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## Research Article

# Affordances in the Home Environment for Motor Development: A Cross-Cultural Study between American and Lebanese Children

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Received 27 March 2013; Revised 10 June 2013; Accepted 23 June 2013

Academic Editor: Annie Vinter

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Considerable efforts have been devoted to map the relations between the home environment and selected aspects of child's development. A recent instrument was developed that aimed at assessing the affordances in the home environment, the AHEMD-SR. Although the AHEMD-SR gave insight into affordances in the home, it was focused on two specific populations from the United States and Portugal. Currently, there is limited research regarding the validity of this instrument when used in different cultures. The purpose of this study was to compare a sample of Middle Eastern children to the normative sample that was used to validate the AHEMD. Results showed a significance difference between the socioeconomic statuses between the groups. Concerning factor analysis, results showed that the Lebanese group had five factors loading as did the American/Portuguese sample but with variables loading differently. Interestingly, the Lebanese group showed higher scores for affordances inside the home such replica toys and games. Our findings show that the state of the environment may play a role in the affordances and development. Future work is needed to look at the specific loading and possible variables that may be included in the AHMED-SR to look at other cultures that may have other limitations.

## 1. Introduction

Recently there has been much attention investigating the relationship between motor development and the home environment. Perhaps the most notable contribution in this area is the *Home Observation for Measurement of the Environment* (HOME) inventory created by Caldwell and Bradley [1] that is used in numerous studies to examine environmental effects on cognitive and social development. Although the HOME inventory was originally designed to specifically examine the relationship of the home to the child's motor development, one of the most striking and consistent HOME findings has been the strong relationship of the availability of stimulating play materials to motor development rather than the "global measures of environmental quality such as SES (socioeconomic status)" [2, page 217].

Although specific motor development measures in the home have been used (e.g., [3–6], Parks and Bradley, 1991,) there is still minimal information available in relation to the multidimensional effects of the home on motor development. In a review, Abbott et al. [7] concluded that the home environment is an important factor contributing to infant motor development but still little research exists examining this relationship. It was suggested that the need for "a valid measure reflecting aspects of the home environment that support infant motor development needs to be created" (page 66). Arguably, such an instrument could have potential for enhancing our understanding of the role of the home environment in early childhood motor development. In addition, such an instrument could provide useful information in a variety of settings, including clinical research with applications to intervention and remediation.

For example, physical therapists could use the instrument to assess the environment and then based on the child's condition provide resources or recommendations to enhance the home optimize motor development.

An instrument aimed at assessing the affordances in the home environment, the AHEMD-SR (*Affordances in the Home Environment for Motor Development Self-Report*), was recently developed [8]. The starting premise of the AHEMD-SR was based on selected ecological (affordance) theories suggesting that the home environment provides *affordances* that can be conducive to stimulating motor development [9, 10]. Affordances are opportunities that offer the individual potential for action and consequently a potential to learn and develop a skill [11–13]. In addition to the more obvious set of affordances such as toys, materials, apparatus, and availability of space, it is believed that stimulation and nurturing of parents (and others) could provide additional components of *events* [12, 13]. In other words, “affordances are opportunities for action that *objects, events, or places* in the environment provide for the animal” [12, page 104]. The AHEMD-SR gives insight into affordances in the home and has been translated into seven languages (including Dutch, French, Chinese, Portuguese, and Arabic; [14]). The home environment, specifically the immediate surroundings of the home, plays a major role in the children's development [15]. Thelen [16] suggested that motor abilities and development are developed from the environment and tasks in which the individual must explore and select the appropriate solution for a given task. The importance of the home environment and affordances has led to the creation of assessments such as the *HOME* and AHEMD-SR; however, there is still limited research comparing these instruments, specifically in our case the AHEMD-SR, with different cultures. In other words, would different cultures (environments) have different score/emphasis on this assessment? Several countries have validated the AHEMD-SR to investigate the effects of affordances in the home on motor development. For example, studies on Iranian and Chinese children have explored the use of AHEMD-SR [17, 18]. Their findings revealed that the AHEMD was a valid indicator for affordances in the home for these two sets of samples. Although the findings revealed that the AHEMD-SR is a valid tool in different cultural contexts, none to our knowledge have specifically compared different cultures using the AHEMD-SR. Therefore the purpose of this study was to compare a sample of Middle Eastern children (Lebanon) to the normative sample that was used to validate the AHEMD (United States and Portugal; selection of the Portuguese sample was comparable in social economic status and parent education to the pilot sample in the US). We were interested to see if the same factor loading would be found across cultures. In other words, would the confirmatory factor analysis find similar results for the Middle Eastern culture? It is our expectation that the outcome of this project would significantly enhance our basic understanding of the potential of the home environment in optimizing motor development, both from a contextual and cross-cultural perspective. In addition, there is a direct benefit to the child and home being examined results of the

