Preschool Children's Life Style and Preferences for Toy in Taiwan

Jo-Han Chang, Chan-Jyuan Zhang, and Ssu-Min Chang

Abstract—**Advancements in information and mobile technologies have changed the life style the next generation of children. Children engage in less outdoor activities and their dynamic activities are gradually replaced by static activities. This study analyzed lifestyles and provided suggestions for future product designers to respond properly to individual differences. The lifestyle research by previous scholars was used as the basis. An AIO scale was combined in a self-devised questionnaire to explore the lifestyles of young children in Taiwan. A total of 79 male and 80 female participants were surveyed. The age was between 2 and 6 years old. Factor analysis results yielded seven factors of Health-promoting, Outdoor exploration, Joint amusement, Independent enjoyable learning, Obedience, Home-based parenting, and Relaxed nature. Subsequently, a cluster analysis method was employed to divide the lifestyles of the participants into clusters of Home-based parenting, Social and self-discipline, Indoor enjoyable learning, and Playing outdoors alone. The distribution of clusters revealed that the majority of the population was in Indoor enjoyable learning, representing the major population of young children in Taiwan. The children in the Indoor enjoyable learning cluster preferred Lego and similar block toys the most. The results of this study can serve as a reference for lifestyle scales of young children in the future. A series of further exploration of young children's lifestyle will be conducted in the future.**

Index Terms—**Preschool, lifestyle, tactile sensitivity, toy design.**

I. INTRODUCTION

Contemporary urban parents have few children and are protective toward their children. Densely populated urban spaces limit young children's range of activity, changing their play pattern and causing muscle weakness among the children. Play spaces on tatami and boards and in the courtyard (for sand and water play and rolling in grass), as well as the chance to play in the sun or breeze are decreasing in modern Taiwan, thus drastically limiting the children's tactile stimulation and causing tactile sensitivity problems [1]. Children's lifestyle greatly influences their health throughout their life courses [2]. The primary reason for sensory integration dysfunction among young children in Taiwan is the reduced and narrowed living space and the elongated duration of indoor activity. Moreover, because of the difference between Western and Eastern cultures, Taiwanese parents tend to be overprotective toward their children in terms of parenting [3].

Because of the aforementioned situations, this study analyzed preschoolers' lifestyle in Taiwan and examined

their difference in lifestyles and preferences for toys. The results can explain young children's lifestyles and serve as a reference for toy design and parenting to improve emerging problems in modern society.

II. LITERATURE REVIEW

A. Tendency of Young Children's Lifestyles

Young children's lifestyles change with the family, living environment, parenting style, and economic status. Plummer [4] indicated that the most widely adopted measurement method of lifestyle is an Activities, Interests, and Opinions (AIO) scale, as well as statistical demographic variables. This study explored different children's lifestyles as follows. In the current society where the declining birth rates lead to young children's lack of regular playmates [5], children experience their interpersonal relationship more with adults than with peers [6]. Following the advent of smart phones, parents presenting no interaction while accompanying their children make the children feel neglected regardless of the duration of company [5]. In Canada, more than 60% of the children aged 2–4 years watched electronic visual displays longer than the suggested duration [7]. Changes in the living environment and reduced spaces for children to jump, exercise, or engage in physical contacts, as well as their fewer chances of being exposed to the sun or breeze result in inadequate tactile stimulation and hence tactile sensitivity [1]. In Taiwan, for example, children keep late hours. Taiwanese parents tend to be overprotective toward their children because of the parenting difference between Eastern and Western cultures [3]. In Taiwan, household expenditures on children are primarily on their food, education, and skill and art cultivation, which accounted for 36.9% of the total expenditure [8]. The time Taiwanese young children spend with their family on holidays exhibited an increasing tendency [9]. Dining atmosphere is the primary factor influencing young children's eating behavior; however, allowing young children to watch television or use smart phones while eating causes adverse effects [3]. Overweight and obesity become prevalent among children all over the world [10]. More than 42 million children aged 5 years or younger are overweight [11]. During 2011 and 2012, more than one-third of young children ate fast food nearly every day [12], ate snacks for an average of three times a day, accounting for 25% of their daily intake [13]. Children of previous generations spent hours exploring their backyard or around their home every week without time limit or being controlled by adults. Caregivers nowadays are more stressed and would restrain children from participating in traditional plays because of the concern of being sued for letting any child get hurt. Such an overprotective measure is thus

