Home Learning Environments: A Cross-Cultural Study Between Germany and Iran

Shima Aminipour¹, Ali Asgari²,³, Elahe Hejazi⁴, and Hans-Günther Roßbach⁵

Abstract
The home learning environment (HLE) index is composed of seven questions regarding educational parent–child interactions. To compare the psychometric characteristics of the six items of HLE index between the two different contexts of Germany and Iran, a sample including 468 preschool children from the National Educational Panel Study (NEPS), Germany, and 465 preschool children from the Longitudinal Study of Iranian Children (LSIC; Growing Up in Iran) were examined. Rasch analysis supports the fitness of the five items of HLE into the model in both countries. However, differential item functioning (DIF) results revealed significant differences between items functioning across the two samples. According to the item difficulty maps, reading to children was the most reported item in the German families, while Iranian parents tended to paint and draw with their children more. While findings support the construct validity and reliability of five of the six items in both samples, different Rasch results may reveal the effects of the cultural dimensions of each country on HLE items.

Keywords
home learning environment index, psychometric characteristics, Rasch model, cross-cultural study

Introduction
Many studies have revealed that the quality of the home learning environment (HLE) has a pivotal role in setting the stage for children’s later cognitive development and academic success (Azigwe, Adda, Awuni, & Ayamba, 2016; Campbell et al., 2014; Currie & Almond, 2011; Niklas, Tayler, & Schneider, 2015; Sylva et al., 2013). While these studies have assessed different aspects of the HLE using a wide variety of instruments, recent discussions emphasize the importance of the domain-specificity of educational processes. To explore and measure most effective educational practices of parents, Melhuish and his colleagues (2008) developed an interview-based

¹University of Tehran, Iran
²University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
³Longitudinal Study of Iranian Children, Tehran, Iran
⁴University of Tehran, Iran
⁵University of Bamberg, Germany

Corresponding Author:
Shima Aminipour, Student in Educational Psychology, Faculty of Psychology and Educational Sciences, University of Tehran, Dr. Chamran Highway, Tehran 1417466191, Iran.
Email: Sh_amini2010@ut.ac.ir
measure in the Effective Provision of Pre-School Education (EPPE) project. On the basis of the analyses of over- and underachievement and analyses of internal consistency, they selected seven items to create the HLE index. HLE items which are called domain-specific activities have been found to be significant predictors of children’s later reading and math achievements (Kluczniok, Lehrl, Kuger, & Rossbach, 2013; Melhuish et al., 2008; Sammons et al., 2015).

Although a wide range of international studies have used the HLE items for assessing the quality of HLE for young children, the vast majority of the works are from Western countries (e.g., Anders et al., 2012; Bradley, Corwyn, Burchinal, McAdoo, & García Coll, 2001; Currie & Almond, 2011; Kluczniok et al., 2013; Melhuish et al., 2008; Niklas et al., 2015; Sylva et al., 2013). However, the HLE is influenced by cultural factors; therefore, conducting cross-cultural comparisons may reveal and explain differences, as well as similarities. Use of the same instrument (i.e., HLE) in the National Educational Panel Study (NEPS) in Germany and the Longitudinal Study of Iranian Children (LSIC) provides an ideal opportunity for comparing and exploring potential differences/similarities in the HLE in two different cultural contexts. Moreover, surprisingly few studies have investigated the psychometric properties of the domain-specific items of HLE using item response models to support the possibility of comparisons in international studies. Therefore, the purpose of this study was to test and compare multiple psychometric properties of the HLE instrument using Rasch (1960) measurement model.

**Literature Review**

According to Bronfenbrenner’s (1986) ecological model, children develop within multiple layers of context (i.e., family, school, and community) which interact with one another to influence the child. Whereas HELs, in particular parent educational practices, represent the microsystem of the immediate setting of the children’s development, it can also be under the microsystem of the influence of cultural dimensions in Bronfenbrenner’s (1986) ecological systems theory.

