

Running head: EMOTION MATCHING TASK: CROSS-CULTURAL EMOTION KNOWLEDGE

### *Cross-cultural Validity of the Emotion Matching Task*

#### **Abstract**

**Objectives.** We aimed to provide evidence of the cross-cultural validity of the Emotion Matching Task (EMT), as a measure of emotion knowledge in preschool children in different cultures, namely, the United States, Italy, and Spain. In particular, we analyzed: 1) the psychometric properties of the scale in each of the three subsamples; 2) the relations between sex, age, verbal ability, and EK, in the overall sample and in the three different cultures; 3) the pattern of acquisition of the various dimensions of emotion knowledge in the overall sample and in the three different countries. **Methods.** Participants were 500 children from Spain ( $N = 180$ ), the United States ( $N = 158$ ) and Italy ( $N = 162$ ) from 36 to 72 months (mean age = 53.75), attending several schools and childcare centers in the three countries. Children were administered the EMT and the Peabody Picture Vocabulary Test (PPVT). **Results.** The EMT demonstrated adequate reliability indices for all three countries. Controlling for the influence of sex, age, and verbal ability, the results revealed between-country differences in all four dimensions of emotion knowledge. The pattern of acquisition of EK was similar in the three cultures. **Conclusions.** These results point to the EMT as an appropriate tool for measuring EK in young children from different cultures. Cross-culturally valid measures are needed to evaluate EK in multicultural contexts, and to test the cross-cultural effectiveness of interventions aimed at encouraging emotional competence.

*Keywords:* emotion knowledge; cross-cultural; preschool; EMT; validity.

*Cross-cultural Validity of the Emotion Matching Task*

Children experience and perceive emotions from the earliest moments of their lives (Lewis, 2008). They exhibit an early and innate ability to communicate through emotions and gradually develop the ability to interpret the causes and effects of emotions, to manage their own or others' feelings (Izard, 2001), and to achieve specific goals in emotionally-charged situations (Camras & Halberstadt, 2017; Denham, 1998). Emotion Knowledge (EK) is defined as the set of skills related to processing emotional information and making adaptive use of this information and includes the ability to: a) recognize emotions, b) label emotions, c) identify the triggers of emotions, and d) anticipate emotions in real or imaginary situations (Izard, 2001; Izard et al., 2011). The receptive ability emerges first, followed by expressive EK. Emotion situation knowledge (Bassett, Denham, Mincic, & Graling, 2012; Morgan, Izard, & King, 2010) then emerges between the ages of three and four and enables children to begin to understand the antecedents and consequences of emotions (Sprung, Münch, Harris, Ebesutani, & Hofmann, 2015). The development of emotion situation knowledge is an essential step, as children can then anticipate how they or others would feel under certain circumstances, or what might happen if they or others feel a specific emotion. Emotion knowledge abilities enable children to begin to understand their own and others' emotional responses (Bennett, Bendersky, & Lewis, 2005; Zeidner, Matthews, Roberts, & MacCann, 2003), and although all individuals develop EK to some extent, its development is influenced by a number of factors. Individual, family, and societal characteristics affect the way children perceive and process emotional information, as well as their responses (Alegre, 2011; Salmon et al., 2013; Schultz, Izard, & Abe, 2005).

Emotion knowledge is related to both age and verbal ability (Harden, Morrison, & Clyman, 2014; Miller et al., 2006; Salmon et al., 2013; Trentacosta & Fine, 2010). Although EK skills evolve over the course of one's life, the period between ages 3 and 6 is a critical time for development. As EK skills evolve, more frequent emotion-eliciting experiences help improve EK. Growing verbal skills also favor the acquisition and use of emotional vocabulary and pave the way for subsequent emotional understanding (Zeidner et al., 2003): when a child is able to understand and talk and ask about emotions and emotion-eliciting situations, the opportunities to acquire knowledge about them increase considerably (Serrat & Sidera, 2018). The relation between biological sex and EK is not as clear. Findings generally indicate that girls score higher than boys in EK (Bennett et al., 2005; Denham, Bassett, Brown, Way, & Steed, 2015; McClure, 2000). However, some studies found no sex differences (Fidalgo, Tenenbaum, & Aznar, 2018; Miller et al., 2006), and others reported an interaction between sex and age, with no difference exhibited by

girls and boys in the earliest years of life, but differences existing in 5-year-old children (Alonso-Alberca, 2014).

EK is crucial for both concurrent and subsequent social adaptation, as well as for learning and success in school (Domitrovich, Durlak, Staley, & Weissberg, 2017; Trentacosta & Fine, 2010). Poor perception and emotion understanding put children at risk for experiencing difficulties in social situations. Children without adequate EK may not correctly interpret or understand how other children feel, which may lead to social difficulties such as rejection or avoiding peer interactions due to erroneous interpretation of emotional signals (Lindsey, 2017; Miller et al., 2006). Children with better EK tend to better regulate their emotions. They are also more responsive in emotionally-charged situations, which helps them in social interactions and in cognitive tasks (Di Maggio, Zappulla, & Pace, 2016; Garner & Waajid, 2012; Voltmer & von Salisch, 2017). In sum, EK may play a key role in the adjustment of young children and seems to have both short- and long-term implications, including facilitating adaptive behavior and preventing the development of social and emotional problems. This is particularly relevant for prevention purposes, given that behavioral and emotional problems are relatively stable over time, and tend to remain throughout childhood and adolescence (Dowdy et al., 2014; Stemmler & Lösel, 2012).

