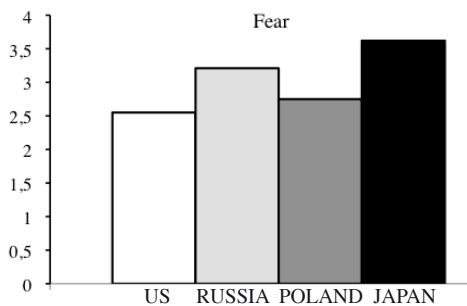


Figure 4. Fear: Comparisons between US, Russia, Poland, and Japan.

Table 2. Intercorrelations among IBQ-R Scales for infants from US ($N=59$) and Japan ($N=59$).

	ACT	DL	FEAR	DO	SL	HP	LP	SOOT	FALL	CUD	PS	SAD	APP	VR
ACT	-	.58**	.32*	-.23	-.03	.21	-.32*	-.17	-.17	-.42**	.28*	.34**	.23	-.02
DL	.31*	-	.34**	-.30*	-.41**	.02	-.29*	-.29**	-.43**	-.30*	.22	.50**	.24	-.08
FEAR	.14	.27*	-	.18	.06	-.18	.08	-.07	-.02	-.19	.43**	.49**	.26*	.09
DO	-.29*	-.43**	.05	-	.47**	.23	.56**	.18	.14	.19	.29*	.01	.11	.43**
SL	-.04	-.22	-.01	.48**	-	.51**	.46**	.26*	.19	.14	.32*	-.01	.19	.48**
HP	-.05	-.05	-.29*	.05	.26*	-	.39**	.22	.14	.09	.27*	-.07	.62**	.34**
LP	-.09	-.21	-.17	.22	.22	.21	-	.17	.12	.26*	.18	-.16	.20	.39**
SOOT	-.05	-.20	.02	.33*	.40**	.11	.19	-	.47**	.26*	.12	-.28*	-.03	.12
FALL	-.06	-.30*	-.06	.14	.21	.25	.28*	.44**	-	.20	-.03	-.46**	-.16	.14
CUD	-.03	-.06	-.12	.03	.17	.37**	.11	.30**	.08	-	-.18	-.29*	-.09	.18
PS	-.07	.02	.03	.30*	.34**	.16	.22	.59**	.17	.18	-	.32*	.39**	.38**
SAD	.21	.48**	.17	-.34**	-.29*	-.06	-.15	-.45**	-.33*	-.16	-.13	-	.15	.11
APP	.24	.26	.32*	.15	.53**	.24	.20	.46**	.28*	.15	.48**	-.09	-	.37**
VR	.03	.02	.23	.40	.57**	.24	.25	.37**	.22	.16	.38**	-.11	.57**	-

* $p < .05$, ** $p < .01$, all two-tailed test. Correlations for the IBQ-R scales computed for U.S. infants are above the diagonal, and for Japanese infants are below.

Activity: ACT; Distress to Limitations: DL; Duration of Orienting: DO; Smiling/Laughter: SL; High Intensity Pleasure: HP; Low Intensity Pleasure: LP; Soothability: SOOT; Falling Reactivity: FALL; Cuddliness: CUD; Perceptual Sensitivity: PS; Sadness: SAD; Approach: APP; Vocal Reactivity: VR.

Table 3. Intercorrelations among IBQ-R Scales for infants from Russia ($N= 59$) and Poland ($N= 59$).