Different instruments have been developed to determine the important factors of the immediate learning environments (Caldwell & Bradley, 1984; Dave, 1963; Elardo & Bradley, 1981; Henderson, Bergan, & Hurt, 1972; Marjoribanks, 1972) and a rich body of research has demonstrated the effects of different aspects of the quality of the HLE on children’s learning and educational achievement (Anders et al. 2012; Bradley & Caldwell, 1980, 1984; Lemelin et al., 2007; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2005; Skwarchuk, Sowinski, & LeFevre, 2014).

On the basis of the framework of the HLE, researchers indicated that the domain-specific factors of the HLE which refer to stimulation of literacy and numeracy by parents are more related to children’s later educational achievement (e.g., Anders et al., 2012; Kluczniok et al., 2013; Manolitsis, Georgiou, & Tziraki, 2013; Melhuish et al., 2008; Skwarchuk et al., 2014).

In this sense, Melhuish et al. (2008) developed several specific parent–child activity items and interviewed parents in the EPPE research project in England. Using the results from these analyses, they selected seven of the 14 parent–child activities which had a positive and significant relationship with the child’s outcomes to create a HLE index. Although the same questions of HLE measure are used widely in several international studies, the majority of the studies have been conducted in Western countries (e.g., Anders et al. 2012; Bradley & Caldwell, 1980, 1984; Bradley et al., 2001; Campbell et al., 2014; Currie & Almond, 2011; Kluczniok et al., 2013; Melhuish et al., 2008; Sylva et al., 2013), where the cultural contexts are different from those of other countries. In fact, most of these studies using HLE have concentrated on the role and relationships of micro-level variables.

Cultural dimensions of the societies may expose effective micro-level variables that may stay invisible from the single, homogeneous culture views (Rubin & Chung, 2013). Thus, as a macro system of values, beliefs and routines, culture supports and encourages patterns of parent–child
interactions. Particularly important here are customs and practices of care and also the psychology of caretakers as cultural parental belief system about what constitutes effective child rearing in terms of parental ethnotheories (Keller et al., 2006). Parental ethnotheory discusses the different ways parents think about their children, their families, themselves, and the most appropriate practices for child rearing in different cultures (Super & Harkness, 2002). Within any culture, parental ethnotheories about children’s learning and the competencies they need are reflected in the ways they organize their interactions with their preschool children and the HLE they prepare (Harkness et al., 2009).

From the cultural and ethnotheoretical perspective, studies describe Germany as an independent, value-orientated and individualistic culture, highly focused on the cognitive competence of children. In German families, the fostering of cognitive development is supported by extensive language simulations, providing books and magazines, face-to-face interactions, and object play (Keller et al., 2006; Keller & Zach, 1993).

In contrast, the Islamic Republic of Iran is described as a religious-oriented country, heavily influenced by Islamic ideologies and philosophy. Based on Islamic early childhood education, children’s age-appropriate needs and rights are highly valued and developmentally appropriate activities, such as fun and engaging play, have a central place (Mirbagher, 1986). Accordingly, one can reasonably assume that the Islamic parental beliefs of Iranian families will be reflected in their parent–child practices and the HLEs they prepare. Considering the cultural dimensions (Hofstede et al., 2010), it is expected that German parents, who are characterized by a strong individualistic and long-term value orientation, would answer the items of HLE differently than Iranian families who are more collectivistic and short-term oriented.

In addition, although HLE has acceptable psychometric characteristics on the basis of classical theory (Melhuish et al., 2008), surprisingly little is known about its psychometric properties according to item-response approaches such as Rasch analysis. Rasch analysis was used because of its simplicity and ease of use in measuring and evaluating individual items and their functioning. According to Granger (2008), Rasch analysis provides an internally valid measure that, when developed from an appropriate sample, is independent of the particular sample to which it is applied. Therefore, by providing information about each single item and a standard and simple graphic interpretation on person and item maps (Törmäkangas, 2011), we can compare HLE items between two contexts more deeply. It is also useful for Likert-type scales and smaller samples (Conrad et al., 2012).