referred to as "cotton wrapped" [14]. The growing number of children with tactile sensitivity is related to their living environment. Children with tactile defensiveness are easily agitated when touched by someone [15] and are less willing to accept new scents[16]. In a society with a declining birth rate, courses for preschoolers prosper owing to new-generation parents' changing concepts. These parents expect their children to learn happily and deem it more important than to acquire the specific skill or knowledge as imparted in the specific courses. However, these children need to go to after-school classes to learn skills or art, unlike children in the past who could simply go out and play after completing their homework [17]. Their play time is compressed [9]. Regarding feeding, some parents tend to adopt negative feeding methods including sweets and snacks [18]. To understand contemporary Taiwanese children's lifestyles, this study developed questionnaires to identify the children's lifestyles to effectively determine suitable product design directions aiming at populations with different lifestyles.

B. Relation between Play Development and Toys

Plays can express children's language of life [19]. A British study on kindergarten children found that in 97% of their free activities, the children played with something [20]. Therefore, this study used toys with high attachment as the basis to discuss product design and determine what types of toys are suitable for children aged 2–6 years to play with. Smilansky [21] referenced Piaget's classification and divided plays into four categories, namely, functional (2 years old or younger), constructive (2 years old or older), dramatic (2–6 years old), and games-with-rules (7–11 years old). According to the findings, we can understand that the primary plays children aged 2–6 years participating in are constructive or dramatic plays. Therefore, these two categories of toys were used as targets. Blocks and Lago are widely known constructive plays [22], and children at home also use dough, modeling clay, sand, and clay to shape objects, use blocks to build buildings, and create drawings to play constructive plays [23]. Dramatic plays are also referred to as symbolic plays, make-believe plays, role play, or play house. Children play dramatic plays mostly at the age between 2 and 6 years. Juan [24] used Piaget's theory as a basis to classify toys into those for symbolic plays (e.g., stuffed toys, dolls, and scaled toys), fluid-constructive plays (e.g., clay, water color, and drawing), structural constructive plays (e.g., blocks, Lego, and puzzles), sensorimotor plays, and mathematical and literacy symbol learning. Accordingly, toys for constructive and dramatic plays are classified as symbolic, fluid-constructive, and structural constructive plays. These play categories were used to design a questionnaire to understand children's preferences and effectively determine specific directions for toy product design.

III. RESEARCH METHODS

This study used questionnaire to collect data regarding young children's lifestyles and preferences for toys.

A. Item Design for Demographic Variables and Lifestyles

The statistical demographics included child age, child gender, parent education level, household income, family size, and place of residence. Based on existing results of relevant children's lifestyle research, a questionnaire about children's lifestyles was devised. The AIO scale was employed to select dimensions relevant to the research topic. A total of 23 items were devised for the questionnaire of lifestyles. Respondents were required to check either of the five options provided for each item, namely, strongly agree, agree, neutral, disagree, and strongly disagree.

B. Questionnaire Design for Preferences for Toys

The questionnaire content was designed to investigate the children's preferences for toys and combined known preferences stated in the literature and a 5-point Likert scale. The participants were provided with toys' pictures for actual observation and select according their preference perceptions. The participants gave a score from 1–5 for their perceptions, in which 1 represented the weakest and 5 the strongest.

C. Data Compilation and Analysis

In this stage, we compiled and analyzed data obtained from the questionnaire survey. Descriptive statistics were conducted on the demographic data to understand the sample structure. Then, data from the lifestyle questionnaire were organized and analyzed using factor analysis and cluster analysis to cluster lifestyles of the children. Finally, the different lifestyles and preferences for toys among the children were analyzed.

IV. RESEARCH RESULTS

This section focuses on analysis and discussion of the research data from questionnaire surveys. Excel and IBM SPSS statistics package 23.0 were used as the instrument for data analysis. Descriptive statistics, factor analysis, and cluster analysis methods were employed to perform statistics.