	ACT	DL	FEAR	DO	SL	HP	LP	SOOT	FALL	CUD	PS	SAD	APP	VR
ACT	-	.58**	.32*	-.23	-.03	.21	-.32*	-.17	-.17	-.42**	.28*	.34**	.23	-.02
DL	.31*	-	.34**	-.30*	-.41**	.02	-.29*	-.29**	-.43**	-.30*	.22	.50**	.24	-.08
FEAR	.14	.27*	-	.18	.06	-.18	.08	-.07	-.02	-.19	.43**	.49**	.26*	.09
DO	-.29*	-.43**	.05	-	.47**	.23	.56**	.18	.14	.19	.29*	.01	.11	.43**
SL	-.04	-.22	-.01	.48**	-	.51**	.46**	.26*	.19	.14	.32*	-.01	.19	.48**
HP	-.05	-.05	-.29*	.05	.26*	-	.39**	.22	.14	.09	.27*	-.07	.62**	.34**
LP	-.09	-.21	-.17	.22	.22	.21	-	.17	.12	.26*	.18	-.16	.20	.39**
SOOT	-.05	-.20	.02	.33*	.40**	.11	.19	-	.47**	.26*	.12	-.28*	-.03	.12
FALL	-.06	-.30*	-.06	.14	.21	.25	.28*	.44**	-	.20	-.03	-.46**	-.16	.14
CUD	-.03	-.06	-.12	.03	.17	.37**	.11	.30**	.08	-	-.18	-.29*	-.09	.18
PS	-.07	.02	.03	.30*	.34**	.16	.22	.59**	.17	.18	-	.32*	.39**	.38**
SAD	.21	.48**	.17	-.34**	-.29*	-.06	-.15	-.45**	-.33*	-.16	-.13	-	.15	.11
APP	.24	.26	.32*	.15	.53**	.24	.20	.46**	.28*	.15	.48**	-.09	-	.37**
VR	.03	.02	.23	.40	.57**	.24	.25	.37**	.22	.16	.38**	-.11	.57**	-

* $p < .05$, ** $p < .01$, all two-tailed test. Correlations for the IBQ-R scales computed for Russian infants are above the diagonal, and for Polish infants are below.

Activity: ACT; Distress to Limitations: DL; Duration of Orienting: DO; Smiling/Laughter: SL; High Intensity Pleasure: HP; Low Intensity Pleasure: LP; Soothability: SOOT; Falling Reactivity: FALL; Cuddliness: CUD; Perceptual Sensitivity: PS; Sadness: SAD; Approach: APP; Vocal Reactivity: VR.

DISCUSSION

This study addressed similarities and differences in early manifestations of temperament in Japan, the United States of America (U.S.), Poland, and Russia, which differ, among other factors, in terms of their individualistic/collectivistic orientations, a cultural attribute most frequently invoked in understanding differences between cultures. In addition, the inclusion of two Slavic cultures enabled us to evaluate potential differences in the development of temperament between these more similar groups and the two other samples, expected to differ more widely along the dimensions of collectivism and individualism. Based on previously observed differences in individualism/collectivism, Japanese parents were expected to exhibit more collectivistic and less individualistic tendencies relative to the Slavic groups, and parents from the U.S. were anticipated to present with less collectivistic and more individualistic approaches (Allik & Realo, 2004). In fact, Russia and Poland received such similar individualism/collectivism ratings that it was not feasible to discriminate between the two. That is, their rank order on the individualism/collectivism scale was interchangeable, depending on the particular index being utilized (Allik & Realo, 2004). These data suggest that few if any differences should be observed between children from these two cultures, if the individualism/collectivism cultural attributes are essential in shaping parental attitudes and behaviors, which in turn influence infant social-emotional development. Thus, based on available theory and relevant empirical findings (Bornstein, Tal, & Tamis-LeMonda, 1991; Keller, 2002; Keller *et al.*, 2004), the degree of individualism/collectivism observed in the different cultures was expected to be reflected in approaches to socialization and parent-infant interactions, which in turn may translate into differences in temperament development.

In addition, hypotheses addressing developmental changes and gender differences were formulated on the bases of the existing literature.

Our analytic strategy yielded a number of statistically significant effects, including main effects of culture, age and gender. Significant effects of culture were observed for Positive Emotionality/Surgency and Negative Affectivity, with subsequently performed ANOVA's indicating significant cultural differences for Smiling and Laughter, High Intensity Pleasure, Perceptual Sensitivity, Approach, and Vocal Reactivity. Follow-up contrasts performed to identify specific cultural differences indicated significant differences between U.S. and Poland, Russia and Poland, as well as Poland and Japan for Smiling and Laughter and High Intensity Pleasure, with U.S. and Polish samples demonstrating the highest levels of these Positive Affectivity dimensions. In addition, the U.S. sample was significantly different from the Russian and Japanese samples on Vocal Reactivity, with U.S. caregivers reporting higher levels of expression for this channel of positive reactivity. ANOVA's further provided evidence of statistically significant cultural differences for Distress to Limitations, Fear, and Falling Reactivity, with follow-up contrasts indicating significant differences between U.S. and Russia, as well as Japan, and between Poland and Japan for the Fear scale. Japanese and Russian infants were characterized as demonstrating the highest and the second highest levels of fearfulness, respectively, with U.S. and Polish infants receiving comparatively lower ratings from their caregivers.