Therefore, rather than providing a mere statistical description of the responses and comparing total scores of the index, the present study attempts to draw some parallels and differences between the multiple psychometric characteristics of the HLE items using the Rasch measurement model in two different contexts: Iran and Germany. Specific aims of the study were to examine and compare the item characteristic curves (ICCs), response category functioning, unidimensionality, item fit, person reliability, differential item functioning (DIF, that is, item invariance), item hierarchy, and person and item reliability for each samples.

Method

Participants

The present study used data from two separate longitudinal studies: NEPS from Germany and LSIC from Iran. Both studies selected and followed their preschool children from preschool settings.

The German sample data came from the NEPS, Starting Cohort Kindergarten (doi:10.5157/NEPS: SC2:4.0.0). NEPS data were collected from 2008 to 2013 as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). NEPS is carried out by the Leibniz Institute for
Educational Trajectories (LiBi) at the University of Bamberg in co-operation with a nationwide network (Blossfeld et al., 2011). The sample for the present study included 468 children that were randomly drawn from starting cohort two, the first wave. About 52% of the children were boys and the children’s average age at the date of observation was 63 months (SD = 5.4). In terms of aspects of socioeconomic status (SES) that relate most strongly with home learning behavior, maternal education is the most important in the early years (Kluczniok et al., 2013; Sammons et al., 2004). Thus, the variable of mothers’ education level in this analysis was controlled in both samples and only families whose mothers had between 12 and 14 years of education were included. Twelve to 14 years of education is equivalent to receiving a bachelor’s degree and this range was chosen because the majority of the mothers have this level of education in both samples. The narrow range meant the study was better able to control for this variable as all other education levels were excluded. German parents’ average age was 41 years (mothers, SD = 5.9) and 43 years (fathers, SD = 6.3). Regarding the ethnic breakdown of the main respondents (mothers), 75% were German and 15% were mixed background.

The Iranian sample included 458 preschool children aged between 4 and 7 years that were drawn randomly from the LSIC also known as “Growing up in Iran.” LSIC, started in 2012, is carried out by Hamnava research institute in Tehran and includes of a single cohort of 490 children aged between 4 and 7 years that were randomly selected from a geographically/purposefully stratified sample of five cities in five provinces of the country. The cities include Bandarabbas, Tehran, Tabriz, Mashhad, and Zandar. About 52% of the children were boys and the children’s average age was 65 months (SD = 8.4). Iranian parents’ average age was 37 years (mothers, SD =5.1) and 41 years (fathers, SD=5.7). About 90% of the main respondents (mothers) were Persian and 10% were Turkish.

**Instruments**

The HLE questionnaire was developed as an index to measure the quality of the HLE in the EPPE project (Melhuish et al., 2008). HLE consists of seven questions about educational activities such as reading books, working with letters, working with numbers, learning poems, rhymes and songs, painting and drawing, and visiting a library that parents undertake with their children. The questions are addressed to parents, asking how often they did the activities with their children during the last week. They could answer according to 4-point Likert-type scale from 1 (rarely) to 4 (always).

In the present study, six of the seven items were examined because they were available in both research projects in Germany and Iran. In both samples, parents were asked identically how often they do the following activities with their young children: (1) reading books, (2) singing songs and poems, (3) playing with numbers, (4) playing with alphabets, (5) painting and drawing, and (6) visiting libraries (Melhuish et al., 2008). (The numbers are simply used to refer to the questions and there is no order of importance among the items—see Appendix for the exact questions that provide the HLE index.)

Whereas Melhuish et al. (2008) produced an index of the seven items including the six mentioned questions in this study on the basis of a regression model to predict categorical variables of over- or underachievement, they only reported its normal distribution. Other studies have also used the questions in combinations with other measures of the HLE and reported the internal consistency of the measures. For example, Klucznioka et al. (2013) used very similar questions in a combination of observation and questionnaire (Cronbach’s $\alpha = .68$).