Although development of emotional abilities is a fundamental and universal aspect of human functioning, it is beyond doubt that culture influences emotional processes (Cole & Tan, 2015; Halberstadt & Lozada, 2011; Keller, & Otto, 2009; Lozada & Halberstadt, 2015; Trommsdorff & Heikamp, 2013). The value placed on emotional experiences and the expression of emotions varies by culture and may impact the socialization of emotions (Halberstadt & Lozada, 2011). Within the present work, the United States, Italy, and Spain are all considered Western industrialized cultures. Moreover, there are additional similarities between Italy and Spain, as both countries belong to the Latin European cluster, along with other countries such as France and Portugal (Gupta, Hanges, & Dorfman, 2002). Latin European countries in general, and Italy and Spain in particular, share historical origins and linguistic backgrounds, which can influence commonalities in social and emotional development. For example, both in Italy and Spain, the family network and the group one belongs to are important social aspects. In these contexts, mutual support and cooperation are particularly relevant, especially in family and friends' groups: when a member of one's own network needs help, personal interests and goals are overshadowed and postponed to favor collective well-being. However, reality is often more complex, and in other aspects, Italy appears

to be more individualistic and similar to the US. For example, outside the extended family and friends' networks, competition with others and orientation to personal success are both encouraged.

Trommsdorff & Heikamp (2013) described how views on self-other relations, and support, control, and sensitivity for emotional development are transmitted through socialization processes. In individualistic societies, emotional competence includes self-awareness and the expression and regulation of socially-disengaged emotions (such as happiness and anger), which are considered assertions of a person's individuality and autonomy. Collectivist societies, on the other hand, encourage an understanding of emotion in relation to what others are feeling, and also promote socially-engaged emotions (such as shame and guilt), which are considered helpful for maintaining group harmony (Lozada & Halberstadt, 2015). Cultural differences in how much value is placed on emotion experiences, emotion expression, how and when children learn about emotions, and parent-child interactions may also impact how adults guide EK acquisition (Lozada & Halberstadt, 2015; Salmon et al., 2013).

By the preschool years, emotion-related behaviors are consistent with cultural norms, reflecting the group's cultural model (Friedlmeier, Corapci, & Cole, 2011). Parental emotion socialization is embedded in a broad context of values, beliefs, and objectives that will influence the development of EK and that ultimately reflects the model of emotion competence established in the cultural group of belonging. The cultural variability in children's EK may reflect differential practices in emotion socialization (Cole, Dennis, Smith-Simon, & Cohen, 2009; Cole & Tan, 2015; Wang, 2008; Yang & Wang, 2016), as coaching style is influenced by cultural views of emotion and by the relevance placed on emotions during socialization. Emotion socialization in individualistic societies is characterized by a style in which parents encourage autonomy and emotional experience. Parents tend to give support and assistance in emotion experiences, as well as show openness and willingness to talk about emotions (Doan & Wang, 2018; Friedlmeier et al., 2011; Wang, 2008). In this sense, the emotion experience is used to promote learning and develop emotion competence and, within it, EK. On the other hand, in collectivistic societies, social norms are prioritized over individual experiences, and socialization promotes emotion competence centered on relationships in the group and values that satisfy group interests over individual interests (Friedlmeier et al., 2011), and conversations about emotions are centered in guiding the child to incorporate social norms (Wang, 2008). In addition to the primary influence that family contexts have in the preschool ages, school settings in different cultures also reflect perspectives of independence and interdependence in emotion socialization (Wang, 2008).

There is a clear need to analyze this key period in the development of emotion competence and EK in early childhood in greater depth, especially from cross-cultural perspectives. In a cross-cultural review of emotion socialization, Friedlmeier et al. (2011) found that the number of empirical studies outside the US remained low, although the field has considerably increased the number of studies in the last years. The main focus thus far has been the comparison between Western and Eastern cultures (Doan & Wang, 2018). There is evidence to suggest that early cross-cultural differences do indeed exist. For example, Euro-American children, by the ages of 3, 3.5 and 4.5, had better EK than Chinese children living in China, as well as Chinese immigrant children. In addition, Euro-American children showed greater memory specificity and refer more to internal states when remembering experiences than the Chinese groups did, arguing that Chinese children's tendency to provide general responses may indicate difficulties in accessing episodic memory, facilitated by EK, independent of culture or language skills (Wang, 2008).

Kuwabara, Son, and Smith (2008) analyzed cultural differences in emotion understanding between 4-year-old Japanese and American children. In particular, they found that when asked how a character would feel in a situation, American children relied on the previously shown emotion expression, while Japanese children relied on the elements of the situation. In addition, American children followed more stable trait-like attributions of emotion, while the Japanese children made less stable state-like attributions. As the authors point out, this reflects cultural differences that may be influenced by linguistic structure, or by the meaning of emotional terms that, while in English are more trait-like, in Japanese can be considered more state-like (Kuwabara et al., 2008).

There is also evidence of cultural differences in the mediating role of EK. One study with Euro-American and Chinese children found that with Euro-American children, emotion coaching and higher EK at the age of 3.5 was negatively associated with internalizing problems at the age of 7. However, there was no significant relation between EK and internalization for Chinese children, suggesting that EK was beneficial, in terms of internalizing problems, just for one of the groups (Doan & Wang, 2018). In a study of EK at later ages, there were no differences in EK between 7-9-year-old Euro-American and first generation Chinese immigrant children, except for Chinese children's greater knowledge of pride and fear. Instead, the authors found that the culture mediated the relation between EK and coping. Additionally, Yang & Wang (2016) found that EK about self-conscious emotions was inversely related to

using distraction as a coping strategy among Euro-American children, while higher EK about pride in Chinese children was associated with using more distraction.

Differences between very different cultures, such as Western and Eastern, are often more evident, and this knowledge is key to understanding the shared elements in the development of emotion knowledge. However, cultural differences also exist between similar countries, and even within the same country, although they may be less pronounced. Additionally, although a particular culture may tend toward a more individualist or collectivist orientation, the two can coexist within the same culture along continuums, rather than as polar opposites (Lozada & Halberstadt, 2015). Cross-cultural studies suggest the importance of being very cautious in the construction, validation, and application of measures for the evaluation of EK. What works well in one country (the EMT, for example, was developed in the US) may not work in the same way in another country (in Spain, in Italy or elsewhere) or different parts of the same country. Therefore, in the case of cross-cultural studies, it is advisable to consider whether differences found in the assessments may be due to differences in the development of EK, cultural differences, or a different functioning of measures.