A significant effect of gender was noted for Positive Emotionality/Surgency only, High Intensity Pleasure and Approach in particular, with males receiving higher scores on both scales, irrespective of culture. These results are consistent with previous reports based on U.S. participants alone (Gartstein & Rothbart, 2003), indicating that male infants receive higher ratings for these extraversion related attributes. Results of the present study indicate that these gender differences can be generalized cross-culturally, albeit in a somewhat limited manner. Elevated levels of High Intensity Pleasure and Approach, while associated with positive affect, could be responsible for the greater risk for externalizing symptoms for males in early childhood. In fact, extraversion has been linked with an increased risk for externalizing type problems, with boys typically experiencing greater levels of both sets of characteristics (Else-Quest, Shibley Hyde, Goldsmith, & Van Hulle, 2006). The present study suggests that High Intensity Pleasure and Approach tendencies may be at least in part responsible for this observed relationship.

Age was associated with a significant effect for Negative Affectivity, with differences emerging for Distress to Limitations and Fear IBQ-R scales. Older infants were perceived by their caregivers as exhibiting higher levels of Distress to Limitations and Fear, consistent with previous studies (Carranza Carnicero *et al.*, 2000; Gartstein & Rothbart, 2003; Gartstein *et al.*, 2003; Rothbart, 1988). Whereas changes in the domains of negative emotionality have been noted throughout infancy, other investigations demonstrated relative stability in negative emotionality constructs by the toddler period (e.g. Lemery *et al.*, 1999). Results of this study suggest that previously observed increases in Fear and Distress to Limitations are representative of developmental changes in temperament not just for infants in the U.S, but Russia, Poland, and Japan as well, increasing our ability to generalize this trend. These increases are understood to be

a function of maturation of the underlying neurobehavioral systems, linked with the manifestations of negative emotions (e.g., the Behavioral Inhibition System, associated with expression of fear). In addition, increases in Fear and Distress to Limitations, or anger/frustration, in particular, have been associated with changes in cognitive functioning. Increases in Distress to Limitations may be at least in part a function of emerging cognitive skills, such as goal directed thinking and long-term memory, allowing goals to be kept in mind, and creating greater potential for frustration. Infants developing these capacities are more likely to show distress when unable to grasp desired objects, or when a caregiver removes a desired object (Carranza Carnicero *et al.*, 2000).

In addition, low to moderate correlations between IBQ-R subscales were observed across all four cultures, with inter-relationships between these subscales demonstrating a pattern consistent with the previously observed overarching factors, namely Negative Emotionality, Positive Affectivity/Surgency, and Regulatory Capacity/Orienting for all participating cultural groups. Thus, although we were not able to perform a formal comparison of cross-cultural structural equivalence due to a relatively small sample size of each cultural group, the overall patterns of correlation coefficients across these countries reflected relationships between narrow band domains of temperament, consistent with the previously demonstrated three factor structure (Gartstein & Rothbart, 2003).