**Statistical Analysis**

The Rasch (1960) measurement model was chosen for this analysis because it is the only item-response theory approach to address multiple psychometric issues associated with scale development and construct validation. Therefore, rather than providing a mere statistical description of the
responses, the present study examines the potential contribution of Rasch analysis in exploring and comparing a number of issues that have been raised concerning the HLE questions in two samples. Our analysis included the following: The ICC, response rating scale function, unidimensionality, fit statistics, differential Item difficulty (DIF), hierarchical order of the items including difficulty maps, and item and person reliabilities of HLE items for each country.

**Results**

Table 1 below presents descriptive statistics of HLE items for each country. Based on the skewness and kurtosis values of less than 2 (West, Finch, Curran, & Hoyle, 1995), it seems that the distribution of the data sets for HLE items is symmetric and relatively normal. Only Item 6 displays moderate departure from normality in the Iranian sample. As can be observed in the table, the means of the items in Germany are higher than Iran except Item 4 learning poems, rhymes, and songs and Item 5 painting and hand drawing. But the standard deviations of the items in Iran are larger which indicates that the responses of HLE items among the Iranian families are heterogeneous.

The assumption of local independence of items was tested as the next step. According to this assumption, the items in a measure should not be related to each other. That is, the correlation of residuals should be 0 after extracting the “Rasch factor” (Lord, Novick, & Birnbaum, 1968). Standardized residual correlations for items, therefore, was computed to test the assumption of local item independence. Standardized residual correlations between each pair of the HLE items were less than 36 and 29 in Germany and Iran, respectively. The low values of standardized residual correlation, therefore, indicated that the Rasch analysis of the study holds the assumption of local dependence of the items (Linacre, 2009).

To investigate the relationship between the latent variable and the performance on an instrument item, the ICC can be used. ICC shows the Rasch-model prediction for each measure relative to item difficulty. The standard mathematical model of this relationship is nonlinear and has an S-shape which is always such that higher ability results in a higher probability of success and the steeper the curve, the better the item can discriminate (Baker, 2001).

In Figures 1 and 2, ICC of the six items of HLE for each country are presented. Expected Score ICC plots the model-expected ICC. This shows the Rasch-model prediction for each measure relative to item difficulty. As the curve is always ascending, this indicates that participants used lower rating scale categories less frequently than the subsequent categories. This monotonic transformation supports the expected model curve of the HLE index (Bond & Fox, 2013).
The expected score is shown on the vertical axis, while the measure relative to item difficulty is shown on the horizontal axis. The central line which is fixed in all the graphs is the Rasch-model-predicted ICC. The line with dots shows the empirical ICC of the HLE items. It is ideal when the empirical ICC line corresponds to the Rasch-model-predicted ICC.
As illustrated, the empirical ICC line with dots demonstrates a monotonically increasing function in both countries but comparing Germany to the graphs of Iran, the central lines (Rasch-model-predicted ICC) for each item are more of an S-shape and the empirical ICC line approximates it better which means the HLE items are more discriminating between high and low quality of home learning behavior in Iranian families. However, the ICC curve in Germany indicates that HLE items are less discriminating between high and low quality of home learning behavior and therefore, it seems that the quality of the HLE in German families is more uniform.

In addition, a test of information function was applied to reveal how well each ability level is being estimated. In fact, it demonstrates that different ability levels are estimated with differing degrees of precision. Figure 3 shows that the graph of Iran has one single peak with the maximum amount of information (4.55) at the ability level of 0 which indicates the ability of HLE to differentiate between low and high ability participants in 0 point is very precise and the estimates will be widely scattered about the true ability. In Germany, however, the amount of information has two maximum points at ability levels of −3 and 3 which are about 1.60 and 1.45, respectively. It means that in these two modes, ability is estimated with some precision. Outside this range, because of the falling slope in information, the corresponding ability levels are not estimated very well. This property essentially reflects the variance of the observed data that was higher in the Iranian sample.