In relation to differences with other cultural groups, a recent study of socialization practices and EK in first generation 5-year-old Latina children found that mother's supportive responses to negative emotions predicted expressive EK. This relation has previously been found with Euro-American samples, showing similarities between cultures. On the other hand, there was no relation between non-supportive maternal responses and EK, which differs from findings with Euro-American children (Pintar-Breen, Tamis-LeMonda, & Kahana-Kalman, 2018). Focusing on two European cultures with potential cultural differences in the developmental goals of independence and interdependence, Molina, Bulgarelli, Henning, & Aschersleben, (2014) used the Test of Emotion Comprehension (TEC) to compare Italian and German preschoolers' emotion understanding. The children tested did not differ in overall ability, although some differences in certain components were observed at specific ages: 3- and 5-year-old Italian children scored significantly higher than German children of the same age in emotion hiding. In other words, Italian preschoolers better understood the fact that expressed and felt emotion may differ.

Models are needed that allow us to understand how emotions emerge and develop with age, and special attention must be paid to the impact of culture in emotional development (Pollak, Camras, & Cole, 2019). In any case, differences in emotion experience, emotion socialization, and EK are expected to occur both across cultures and within cultures. A deeper and more detailed knowledge of cultural

practices and beliefs related to emotions in different, yet similar, cultures is significant in better understanding emotion socialization and its influence on the development of emotion competence (Denham, Bassett, & Wyatt, 2007). In this sense, more studies expanding the number of cultures studied is needed, as the development, the value of the EK and the weight that different cultural elements have in it may be different depending on the culture (Doan & Wang, 2018; Friedlmeier et al., 2011). To reach this goal, culturally-appropriate measures of social and emotional development are needed (Friedlmeier et al., 2011; Heo & Squires, 2012). Regarding EK, valid measures are necessary in order to conduct rigorous assessments of EK from a developmental perspective, to evaluate emotion competence in relation to both previous levels and expected results in early developmental stages, and to identify the variables that may influence its development (Denham, Ferrier, Howarth, Herndon, & Bassett, 2016; Domitrovich et al., 2017; Wigelsworth, Humphrey, Kalambouka, & Lendrum, 2010).

Progress in this area is improving the ecological validity of the measures, minimizing verbal requirements and embedding assessments within play to evaluate children's performance in real situations (Izard et al., 2011; Schultz et al., 2010; Watanabe et al., 2019; Wigelsworth et al., 2010). In this sense, the importance of the child's responses is emphasized, as the child can give detailed information about his or her own reality that the other respondents can't (Humphrey et al., 2011). On the other hand, the measures must also be adapted to the population and culture in which they are applied. When a measure developed for one culture is used for a different one, a cross-cultural adaptation must be carried out; this includes not only translating the language of the measure, but also adapting it to the target culture (Beaton, Bombardier, Guillemin, & Ferraz, 2000). Merely translating a measure into a new language may not guarantee the original internal consistency and validity of the instrument, as cultural and linguistic nuances must be taken into account (Van de Vijver & Hambleton, 1996). Hence, it is essential to implement rigorous design and adjustment procedures that ensure the adequacy of the measures, as transferability between countries cannot be automatically assumed (Humphrey et al., 2011). Adequate psychometric properties of the tools in each culture in which they are used must be assured. Therefore, deeper evidence about the cross-cultural validity of the measures is pertinent. Cross-culturally valid measures will allow us to analyze EK in multicultural contexts, and to test the cross-cultural effectiveness of interventions aimed at encouraging emotional competence.

One measure of EK among preschool children is the Emotion Matching Task (EMT; Izard, Haskins, Schultz, Trentacosta, & King, 2003), which is designed to assess the different EK facets in

children aged 3 to 6. The EMT has shown adequate psychometric properties, and it is easy to use. It assesses children's knowledge of the basic emotions that emerge first: happiness, sadness, anger and fear/surprise (Lewis, 2008), through four dimensions: 1) emotion expression matching, 2) emotion situation knowledge, 3) expressive EK (emotion labeling), and 4) receptive EK. The EMT gives an overall score and a score for each dimension, which enables an in-depth analysis of the development and acquisition of the different components of EK.

The EMT has been adapted to other cultures, including Spain (Alonso-Alberca, Vergara, Fernández-Berrocal, Johnson, & Izard, 2012), Italy (Di Maggio, Zappulla, Pace, & Izard, 2013), Brazil (Andrade et al., 2014), China (Dow, 2016) and New Zealand (Randall, 2012). In each of these cultures, the EMT has shown adequate psychometric properties, indicating that it is a valid tool for assessing EK in young children in the above mentioned cultures. As part of the validation process, past studies in Spain, Italy and the US have analyzed convergent validity of the EMT, finding positive relations between EK and emotion regulation, effortful control and social skills, as well as negative relations between EK and behavioral and emotional problems (Alonso-Alberca et al., 2012; Di Maggio et al., 2013; Morgan et al., 2010). The EMT is also sensitive to changes following interventions designed to encourage EK (Di Maggio, Zappulla, Pace, & Izard., 2017; Dow, 2016; Finlon et al., 2015; Izard et al., 2008; Randall, 2012). So far, however, these studies have only applied the measure to a single culture. The aim of our study is to perform a combined analysis with samples from different cultures, namely Italy, Spain and the United States, in order to evaluate the EMT's cross-cultural validity.