Overall, support for our hypotheses can be described as mixed. As anticipated, significant differences between cultures emerged; however, the pattern of differences was not completely in accord with our predictions based on previously reported differences in the individualism/collectivism cultural orientation. That is, the pattern of findings indicated that U.S. mothers' ratings were more similar to the perceptions of mothers in the Polish sample, whereas mother-report of infant temperament provided by the Russian sample was more consistent with the observations provided by Japanese caregivers. The noted differences between the temperament ratings provided for U.S. infants and those reported for Japanese and Russian infants were consistent with the anticipated differences, given that the U.S. culture has been deemed more individualistic than Russian and Japanese cultures, which in turn were described as more collectivistic. We also anticipated fewer differences between Russian and Polish samples because of their more similar Slavic cultural backgrounds, and greater parallels in terms of collectivistic tendencies, presumably at least in part a function of their communist histories (Allik & Realo, 2004). Greater similarity between U.S. and Polish samples was not anticipated on the basis of the available individualism/collectivism ratings (Allik & Realo, 2004), and may be a function of very recent history, with the culmination of dramatic political and economic changes associated with the fall of communism, which impacted Poland earlier and perhaps more profoundly than Russia. It should be noted that this socio-political shift may be reflected largely in the parents' perceptions of the infants, and the impact on observed child behavior should be evaluated in the future.

Thus, factors propelling Poland toward capitalism, and presumably greater levels of individualism and more similarities with the U.S., appear to have exerted a more powerful influence on parental perceptions, relative to longstanding geopolitical ties with Russia, in the context of the present investigation. Another potential explanation for the observed pattern of results, related to these socio-political events, has to do with the

link between parental perceptions of their children's attributes and their experience of political uncertainty (Shamai, 2001). The latter study indicated that parents experiencing greater levels of stress and uncertainty reported more frequent/severe negative emotional experiences (e.g., fear, anxiety, etc.) for themselves and their children. It is possible that parents in the Russian sample experienced greater levels of uncertainty because of more recent significant socio-political changes, which in turn translated into higher ratings of child negative attributes, and perhaps lower ratings on positive affectivity characteristics, relative to the Polish sample. Alternatively, cultural factors in addition to individualism/collectivism and socio-political changes may impact the manner in which parents provide information regarding their infants. Specifically, cultural differences outlined in the context of "ideal" and "actual" affect may be relevant to understanding how parents report regarding their children's behavioral and emotional tendencies. Tsai, Knutson, and Fung (2006) proposed that how people want to feel ("ideal affect") differs from how they actually feel ("actual affect") and that cultural factors influence ideal more than actual affect. Design of the present study does not allow us to rule out the possibility that parental "ideal affect" influenced their ratings of infant temperament, including emotional reactivity across multiple domains and emerging regulatory capacity, contributing to the cross-cultural differences observed in this study. Utilization of direct observations of infant emotional reactivity and regulatory capacity would enable researchers to more conclusively address this possibility in future research.

The present study is impacted by a number of limitations, including our exclusive reliance on parent-report of infant temperament noted earlier. This concern is at least somewhat mitigated by recent evidence that has shown parental report of child temperament to have superior predictive validity relative to other sources of information addressing child temperament, such as structured observations (Hart, Field, & Roitfarb, 1999; Pauli-Pott, Mertesacker, Bade, Haverkock, & Beckmann, 2002).

It should be noted that our focus on parental perceptions of infant temperament was largely a function of the fact that parents represent primary socialization agents exerting salient environmental effects, especially in early childhood, which are likely to be determined, at least in part, by parental perceptions of the infants (Rothbart & Bates, 1998). Nonetheless future research should utilize structured laboratory observations along with parent-report indicators of infant temperament, utilizing information from secondary caregivers and external care-providers when possible, for a more comprehensive and representative picture of child functioning. The latter approach would also have the advantage of enabling researchers to address questions regarding construct validity of parent report across a variety of cultures. Second, the sample sizes included in this study could be described as relatively small, leading to lower levels of power and limiting the extent of our ability generalize the results. Subsequent investigations should aim to include larger groups of participants, which would enable researchers to establish structural equivalence for different cultural groups, which was not accomplished in this study. Although we had previously provided evidence for such equivalence for U.S. and Russian samples, this work with the IBQ-R has not been conducted with Polish and Japanese participants. Additional support for equivalence of the measure across cultures could be obtained by recruiting bilingual parents of infants in each country and

asking them to complete the IBQ-R in English and either Russian, Polish, or Japan, in order to determine the scope of commonality of items and consequently the endorsed temperamental characteristics. In addition, we were not able to compare our samples on a number of potentially important demographic/background attributes, which should be addressed in the future. In particular, it would be important to consider factors such as parental education and socio-economic status.

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