AHEMD-SR could improve the overall affordance factor of the home/environment.

## 2. Method

**2.1. Participants.** The study involved a sample of 225 families from Lebanon (125 males (56%) and 100 females (44%)) who were compared to the validating sample of 367 families in United States and Portugal (American/Portuguese; 199 males (55%) and 166 females (46%)). Age ranges for the both groups were from 18 to 42 months (American/Portuguese  $M = 36.0 \pm 5.2$  months and Lebanese  $M = 32 \pm 10$  months).

**2.2. Assessment.** Affordances in the home environment were assessed via the AHEMD-SR and were translated into Arabic and French by four professional independent translators (two French and two Arabic). Back-translation and evaluation were conducted by two experts in the field of motor assessment. As reported previously, the AHEMD-SR consists of five factors (subscales described afterwards plus a section on *Child and Family Characteristics*). Three types of questions were used: simple dichotomic choice, 4-point Likert-type scale, and description-based queries, representing 20 variables and 67 items.

Previously, construct validity and reliability were examined using Portuguese and US families (see [8]). It was hypothesized that affordances are organized according to a common structure that can be represented by a number of specific stable dimensions of the home environment. Based on the study's findings, the confirmatory factor analysis (used to assess construct validity; Joreskog et al. 1999) resulted in a 5-factor solution that best fit the data: *Outside Space* (OS), *Inside Space* (IS), *Variety of Stimulation* (VS), *Fine Motor Toys* (FMT), and *Gross Motor Toys* (GMT). All fit indexes were over .90, the root mean square error of approximation was smaller than 0.5, and all factors were well defined by single path loadings. The standardized factor loadings varied in a range from .33 to .85 but revealed in every case a statistically significant *t*-ratio ( $P < .001$ ; [8]). Reliability was established through the *scale reliability coefficient* with a value of .85 with a SE of 0.028 and a 95% CI ranging from .80 to .91, which indicated a high consistency of the instrument for measuring the construct of interest.

**2.3. Procedure.** Directors of the early childhood centers in Lebanon gave each family a letter explaining the purpose of the study, asked for their collaboration, and provided consent forms. Approximately 1 week later, a package with the AHEMD-SR was sent with instructions to return them within the same week. A coded number was assigned to each family/child to keep researchers naïve to the results. The investigators' university institutional review board (IRB) granted approval to the study.

**2.4. Treatment of the Data.** Analysis consisted of *t*-test procedures to compare characteristics of each cultural sample. Confirmatory factor analysis was used to determine the best fit factors into the model and to compare if the Lebanese

TABLE 1: SSE.