More cross-cultural studies examining emotion competence and how culture impacts its development in early childhood are needed, as they may bring new and important information to the field of study (Halberstadt & Lozada, 2011). It is important to invest in understanding both the nature of emotion as well as the underlying mechanisms of adaptive and maladaptive development within one's own culture and between cultures (Pollak et al., 2019). Our study is an attempt to determine whether a test for measuring emotion knowledge in young children, the Emotion Matching Task, is an appropriate instrument for performing an in-depth analysis of EK among children from different Western industrialized cultures. The main aim of this study was to provide evidence regarding the cross-cultural validity of the EMT, as an instrument for measuring EK in 3- to 6-year-old children in samples from different countries and cultures, specifically the United States, Italy and Spain. To achieve this, we analyzed: 1) the psychometric properties of the scale in each of the three subsamples; 2) the relations



between sex, age, verbal ability and EK, in the overall sample and in the three different cultures; 3) the pattern of acquisition of the various dimensions of emotion knowledge in the overall sample and in the three different countries. We expected: 1) an adequate reliability of the different adapted versions of the EMT; 2) age and sex were related to EK, with older children having better EK than younger and with females having better EK than males; 3) EK abilities are acquired progressively, with receptive EK emerging first in early development, followed by expressive EK and expression matching, and, finally, with emotion situation knowledge, the most complex of the abilities, emerging during preschool years and developing through the grade school years.

## **Method**

### Participants

Participants were 500 children from Spain ( $N = 180$ ), the United States ( $N = 158$ ) and Italy ( $N = 162$ ). The children's age ranged from 36 to 72 months (mean age = 53.75;  $SD = 9.95$ ). Sex distribution was balanced, with 49.6% of participants being female. Age distribution was also balanced: 30.4% of participants were 3 years old, 35.8% were 4 years old, and 33.8% were 5 years old (see Table 1). The study presented here is part of a larger project that involved several schools and childcare centers in US, Italy and Spain for the adoption of the Emotions Course, an educational program aimed to develop socio-emotional skills in children aged 3 to 5 years (Izard et al., 2008). The research and intervention project was illustrated to the headmaster of each school; having also received the positive opinion of the teachers, the schools have accepted to adopt the Emotions Course and to carry out the research related to it. The data presented here comes from seven schools that have agreed to join the project. In these schools, 96% of the parents signed informed consent for participation in the study. In each country, schools were selected in the middle-class area of large cities so that children could be representative of a middle-class population.

### INSERT TABLE 1

### Procedure

In all three countries, letters were sent to the parents of the children, informing them of the nature, aims and procedure of the study. Written consent was obtained from the parents of all the children participating in the study. Children were interviewed in an area set aside for this purpose at the participating schools. The assessment sessions were conducted individually by research assistants. The researchers were introduced to each group of children prior to administering the tests in order to ensure a good rapport. It

took about 20 minutes to administer the verbal ability instrument (PPVT) and the emotion knowledge measure (EMT). The research respected ethical norms and was approved by the ethics committee of each country: in Spain by the University of the Basque Country; In Italy by the Italian Psychology Association; and in the United States by the University of Delaware Internal Review Board.

## Measures

### *Emotion Knowledge*

The Emotion Matching Task (EMT) consists of a series of 182 photographs of children (boys and girls) making facial expressions of sadness, happiness, anger and surprise/fear, similar to those found in everyday life. The photographs feature ethnically-diverse children (Black, Hispanic, White, and biracial). The EMT measures four dimensions: emotion matching (EMT.1), emotion situation knowledge (EMT.2), expressive EK (EMT.3) and receptive EK (EMT.4). Each dimension consists of 12 items, each assigned a score of 0 (incorrect) or 1 (correct). In part 1 (expression matching), children are shown a photograph of an expression and must choose which of four other photographs features the same expression. In part 2 (emotion situation knowledge), children are asked to indicate which of four pictures matches a given situation: for example, "Show me who got a cute puppy for their birthday." In part 3 (expressive EK), children are shown a single photograph and are asked to look at the face of the child featured in it and say how the child feels. In part 4 (receptive EK), the examiner states an emotion and asks the child to point to the corresponding facial expression on a sheet of four pictures. The EMT was administered to children individually, and took approximately 10-15 minutes to complete.

The American, Italian and Spanish versions were administered to their corresponding subsamples. The original version of the Emotion Matching Task (Izard et al., 2003) showed good internal consistency for the total score ( $\alpha = .88$ ); the alphas for each of the four parts were .65, .54, .76, and .80, respectively. In the Italian version of the EMT (Di Maggio et al., 2013), the alphas for each of the four parts were .57, .50, .73, and .79, respectively, and the alpha for the total score was .86. The Spanish version (Alonso-Alberca et al., 2012) showed good reliability, with omega indexes of .81, .74, .98, and .91 for the four parts, and .82 for the total score.

### *Verbal Ability*

The Peabody Picture Vocabulary Test, third edition (PPVT-III), was used to assess the children's receptive vocabulary. The test consists of cards, each featuring 4 stimulus pictures; examiners ask the children to choose the one that best represents the meaning of a given word. The difficulty increases

progressively. The test takes approximately 5-10 minutes to administer. The American (Dunn & Dunn, 1997), Italian (Stella, Pizzoli, & Tressoldi, 2000) and Spanish (Dunn, Dunn, & Arribas, 2006) versions of the PPVT were administered to the corresponding subsamples. The American version has good internal consistency ( $\alpha = .94$ ), as do the Spanish ( $\alpha = .91$ ) and Italian versions ( $\alpha = .94$ ). We used children's standard scores on the PPVT, which already controlled for children's age, as the measure of verbal ability.

#### Data Analysis

Preliminary descriptive analyses were conducted to describe the variables among the samples (age, sex, verbal ability and emotion knowledge); analyses of variance were carried out to determine any differences between the three samples under study. To examine the psychometric properties of the scale in each of the three subsamples, the internal consistency of the EMT was studied using polychoric correlation with omega  $\Omega$  coefficients, which are more appropriate estimators of reliability than alpha coefficients for categorical items, such as those of the EMT (Gadernann, Guhn, & Zumbo, 2012). Moreover, bivariate correlations were carried out between the EK components among the three samples. Simultaneous regression analyses were conducted to examine the relations in EK based on age, sex and verbal ability in the three different cultures. Finally, a subsample mixed analysis of variance was conducted to examine any differences in the development of the different dimensions of EK within samples. In order to determine whether the differences in performance level of the four EK dimensions offered a distinct pattern based on the country, pairwise comparisons within the EMT dimensions were conducted for each country. Bonferroni adjustment was applied for ANCOVA pairwise comparisons.