When the Rasch measurement model is used with rating scales that have a Likert-type format, the response category structure allows us to evaluate how the response options are used. It is expected that the responses to the items that correspond to the levels of the construct progress in a linear fashion from low to high (Tennant & Conaghan, 2007). When the responses to items correspond to the levels of the construct being measured, the thresholds between each response and the next are ordered in increasing value from low to high. The response category functioning for each country (shown in Table 2) indicates that 58% of the responses to the HLE items in Germany were answered “often” and only 10% were answered “rarely.” The probability of endorsing each response category increases from 10% (the first category response) to 58% (third category response) which shows the expected monotonic increases in the average measure estimates. But the percentage of observed answers for each category (1-4) in Iran was approximately equal, with

Figure 3. Test information function of Germany and Iran.
“often” having the less observed percentage. There is no increasing linear order in the Iranian sample. Therefore, when the thresholds do not progress in a linear fashion, collapsing response categories would improve the scale (Tennant & Conaghan, 2007).

**Fit Statistics**

Using fit statistics, we tested how well the observed data from both samples fit into the expectations of the Rasch measurement model. The results of both countries are presented in Table 3. In the Rasch model, infit and outfit values are two important indicators for evaluating misfit items. Considering infit and outfit mean-square (MNSQ) less than 1.33 as acceptable values (Wilson, 2004), only Item 6, “visiting a library,” misfits into the Rasch model for both samples. This means that the frequency of “visiting a library” reported in both Germany and Iran is not expected by the Rasch model criterion.

**Unidimensionality**

Another psychometric characteristic of the Rasch measurement model, unidimensionality, ensures that the items of an instrument assess a single construct, leading to the construct validity of that instrument. For examining unidimensionality of an instrument, Linacre (2006) suggests that the variance explained by the measures of more than 40% is considered a strong measurement dimension. In the present Rasch analysis, the variance explained by measures and the unexplained variance were 74.5% and 25.5% in Germany and 76.7% and 23.3% in Iran, respectively. Looking at patterns in the residuals is a further way to examine the unidimensionality that was
undertaken and confirmed in testing the model’s assumption of local independence of items in the initial steps of Rasch analysis. Taken as a whole, as was expected, the HLE questionnaire showed to be a unidimensional instrument in both German and Iranian contexts.

**DIF**

For comparing invariance between separate subgroups, the Rasch model requires examination of the DIF. DIF can identify significant differences across subgroups (Bond & Fox, 2007). Chi-square, DIF contrast, and probability values of each item are summarized in Table 4. The DIF contrast shows the difference in difficulty of the item between the two groups. This should be at least 0.7 logits for DIF to be noticeable (Conrad, Dennis, Bezruczko, Funk, & Riley, 2007). $\text{Prob}$ shows the probability that this amount of contrast is random, when there is no systematic item bias effect. For statistically significance DIF on an item, $\text{Prob}$ should be $\leq .05$. As can be observed in Table 4, there was only a nonsignificant difference (Chi-square= 1.7762, $\text{Prob} > .05$) on Item 3 that indicates this item has no overall DIF across two countries. But the other items showed statistical significance and substantive difference between Germany and Iran.

Figure 4 presents easily interpretable graphs of the relationships of the two countries on the items. Whereas there were no significant differences of the five HLE items, (1) reading out for children, (2) working with letters, and (6) visiting a library were higher in Germany. However,

<table>
<thead>
<tr>
<th>Items</th>
<th>Chi-square</th>
<th>DIF contrast</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68.16</td>
<td>0.81</td>
<td>.00</td>
</tr>
<tr>
<td>2</td>
<td>34.67</td>
<td>0.56</td>
<td>.00</td>
</tr>
<tr>
<td>3</td>
<td>1.77</td>
<td>0.13</td>
<td>.18</td>
</tr>
<tr>
<td>4</td>
<td>76.50</td>
<td>0.80</td>
<td>.00</td>
</tr>
<tr>
<td>5</td>
<td>135.90</td>
<td>1.15</td>
<td>.00</td>
</tr>
<tr>
<td>6</td>
<td>35.24</td>
<td>0.71</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note. DIF = differential item functioning.
Item 4, learning poems, rhymes, and songs, and Item 5, painting and drawing, were more common in Iran.