A. Questionnaire Distribution and Sample Structure

The researchers distributed paper-based questionnaires to parents with children aged 2–6 years. A total of 159 valid questionnaires were collected during the survey period from July to August 2017. The frequency distribution method of descriptive statistics was employed to conduct preliminary statistics and analysis of the demographic variables provided in the 159 valid questionnaires to understand the background of the participants. The majority of the children were aged at 2 years (29.6%). The overall distribution showed that the child gender and parent education level were evenly distributed. Highest education level of the parents was mostly of the undergraduate level (46.5%). Nearly a half of the participants were double-income family (49.7%). Parents with a total monthly income of 20001–30000 NTD had the least proportion (5%), whereas parents with the other income ranges separately accounted for at least 20% of the population, marking an even distribution. Most of the children had one sibling (45.9%) and were the eldest child (71.1%). The majority of the participants resided in northern Taiwan (58.5%).

B. Factor Analysis of Lifestyle

In questionnaire survey, the participants were required to complete 30 items including AIO lifestyle variables for their

2–6-year-old children. After the questionnaire was returned, items 5, 6, 8, 10, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, and 29 were set to be reverse-scoring items. The questionnaire reliability was tested using Chronbach's alpha. The alpha value reached 0.765, signifying that the proposed questionnaire was reliable. The 30 items regarding lifestyles underwent item analysis to examine whether the items exhibited discriminability. Levene's test was conducted to determine equality of variance. A level of significance greater than 0.05 indicates identity or equality and identical variables are thus adopted, whereas the significance lower than 0.05 means difference or being affected and identical variables are not adopted. A value of the t test lower than 0.05 signifies the existence of discriminability. The results showed that Q12, Q28, and Q30 had no discriminability and were thus removed from subsequent analysis. When principal component analysis was conducted, factor analysis results were tested in terms of validity. Correlation coefficients with the lowest communality were deleted repeatedly. Reliability and validity were retested after each deletion. Because the factor analysis involved the use of correlation coefficients as the basis of factor extraction, Bartlett's sphericity test was conducted to determine whether the correlation coefficients were suitable. After 11 items with no significant validity were deleted, the results showed a KMO value of 0.674 and the chi-squared value of Bartlett's sphericity test was 674.266, reaching significance. This represented that the correlation coefficients were appropriate to be used to extract factors in factor analysis. Thus, the obtained data were suitable for factor analysis. During the analysis of principal component analysis, the cumulative explanation rate as of the seventh factor was 62.742%. The eigenvalues of each factor were greater than 1, yielding 7 principal factors, as shown in Table I. In addition, reliability analysis of the items within each factor had a Cronbach's alpha coefficient of 0.703.

TABLE I: LIFESTYLE COMMON FACTOR CUMULATIVE VARIANCE EXPLAINED

	Components						
	1	2	3	4	5	6	7
Q20 My child is often uninterested in eating vegetables and fruits, having unbalanced diet.	.832						
Q16 My child prefers certain types of food and is reluctant to accept new flavors.	.811						
Q8 My child keeps late hours. (reverse-scoring)	.543						
Q18 My child enjoys snacks, which accounted for 25% or more of his or her daily intake. (reverse-scoring)	.506						
Q9 My child plays outdoors at least three times a week.		.807					
Q7 I often bring my child to places where we can play sand or water or roll in grass.		.757					
Q10 I do not let my child play challenging recreational facilities. (reverse-scoring)		.573					
Q3 My child enjoys playing with others in everyday life.			.800				
Q1 My child is willing to actively share things with others.			.793				
Q2 My child has regular playmates such as siblings, cousins, and neighbors.			.539				
Q26 I feel it important to have the child learn, arrange schedules, do homework, and play independently.				.764			
Q27 I believe nature is the best skill and art teacher to children.				.705			
Q24 I believe learning skills or knowledge is not as important as having happy learning experiences when a child attends a skill or art class.				.663			
Q19 My child refuses hot or cold foods. (reverse-scoring)					.754		
Q29 My child is particularly sensitive to the texture of clothes and does not like new clothes, coarse patterns, collars, jumpers, sweaters, hats, or scarves. (reverse-scoring)					.737		
Q25 My child needs to go to a cram school at least 3 days a week to increase time of learning. (reverse-scoring)						.725	
Q17 My child enjoys fast food and eats it at least 5 times a week. (reverse-scoring)						.657	
Q6 My child spends an average of at least 4.6 hours a day on using smartphones or tablet computers. (reverse-scoring)						.562	
Q22 My child hates activities that may get him or her dirty such as sand play, finger painting, mud, and clay. (reverse-scoring)							.874
Initial eigenvalues in total	3.406	2.396	1.809	1.475	1.257	1.127	1.079
Variance explained %	17.028	11.982	9.044	7.377	6.284	5.633	5.394
Cumulative variance explained %	17.028	29.01	38.054	45.431	51.715	57.348	62.742
Factors	Health-promoting	Outdoor exploration	Joint amusement	Independent and enjoyable learning	Obedience	Home-based parenting	Relaxed nature