### Results

#### Preliminary Descriptive Statistics

Means and standard deviations of the variables (age, verbal ability and EK components) are presented in Table 2. A 2 (gender) by 3 (country) multivariate analysis of variance (MANOVA) revealed a significant overall effect of Country, Wilks = .51,  $F(14, 966) = 29.34, p < .000$ . The effects of Gender and Gender x Country interaction were nonsignificant. Follow-up univariate analysis of variance revealed significant effects of country on PPVT and on all the EMT variables. ANOVA showed significant effects of country. Post-hoc Tukey HSD tests at the  $p < .01$  level indicated that Italian children scored lower on PPVT than Spanish and US children, who did not differ from each other. Regarding EMT scores, post hoc tests showed that Spanish children had higher scores in expression matching (EMT1), emotion situation

knowledge (EMT2), and expressive EK (EMT3) than Italian and US children, who did not differ from each other. Results regarding receptive EK (EMT4) revealed differences among the three countries, with Spain scoring higher, followed by Italy and then the United States. Finally, considering the EMT total, the US children scored lower than Italian and Spanish children, who did not differ from each other.

INSERT TABLE 2

Internal Consistency of the EMT

Internal consistency was calculated using polychoric correlations, as the items in the EMT are categorical. Separate reliability analyses were carried out for each country for both the overall EMT score and for each of the sub-scales. Results were satisfactory, with omega  $\Omega$  coefficients for sub-scales 1-4 of .77, .74, .92 and .89, respectively, and of .80 for the overall EMT score.

INSERT TABLE 3

As shown in Table 3, the test's internal consistency was satisfactory in all three cultures, verifying the EMT's reliability.

Intercorrelations among EK Components

The intercorrelations among the variables (Table 4) showed largely similar patterns across samples, with all the partial scores of EMT correlating positively and significantly with each other, as well as with the total score. Both age and verbal skills were positively correlated with EMT scores in the three samples.

INSERT TABLE 4

Relations between Age, Sex, Verbal Ability and EK Components

To analyze the relations between the key factors of age, sex and verbal ability, with EK, simultaneous regression analyses were conducted for each dimension of the EMT, including sex and age as independent variables and verbal ability as a covariate for each dimension (see Table 5). The effect of each variable on each dimensions of EK was examined, controlling for the effects of the others in order to avoid misleading results regarding the relations between variables. First-order interactions between sex and age were initially considered in the regression analyses, but they were not statistically significant for the EMT dimensions and were eliminated from the model.

INSERT TABLE 5

Age and verbal ability were positively related to all EK dimensions, suggesting that EK is more developed in older children and in children with stronger verbal skills. Sex was not found to be a statistically significant predictor of EK dimensions. As mentioned above, interaction effects between sex

and age were not statistically significant. Therefore, the hypothesis that sex differences increase with age was refuted for this age range.

#### Development of the Different Dimensions of EK

To examine these cultural differences in greater depth, the sequential acquisition of emotion knowledge was analyzed, focusing on the differences between the three countries, using a mixed ANCOVA, with country as the independent variable, the four dimensions of EK as repeated measures variables, and age and verbal ability as covariables. Sex was not included as a covariable as it had not been shown to influence outcomes in the analyses presented above. There was a statistically significant interaction between the variable country and the repeated measures variable EK ( $F(6, 1470) = 6.73, p < .001$ ). As shown in Figure 1, in addition to the differences presented above, the results of this analysis demonstrate that the different EK abilities appear to be acquired sequentially.

#### INSERT FIGURE 1

As there was an interaction between the EMT dimensions and country, the simple effects on the differences between the EMT tasks for each country were compared. Post hoc tests using the Bonferroni correction (Table 6) revealed statistically significant differences between all tasks for Italy and Spain. For the US sample, statistically significant differences were found between all the dimensions, with the exception that no differences were observed between dimensions expressive and receptive EK. The results are consistent with the proposed theoretical model, reflecting the following pattern of development: receptive EK, expressive EK and expression matching and, finally, emotion situation knowledge.

#### INSERT TABLE 6

### Discussion

The main aim of the study was to provide evidence of the cross-cultural validity of the Emotion Matching Task, as a measure of emotion knowledge in preschool children in different cultures, namely, the United States, Italy and Spain. The results validated the EMT as an appropriate instrument for young children from different Western industrialized cultures. It was sensitive enough to detect differences between samples and highlight cultural differences between similar countries, which although less pronounced, do nevertheless exist (Molina et al., 2014).

Regarding the scale's psychometric properties, the EMT demonstrated adequate reliability indexes for all three countries, although they were somewhat lower for Italy than they were for the United States

and Spain. The values obtained in this study were substantially higher than those obtained in the original US version (Morgan et al., 2010) and in the Italian version (Di Maggio et al., 2013), and similar to those obtained in the Spanish version of the EMT (Alonso-Alberca et al., 2012), but this difference is most likely due to the analysis strategy used in the earlier studies (Cronbach's alpha coefficient underestimates reliability values for scales with dichotomous items). The values obtained in this study, using the omega coefficient, support the internal consistency of the instrument.

The study's second objective was to analyze the relations between sex, age, verbal ability, and the different dimensions of EK and to determine whether they are similar in all three cultures. As expected, older children and those with stronger verbal skills demonstrated better EK. No differences were found between girls and boys in any of the dimensions of EK. Nor were any interaction effects between sex and age observed. Therefore, the hypothesis that sex differences increase with age was refuted for this age range. The results revealed differences between countries in all four dimensions of emotion knowledge. Controlling for the influence of sex, age, and verbal ability, Spanish preschool children scored higher than the American and Italian ones in all four dimensions of EK. On the dimensions of expressive EK, expression matching, and emotion situation knowledge, there was no significant difference between Italian and American children, although both groups scored lower than Spanish children. However, on receptive EK, Italian children scored significantly higher than those of their American counterparts. Turning to the total EK score, the Italian and Spanish children scored similar and higher than American children. These results should be read in the light of similarities and differences between cultures.