**Item Difficulty Map and Hierarchical Order of HLE Items**

According to the item difficulty maps (Figure 5), the order of items from more to less difficult in Germany was as follows: (6) visiting a library, (4) learning poems, rhymes, and songs, (5) painting

<table>
<thead>
<tr>
<th>Germany</th>
<th>Iran</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>(6) visiting a library</td>
</tr>
<tr>
<td>3</td>
<td>(4) learning poems, rhymes, and songs</td>
</tr>
<tr>
<td>2</td>
<td>(5) painting and drawing</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-4</td>
<td></td>
</tr>
<tr>
<td>-5</td>
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</tbody>
</table>

**Figure 5.** Persons map of items.

Note. $S=1$ standard deviation; $T=2$ standard deviations.
and hand drawing, (2) working with letters, (3) working with numbers, and (1) reading out books. The order in Iran was (6) visiting a library, (1) reading out books, (2) working with letters, (4) learning poems, rhymes, and songs, (3) working with numbers, and (5) Painting and hand drawing. Although Item 6, visiting a library, and Item 4, learning poems, rhymes, and songs, were the most difficult ones for the German families and Item 1, reading to children, was the easiest and the most reported activity.

The item difficulty map for the Iranian sample shown in Figure 5 indicates that the most difficult item in this sample, as in the German sample, was Item 6 visiting a library. However, only Item 1, reading to children, and Item 2, working with letters, have an acceptable level of difficulty, and the easiest and most reported item was (5) painting and drawing. As can be seen on the map, the mean of the items’ difficulty is higher than the mean of the ability of the persons, which means that the HLE items were more difficult to endorse in the Iranian context. In fact, approximately 30% of the Iranian parents reported no HLE activities. An interesting and perhaps surprising result of our analysis was that Item 6, visiting a library, was not frequently reported in neither of the countries while Item 2, playing and working with numbers, was the second easiest item in the hierarchy in both countries.

Reliability

A Rasch analysis was used to produce person and item reliability indices. In the current study, person and item reliability scores were .71 and 1 for the German sample and .70 and 1 for Iranian sample, which are acceptable (Smith, 2001). Separation indexes were also produced by Rasch analysis of the present study. Person separation index indicates the number of distinct strata of persons discerned within each domain. A larger index indicates that more distinct levels of functioning can be distinguished in the measure. The person separation indices were 1.57 and 1.52 for Germany and Iran, respectively. To distinguish the number of distinct strata Duncan, Bode, Lai, and Perera (2003) suggests that “with an index of 1.50, one can discern 2 strata (high and low).” Hence, two distinct strata (high and low) can be distinguished in both of our samples.

In sum, the results of the Rasch analysis in item fit and unidimensionality categories reveal that HLE is a unidimensional measurement, however, among the six domain-specific items of the measure, Item 6, visiting a library, misfits the model in the both samples. Moreover, the item difficulty map demonstrates that Item 6, visiting a library, is the most difficult item for both samples. The DIF reveals significant differences across the two countries in all the HLE items except in Item 3, the frequency of playing with numbers. However, the reliability indexes for both populations are acceptable.

Discussion

The goal of the present study was to compare the psychometric properties of the six domain-specific items of the HLE between Germany and Iran using the Rasch measurement model. Results of item fitness revealed that only Item 6, visiting a library, misfit the model in both samples. But, the unidimensionality results support the measure’s construct validity and demonstrate that all of the items measure a single construct.