C. Lifestyle Factor Naming

Factor 1 contains four items Q20, Q16, Q8, and Q18, emphasizing children's dietary health, balance, and diversity, as well as their regularity in sleep time. This factor helps researchers identify whether the participant pay attention to health-promoting ideas, hence the name Health-promoting. Factor 2 contains three items Q9, Q7, and Q10, revealing the parents' willingness of encouraging the children to engage in

outdoor activities and contact with and challenge nature, hence the name Outdoor exploration. Factor 3 contains three items Q3, Q1, and Q2, indicating the child's preference for sharing with people, playing together, and having regular playmates, hence the name Joint amusement. Factor 4 contains three items Q26, Q27, and Q24, emphasizing the child's independent learning abilities, happy learning, and independent exploration of nature, hence the name Independent and enjoyable learning. Factor 5 contains two items Q19 and Q29, suggesting that the child ate balanced foods, was less sensitive to clothing, and felt content about food and clothing, hence the name Obedience. Factor 6 contains 3 items Q25, Q17, and Q6. This factor consists of reverse-scoring items that indicate the parents' conception of forsaking learning in cram school and limit their children's fast food intake as well as children's use of smart devices. Parents who did these were more likely to spend more time at home to parent their child; thus, this factor is named as Home-based parenting. Factor 7 contains one item Q22, which was scored reversely. The item suggested that the child does not reject getting themselves dirty; instead, they enjoy plays with sticky, irregular particles. We infer such children were naïve and relaxed, hence the name Relaxed nature.

D. Cluster Analysis of Lifestyle

We conducted cluster analysis on the 159 participants according to their lifestyle factors. The participants sharing high homogeneity were clustered in a group. The Ward's method or minimum variance method was used to cluster the participants in accordance with the Euclidean linear distance squared. After observing the cluster dendrogram, we plotted a clustering line at a linkage distance of 15, dividing all participants into four clusters. Subsequently, discrimination analysis was conducted to identify the clustering correctness. The results revealed that the significance was $0.000 < \alpha = 0.05$, reaching the level of significance. Next, one-way analysis of variance was performed to explore the difference in factors and lifestyles between clusters to examine the appropriateness of the clustering. As shown in Table II, significance of all factors was lower than $\alpha = 0.05$. All four clusters exhibited significant difference in lifestyle factors except for Factor 1. This means that the participants with different lifestyles were effectively clustered. The factor component of the four clusters was extracted from the item with an absolute value of its mean higher than 0.4. Higher values denote higher relevance.

TABLE II: VARIABLE ANALYSIS OF LIFESTYLE CLUSTERING AND FACTORS

	Cluster Mean-square	Degree of freedom	Error Mean-square	Degree of freedom	Cluster 1	2	3	4	F	Significance
Factor 1: Health-promoting	.834	3	1.003	155	.11497	-.03803	-.13143	.17497	.832	.478
Factor 2: Outdoor exploration	8.611	3	.853	155	.30013	.33454	-.49708	.35390	10.098	.000***
Factor 3: Joint amusement	27.107	3	.495	155	.20675	.42629	.35941	-1.53815	54.793	.000***
Factor 4: Independent and enjoyable learning	20.285	3	.627	155	-1.03314	-.01082	.51968	.28093	32.366	.000***
Factor 5: Obedience	4.304	3	.936	155	-.33616	.52533	.02358	-.12893	4.597	.004**
Factor 6: Home-based parenting	7.720	3	.870	155	.34701	-.76459	.03693	.22547	8.874	.000***
Factor 7: Relaxed nature	16.973	3	.691	155	.22668	-1.15022	.40817	-.04282	24.568	.000***