The three countries compared in this study are considered Western industrialized cultures, but they differ in the value characteristics of independence and interdependence. Spain is the most collectivistic culture, followed by Italy, which could be defined as an "individualistic culture with collectivistic traits" (Antonelli & Rubini, 1999; Lo Coco, Zappulla, & Di Maggio, 2003), and finally the United States, which has a very individualistic profile (Triandis, 1995). It seems reasonable to expect that an understanding of emotions in early childhood would be more highly developed in collectivist societies such as Spain, considering that the knowledge of emotion is acquired earlier in collectivist cultures, and collectivism seems to be associated with higher social intelligence (Greenfield, Keller, Fuligni, & Maynard, 2003; Molina et al., 2014).

Limitations and Future Research Directions

This study is not without certain limitations. First of all, the study did not include a measure assessing individualistic and collectivistic orientation in our samples. Therefore, explanations based on the differences between individualistic and collectivistic cultures should be seen as possible hypotheses for subsequent studies rather than as conclusions of the present study. Moreover, it is now widely accepted that the dichotomizing of world nations as individualistic or collectivistic has surpassed its heuristic purpose (Friedlmeier et al., 2011). The framework for contemporary cultural research now emphasizes that culture is fluid and changing. This shift takes into account migratory processes and the presence of multiethnic contexts in most societies, as well as the heterogeneity and overlap that exists between and within different cultural communities (Miller, 2002). In this regard, Harwood, Schoelmerich, Schulze & Gonzales (1999) affirmed: “The reality is that no substantive researcher (to our knowledge) claims that cultures are monolithic, homogeneous entities devoid of internal variation, or that ‘individualistic’ cultures lack a concept of relatedness, and ‘sociocentric’ cultures lack a concept of personal choice” (p.1006). This nuanced perspective implies that cultures are an intricate patterning of similarities and differences and that this variability of cultural contexts shapes individuals’ beliefs and behaviors, including the socialization of children’s emotions (Rothbaum, Pott, Azuma, Miyake, & Weisz, 2000). For example, the two aspects of emotional competence - individualistic and relational emotion competence - that are often used as theoretical framework for interpreting parental emotion socialization strategies in cross-cultural perspectives are not seen as exclusive to specific societies. Rather, they can coexist and be complementary. In a move to synthesize, the proposed concept of “emotional interdependence” captures childrearing practices aimed to promote the mix between children’s autonomy and multiple relationships with family and social groups (Kagitcibasi, 2007). Future studies should explore the influence of cultural variables on the emotional socialization aimed to promote different facets of emotion competence in children, including emotion knowledge.

Despite the cultural differences of the various EK dimensions described above, the pattern of acquisition is similar in all three cultures, and it is consistent with previous research (Alonso-Alberca et al., 2012; Morgan et al., 2010; Izard et al., 2011; Di Maggio et al., 2013). The data suggest that the normal developmental sequence for EK abilities is as follows: receptive EK, expressive EK, expression matching and, finally, emotion situation knowledge (Bennett et al., 2005; Camras & Halberstadt, 2017; Morgan et al., 2010; Schultz et al., 2005). Thus, the hypothesis that EK is acquired in a similar sequence across the three cultures is mostly supported, although the U.S. children differed slightly, in that their level of expressive

EK was slightly higher than their receptive EK. The development of these abilities in childhood is progressive, and has a hierarchical structure. In other words, in order to understand emotions, children must first perceive them correctly. Understanding factors that are likely to trigger emotions and possible consequences of those emotions, allows children to then acquire related abilities, such as emotion regulation (Denham, Zinser, & Bailey 2011; Schultz et al., 2005; Sprung et al., 2015; Zeidner et al., 2003). Although this study supports the sequential structure of the acquisition of emotion abilities, further research is required to analyze and corroborate these results in samples of older children, who would be expected to score highly on all dimensions of the EMT. Furthermore, it would be beneficial to broaden the cross-cultural analysis of EK by examining both antecedents (such as family characteristics or socioeconomic status) and consequences (such as social and behavioral problems).

Early identification of behavior and emotion problems (Dowdy et al., 2014) is crucial in order to intervene and mitigate long-term consequences to the child's development. Building culturally-appropriate methods for analyzing emotion development in a variety of cultures would allow emotion researchers to clarify basic questions about the nature of emotion (Haldsbertat & Lozada, 2011), and identify difficulties in processing. In this sense, further cross-cultural studies using the Emotion Matching Task may improve our understanding of the similarities and differences in the acquisition and development of emotional abilities and may help us analyze how they are related to other psychological dimensions (Denham et al., 2016; Molina et al., 2014; Voltmer & von Salisch, 2017).

From this point of view, this study has important implications for research and interventions in the education field. Over the past decade, many evidence-based social and emotional learning programs for children 3-5 years have been developed. Research has shown that their implementation in kindergarten has positive impacts on children' adaptive behaviors, their school readiness and long term success in academic performance and in life (Bierman & Motamedi, 2016; Taylor, Oberle, Durlak, & Weissberg, 2017). Along with this recognition has come increased attention to ways of promoting healthy social and emotional development, preventing the development of social, emotional and behavior problems, and intervening early when young children are displaying challenging behavior or delays in social emotional development (Powell & Dunlap, 2009). Moreover, these educational programs are evidence-based. According to the standards of evidence (Flay et al., 2005), the measures to evaluate the efficacy and the effectiveness of educational programs must be psychometrically sound. The standards of evidence also



establish that it is desirable to use multiple measures of the same construct and that, for the generalizability of the findings, it is desirable to replicate the programs with different populations.