Furthermore, according to item map difficulty, Item 6, visiting a library, was not as frequently reported as the other items of HLE. An essential point that should be taken into account when interpreting misfit of this item is that our target children are preschoolers, that is, they are not officially able to write and read. Not surprisingly, then, families might prefer to practice other learning activities, like reading to their children in Germany (Keller, Völker, & Yovsi, 2005) or encouraging them to paint and draw in Iran, simply because they consider those activities more appropriate for their preschool children (Mirbagher, 1986). This item may fit the model for older populations.
For evaluating measurement invariance of the measure, DIF was applied but did not confirm
the hypothesis that the HLE questionnaire held measurement invariance across the two countries.
With the exception of Item 3, playing with numbers, significant differences existed between the
items. While Items 1, reading to children, Item 2, working with letters, and Item 6, visiting a
library, were higher in Germany, Item 4, learning poems, rhymes, and songs and Item 5, painting
and drawing, were reported more in Iran.

As a result, based on the findings of the DIF and item difficulty map, our results offer evidence
of the significance of reading to children, as the most reported item, and then working and play-
ing with numbers and letters during preschool years in German families. This is in line with
previous studies on ethnotheories of German families, which revealed that the German maternal
involvement in the HLE of young children happened through language promotions, providing
books and magazines, and face-to-face interactions (Keller et al., 2006; Keller & Zach, 1993).

Regarding the Iranian results, the finding that families pay less attention to the necessity of
educational activities such as reading to children and working with letters might be related to the
collectivistic and short-term oriented cultural context, in which people focus on culturally valued
roles to work together and on social harmony and group cohesion (Becker et al., 2014). Clearly,
then, parents may de-emphasize academic skills and, instead, emphasize other activities, like
social skills, for their children before school age.

Moreover, families as well as the educational system in Iran are influenced by the Islamic
principles of early childhood education which place a higher value on what children may enjoy
more, like play and art. Not surprisingly, Iranian parents are most likely to involve their young
children in artistic and creative activities like painting and drawing than in literacy-related activi-
ties, which are more related to school.

Limitations and Future Research

Regarding the one misfit item of the HLE index, Item 6, visiting a library, it is expected that
removing it from the HLE questions will create more valid results and increase the utility of the
measure for preschool children. Substitution of this item with other appropriate questions for this
age group such as visiting a bookstore is suggested.

The significant impact of DIF across Germany and Iran indicated that the presumption of
measurement invariance does not hold. If it does not hold, then comparisons of the total scores of
the HLE and further interpretations are not fully meaningful and may need revisions. Therefore,
testing measurement invariance as a prerequisite for the next meaningful comparisons across
countries is highly recommended.

HLE items were compared between two countries focusing on two cultural dimensions (indi-
vidualism vs. collectivism and long-term orientation vs. short-term normative orientation); hence,
to generalize the results of this study and investigate the potential role of the other cultural
dimensions (e.g., masculinity vs. femininity, indulgence vs. restraint, and uncertainty avoidance
of cultures) on HLE activities, more cross-cultural studies among more than two countries are
necessary. The potential effects of these differences within the cultures can be studied in future
researches Furthermore, the Rasch analysis should be more valid if larger samples with a higher
variance range drawn from other diverse populations should be tested in future studies.

Both samples included young children who participated in preschools or kindergartens,
accordingly, the study design has the potential to result in a selective sample. In addition, the
present study over-relied on parents self-reports of demographic data and reports of the fre-
cquency of HLE activities—a fact that made us cautious when interpreting the results.

In conclusion, the HLE, has good psychometric characteristics and with the above mentioned
adjustments, will be useful in future research. With respect to the strong effect of all the HLE
items in predicting later achievement of preschool children, encouraging families from different
cultures to practice all HLE activities may optimize holistic child development by preschool educators and practitioners. For example, German families should pay more attention to painting, drawing and singing with children and Iranian families should increase educational activities like reading books and playing with the alphabet with their children.

Appendix

The Items of HLE Index

1. How often did you read books to your child in last week?
2. How often did you sing songs, rhymes, and poems with your child in last week?
3. How often did you play with numbers with your child in last week?
4. How often did you play with the alphabet with your child in last week?
5. How often did you paint and draw with your child in last week?
6. How often did you visit a library with your child in last week?

Authors’ Note

This manuscript has not been published and is not under consideration for publication elsewhere.

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Declaration of Conflicting Interests

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