Variable	American N (%)	Lebanese N (%)	Chi-square	P
Kind time				
2 or less	132 (45.6)	64 (28.9)	14.1	.0002
3 or more	158 (54.4)	158 (71.2)		
Adult in the family home				
1	12 (3.3)	4 (1.8)	9.3	.009
2-3	303 (82.6)	204 (91.9)		
4 or more	50 (13.6)	14 (6.3)		
Children in the family home				
1	168 (46.5)	84 (38.7)	32.4	<.0001
2-3	191 (53)	130 (59.9)		
4 or more	2 (.6)	3 (1.4)		
How many rooms				
2 or less	94 (25.6)	11 (5.0)	213.4	<.0001
3-4	263 (71.7)	95 (42.4)		
5 or more	10 (2.8)	118 (52.7)		
Father's education				
1	36 (10.7)	35 (15.6)	73.5	<.0001
2-3	107 (31.6)	143 (63.6)		
4 or more	98 (29.0)	9 (4.0)		
Mother's education				
1	27 (7.9)	11 (4.9)	201.9	<.0001
2-3	87 (25.5)	150 (67)		
4 or more	227 (66.5)	4 (1.8)		
Income				
2 or less	200 (61.9)	87 (43.9)	39.1	<.0001
3-4	95 (29.4)	53 (26.7)		
5 or more	28 (8.7)	58 (29.3)		

sample would load the same as the American/Portuguese validating sample (see [8]; factors included outside space, inside space, physical space, variety of stimulation, fine motor toys, gross motor toys, and play materials and yielded a five-factor loading—outside space, inside space, variety of stimulation, fine motor toys, and gross motor toys). The data analysis was performed with SPSS 19.0 with statistical significance set at the  $P < .05$  level.

### 3. Results

Table 1 shows the frequency distributions of American (US/Portuguese) and Lebanese group with respect to demographic and social variables of parents and social variables. Significant differences emerged between the groups for the socioeconomic variables (income, father's and mother's education, room in the home, and adult and children in the home).

There was significant difference between the Lebanese sample and the American/Portuguese validating sample (fit;

TABLE 2: AHMED between American and Lebanese.

	Mean	SD	Range	df	P
F outspace					
American	2.1	1.9	0–6	590	.000
Lebanese	1.46	1.8	0–6		
F inspace					
American	8.0	1.6	2.7–11.5	341.1	.000
Lebanese	13.8	2.5	5.3–19.7		
F variety					
American	12.2	1.8	6–16	590	.000
Lebanese	11.1	1.9	5–15.8		
F fine motor					
American	51.3	20.2	7–102	590	.000
Lebanese	68.1	20.7	24–117		
F gross motor					
American	21.5	10.4	1–57.5	590	.000
Lebanese	31.4	10.6	12–73		
Total					
American	95.3	30.5	29.3–185	589	.000
Lebanese	126.1	31.2	51–218		

Table 2). In reference to specific fit, analyses indicated that the American/Portuguese sample had higher means in outside space ( $M = 2.1$   $SD = 1.9$ ) and variety ( $M = 12.2$   $SD = 1.8$ ; Table 2). The Lebanese sample had higher scores for Inspace, Fine Motor, and Gross Motor.

Interestingly, the Lebanese sample also showed five loading factors (Table 3) but with differences in how the variables loaded. outside space (.89) and outside apparatus (.84) loaded strongly on factor 1 (outside space) and were similar to the American/Portuguese sample analysis.

### 4. Discussion

The home environment plays a vital role in a child's development [14, 19–21]. It is reasonable to conclude that children's development is influenced by environmental/social and biological factors is are susceptible to positive and/or undesirable situations. The focus of this study was to investigate influence of homes affordances based on the AHMED-SR across two different cultures. The factor analysis performed on the AHMED-SR for Lebanese sample was designed to answer two basic questions: do the items represent the same set of underlying constructs for the different cultures (Lebanon compared to US/Portuguese)? and does the underlying factor structure for the measures correspond to the current sets of subscale for each category?