A strength of this cross-cultural study is in contributing to the set of the measures for evaluating EK in preschool ages, across different countries. So far, studies on EK have used evaluation measures such as the *Diagnostic Analysis of Nonverbal Accuracy Scale 2* (DANVA2; Nowicki, 1997) or the *Test of Emotion Comprehension* (TEC; Pons e Harris, 2000). These measures were not specifically constructed for the preschool age range, although they allow the assessment of EK in preschool. TEC is based on drawings of facial expressions of the four basic emotions and evaluates receptive EK and emotion situation knowledge, but no part of the test measures expressive EK. DANVA2 only evaluates receptive knowledge of the four basic emotions, based on photographs of children's faces expressing joy, sadness, anger and fear. Evaluating all components of EK in the preschool age range requires an instrument constructed specifically for that developmental period.

Unlike these two instruments, the *Affective Knowledge Test* (AKT; Denham, 1986) and the *Emotion Matching Task* (EMT; Izard et al., 2003) were specifically designed to be used with preschool children and therefore evaluate both receptive and expressive EK as well as the emotion situation knowledge. AKT uses two puppets with detachable and interchangeable faces that show different expressions, and EMT uses photographs of children making facial expressions of sadness, happiness, anger and surprise/fear. The EMT allows evaluation of all the dimensions of EK in the preschool age and also seems to have a greater ecological validity. While drawings and puppets used in the tests mentioned represent the same of basic emotions, photographs of different children expressing emotions have a more natural appearance similar to that found in everyday life. Moreover, the photographs in the EMT show ethnically-diverse children and this favors its application in different countries or in multi-ethnic contexts. Until now, only the original Morgan et al. (2010) study analyzed the convergent validity of the EMT. In this direction, future studies are desirable, especially in Italy and Spain where the validation process of the EMT is already underway. Further, future studies should employ a longitudinal design to carry out cross-cultural comparisons of the development of EK in order to help us better understand the sequential acquisition of EK over time, as well as the variables involved. Following growth in children's emotion knowledge and competence from the early stages of life through middle childhood will help increase scientific knowledge regarding early childhood development (Alonso-Alberca & Vergara, 2018; Denham et al., 2016; Domitrovich et al., 2017; Wigelsworth et al., 2010). Finally, concurrent analyses should be

carried out on each specific emotion, as cultural differences in EK may vary depending on the emotion being examined (Gong, Wong, & Wang, 2018).

Clearly, achieving these goals will require resources to help researchers measure how children progress in their acquisition of emotional abilities, and obtaining information directly from the child is most desirable (Humphrey et al., 2011). The EMT is a tool that allows researchers to obtain firsthand, nuanced information directly from the child about his or her EK. Researchers will need to evaluate children's performance in this area on multiple occasions, and will also need to be able to detect any possible difficulties that appear in the course of their development of emotion knowledge. They will need valid, reliable assessment instruments and strategies that enable them to analyze and monitor the situation (Alonso-Alberca & Vergara, 2018; Denham et al., 2016; Trentacosta & Fine, 2010; Wigelsworth et al., 2010), preferably with proven cross-cultural validity so that effective comparisons can be carried out across multiple cultures.

**Ethical approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The research was approved by the ethics committee of University of the Basque Country (Spain); of the Italian Psychology Association (Italy), and of the University of Delaware Internal Review Board (US). This Research did not receive any funds.

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**Informed consent:** Informed consent was obtained from all individual participants included in the study.

#### **Author Contributions**

NAA, AIV, CZ, RDM, UP, and KFS designed and executed the study, assisted with the data analyses, wrote the paper, and edited the final manuscript.

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Table 1. Sample distribution by country, sex and age group

	U.S. ( <i>N</i> = 158)		Italy ( <i>N</i> = 162)		Spain ( <i>N</i> = 180)		Total ( <i>N</i> = 500)	
Country	Girls ( <i>N</i> = 83)	Boys ( <i>N</i> = 75)	Girls ( <i>N</i> = 81)	Boys ( <i>N</i> = 81)	Girls ( <i>N</i> = 84)	Boys ( <i>N</i> = 96)	Girls ( <i>N</i> = 248)	Boys ( <i>N</i> = 252)
Age 3	32	19	19	18	29	35	80	72
Age 4	26	29	37	31	27	29	90	89
Age 5	25	27	25	32	28	32	78	91

Table 2. Means (and Standard Deviations) and ranges for age, verbal ability, and EK components in the three samples

	<i>Italy</i>	<i>Spain</i>	<i>U.S.</i>		
DIMENSION	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	Range	<i>F</i> value
Age (months)	54.02 (9.77)	53.61 (10.57)	53.59 (9.39)	36-72	.10
Verbal ability	89.86 <sup>a</sup> (11.84)	110.16 <sup>b</sup> (12.58)	106.80 <sup>b</sup> (15.84)	63-145	108.46***
EMT 1. Expression Matching	7.85 <sup>b</sup> (2.07)	8.62 <sup>a</sup> (2.01)	7.56 <sup>b</sup> (2.58)	1-12	10.41***
EMT 2. Em. Sit. Knowledge	6.73 <sup>b</sup> (2.09)	7.39 <sup>a</sup> (2.06)	6.66 <sup>b</sup> (2.36)	0-12	5.87**
EMT 3. Expressive EK	8.72 <sup>b</sup> (2.03)	9.21 <sup>a</sup> (2.18)	8.49 <sup>b</sup> (3.01)	0-12	3.88*
EMT 4. Receptive EK	9.51 <sup>a</sup> (2.19)	10.30 <sup>b</sup> (1.47)	8.24 <sup>c</sup> (2.72)	0-12	38.69***
EMT Total	34.63 <sup>a</sup> (7.56)	35.52 <sup>a</sup> (5.76)	30.99 <sup>b</sup> (8.27)	9-54	17.97***

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .000$

*Note:* For each row, means with different apexes differ significantly from each other, with  $\eta^2 > .05$ ;

Table 3. Reliability: Omega coefficients for the EMT (total sample & each country)

DIMENSION	<i>Total sample</i>	<i>Italy</i>	<i>Spain</i>	<i>U.S.</i>
EMT Total	.86	.83	.85	.83
EMT 1	.77	.70	.77	.83
EMT 2	.74	.74	.81	.78
EMT 3	.92	.70	.81	.87
EMT 4	.89	.86	.70	.89

Table 4. Intercorrelations among age, verbal ability and EK components

	PPVT (Pt)	EMT 1	EMT 2	EMT 3	EMT 4	EMT total
<i>Italy</i>						
Age (months)	-.04	.25**	.30**	.16*	.35**	.26**
Verbal ability		.27**	.28**	.01	.21**	.22**
Expression Matching (EMT1)			.40**	.21**	.50**	.64**
Em. Situation Knowledge (EMT 2)				.12	.44**	.48**
Expressive EK (EMT 3)					.29**	.62**
Receptive EK (EMT 4)						.64**
<i>Spain</i>						
Age (months)	-.10	.44**	.52**	.36**	.41**	.58**
Verbal ability		.19*	.28**	.25**	.21**	.31**
Expression Matching (EMT1)			.49**	.37**	.46**	.78**
Em. Situation Knowledge (EMT 2)				.39**	.33**	.76**
Expressive EK (EMT 3)					.38**	.74**
Receptive EK (EMT 4)						.68**
<i>U.S.</i>						
Age (months)	.15	.57**	.46**	.39**	.36**	.57**
Verbal ability)		.39**	.42**	.42**	.49**	.54**
Expression Matching (EMT1)			.55*	.47**	.51**	.81**
Em. Situation Knowledge (EMT 2)				.40**	.45**	.75**
Expressive EK (EMT 3)					.43**	.77**
Receptive EK (EMT 4)						.77*

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .000$

Table 5. Simultaneous regression of age, verbal ability, and sex on the EK components

	$\beta$	Total $R^2_{\text{adjusted}}$	N
Expression Matching (EMT 1)		.25**	500
Age	.42**		
Verbal Ability	.29**		
Sex	-.04		
Em. Situation Knowledge (EMT 2)		.28**	500
Age	.43**		
Verbal Ability	.33**		
Sex	-.03		
Expressive EK (EMT 3)		.17**	500
Age	.33**		
Verbal Ability	.26**		
Sex	-.07		
Receptive EK (EMT 4)		.18**	500
Age	.33**		
Verbal Ability	.27**		
Sex	.01		

\* $p < .05$ , \*\* $p < .01$



Table 6. Pairwise comparisons for EMT dimensions in each country (Bonferroni correction applied)

(I)factor1	Italy (N = 162)				Spain (N = 180)				US (N = 153)			
	$\bar{Y}$	SD	LIC	HIC	$\bar{Y}$	SD	LIC	HIC	$\bar{Y}$	SD	LIC	HIC
EMT.1- EMT2	1.05**	.20	.52	1.58	1.27**	.18	.81	1.74	.887**	.18	.40	1.37
EMT.1- EMT.3	-.88**	.23	-1.49	-.27	-.58*	.20	-1.12	-.05	-1.02**	.21	-1.58	-.46
EMT.1- EMT.4	-1.72**	.20	-2.24	-1.19	-1.64**	.17	-2.10	-1.18	-.68**	.18	-1.16	-.20
EMT.2- EMT.3	-1.93**	.24	-2.56	-1.29	-1.86**	.21	-2.42	-1.30	-1.91**	.22	-2.49	-1.32
EMT.2- EMT.4	-2.77**	.21	-1.44	-.23	-2.92**	.19	-3.41	-2.42	-1.57**	.19	-2.08	-1.05
EMT.3- EMT.4	-.84*	.23	-1.44	-.23	-1.06**	.20	-1.59	-.52	-.34	.21	-.21	.90

\* $p < .05$ , \*\* $p < .01$

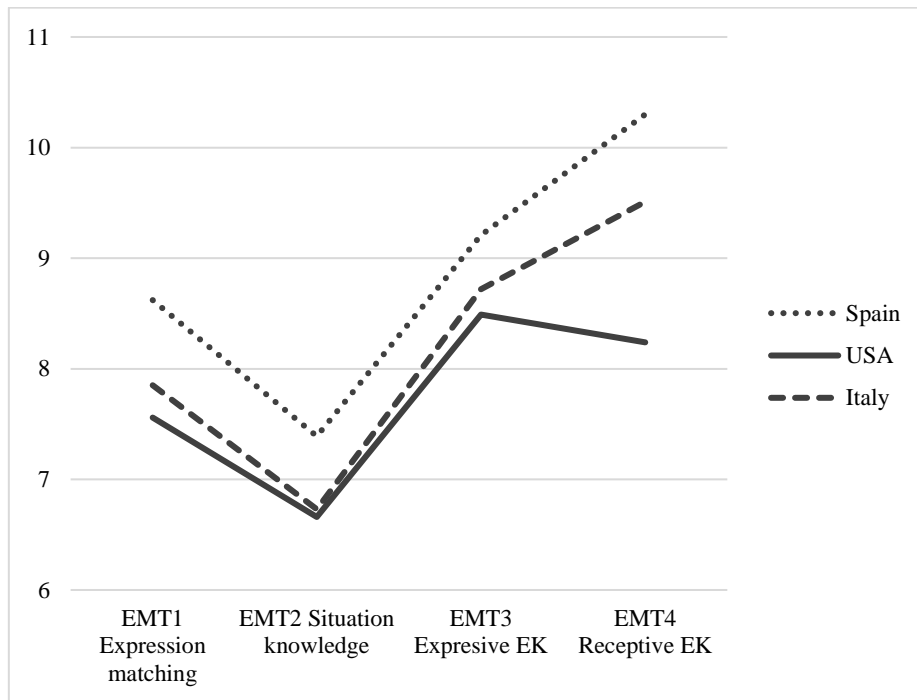


Fig. 1. Means for EK components by country, controlling for age and verbal ability