In the case of the first question, in the same set of underlying constructs for the different cultures, results showed considerable overlap in the factor structures for the two cultures. However, it is important to point out that in the Lebanese environment, the factors load differently compared to American/Portuguese validating sample. A possible explanation could lie in the ecology of Lebanon. Open spaces including public gardens and playgrounds are very limited in

TABLE 3

Variables	American	Lebanon
Outside surface	OS	OS
Outside apparatus	OS	OS
Inside space	IS	*IS
Inside apparatus	IS	*OP
Inside play space	IS	*IS
Play stimulation	VS	*OP
Freedom of movements	VS	*OP
Encouragement of stimulation	VS	*OP
Daily activities	VS	*SS
Replica toys	FMT	*PM
Educational toys	FMT	*PM
Games	FMT	*PM
Construction toys	FMT	*PM
Real materials	FMT	*PM
Others	GMT	*PM
Musical materials	GMT	*PM
Manipulative materials	GMT	*PM
Locomotors materials	GMT	*PM
Body exploration materials	GMT	*PM and SS

OS: outside space; IS: inside space; VS: variety of stimulation; FMT: fine motor toys; GMT: gross motor toys; PM: play materials; \*SS: supportive stimulation; \*OP: opportunity; \*IS: inside space; \*PM: play materials.

Lebanon which could confine children from playing outside. In addition, Lebanon has experienced several recent wars and internal conflicts where the use of outside space (when available) may not be an affordance because of safety issues [22].

Not only could this war experience have influenced the findings but also the ecology of the two different cultures may have an effect on the results as evident in Table 2. This is evident in how the factors loaded. For example, the American/Portuguese sample was reported to have higher scores for outside space, inside surface, and daily activities. Interestingly, there were no differences for outside apparatus, inside apparatus, encouragement of stimulation, and gross motor. These data hint that perhaps Americans have different types of environments mainly space outside that load differently compared to the Lebanese group. The Lebanese group showed higher scores for affordances inside the home such as replica toys and games. These results may be due to the fact of the possible risk factors and the limited accessible public outside space in Lebanon and possible SES differences between samples. It was also shown that outside affordances were affected by the safety of the environment. In other words, the perception and safety of the environment dictate and if children were allowed to explore their outside environment. In addition to the perception and safety of the environment, the living arrangements in Lebanon may play a role. In Lebanon, most of the people live in apartments and therefore outside space was not necessarily available and the municipal parks are limited.

The difference between the five factors loading differently for the Lebanese group may have been attributed to the differences of affordances based on the socioeconomic status of the group (Table 1). Regarding SES, it is likely that the US culture (higher SES) was able to afford more and different types of affordances to children (toys and spaces). Furthermore, the distinction between the groups was also evident with the education level of the father and mother. For example, in the Lebanese sample, 71.9% of the mothers only had completed high school or less whereas the American/Portuguese validating sample had only 33.4%. Concerning the individual scores on the AHEMD, results showed that the Lebanese were different compared to American/Portuguese sample. It is these differences that may have made the five factors load differently. Although it seems that both groups valued the importance of affordances, it seems that there were perhaps environmental constraints (safety and lack of availability) that may have played a role in the outside environments for the Lebanese groups.

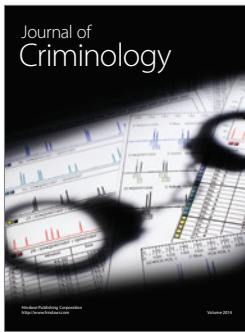
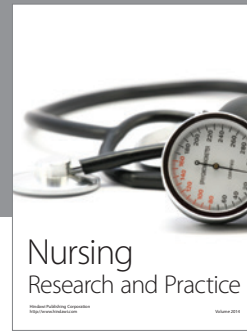
These findings showed that the AHEMD-SR did in fact detect five factors for the Lebanese sample as it did for the US/Portuguese sample but loaded differently. Future work is needed to look at the longitudinal evaluation of infant development and to assess different cultures (cross-cultural). It has been reported that motor affordances do have positive impact on future motor ability but the question still remains if the type of affordances offered from different cultures have similar effects [21]. Possible limitations of our current study include the self-report of parents and the assumptions that items in the homes are used by infants. Our future work will be to translate the AHEMD-SR into other languages to validate and compare the influences of the environment to motor development.

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