Note 1: Data represent the results of ultimate cluster centers.
Note 2: * represents significant difference of P < 0.05, ** represents very significant difference P < 0.01, and *** represents extremely significant difference P < 0.001.

TABLE III: DEMOGRAPHIC VARIABLE DISTRIBUTION OF EACH CLUSTER—CHILD GENDER (ORGANIZED BY THIS STUDY)

Cluster			Home-based parenting	Social and self-discipline	Indoor enjoyable learning	Playing outdoors alone	Overall
Child gender	Boy	Number	12	15	33	19	79
		Percentage	15.2%	19.0%	41.8%	24.1%	100.0%
	Girl	Number	27	14	30	9	80
		Percentage	33.8%	17.5%	37.5%	11.3%	100.0%
Total		Number		39	29	63	28
		Percentage		24.5%	18.2%	39.6%	17.6%

The aforementioned statistical data were analyzed with the results shown in Table II. The four clusters were named as follows: Cluster 1 had the mean of Factor 4 lower than that of the other factors, whereas the mean-square of Factor 6 was higher than the other factors. The mean-square of Factor 5 was only higher than Factor 2. This suggested that the participants were relatively passive in learning and the parents spent more time parenting their children at home and

the children were selective about food and clothing. Thus, this cluster was named Home-based parenting, comprising 39 participants. In Cluster 2, the mean-squares of Factor 3 and Factor 5 were higher than those of other factors. The means of Factor 6 and Factor 7 were lower than that of other factors. Participants in this cluster enjoy sharing and playing with others and had an obedient personality. They spent longer time learning outside home and disliked plays that may get

themselves dirty. Therefore, this cluster was named Social and self-discipline, comprising 29 participants. Cluster 3 achieved higher means on Factor 4 and Factor 7 and a lower mean on Factor 2. The participants of this cluster emphasized active learning, relaxed lifestyle and rarely explored outdoors; they were thus named Indoor enjoyable learning, comprising 63 participants. In Cluster 4, the mean of Factor 3 was lower than that of other factors, whereas the mean-square of Factor 2 was higher than that of the other factors. Participants of this cluster sometimes played outdoors but seldom share their toys or played with others. Thus, they were playing outdoors alone, comprising 28 participants, as shown in Table III.

E. Difference Analysis of Preferences for Toys among Lifestyle Clusters

We used one-way analysis of variance to examine whether significant difference existed among the clusters regarding preferences for toys. The results revealed that the four clusters exhibited significant differences in the preference levels of crayons and water colors. Children of the Indoor enjoyable learning cluster preferred crayons more than did children of the Playing outdoors alone cluster. Regarding the preference level for water colors, the Home-based parenting and Indoor enjoyable learning clusters scored higher than did the Playing outdoors alone cluster. The four clusters exhibited significant differences in the frequency levels of using sand tools and crayons. The Home-based parenting cluster played sand tools more frequently than did the Indoor enjoyable learning cluster.

V. CONCLUSION AND SUGGESTIONS

A. Lifestyle Clusters and Trends

This study referenced the AIO scale from the literature as the foundation. The results regarding Taiwanese preschoolers' lifestyles which can be divided into four markedly different clusters are present as follows:

(1) Home-based parenting: Passive learners with their parents spending more time parenting the children at home; these children were also selective about foods and clothing.

(2) Social and self-discipline: The children preferred to share and play with others, having an obedient personality, spending longer time learning outside home, and prefer not to engage in plays that get themselves dirty.

(3) Indoor enjoyable learning: The children valued active learning and relaxed lifestyles and rarely explored outdoors.

(4) Playing outdoors alone: The children occasionally played outdoors but seldom share toys or played with others.

Difference between preschoolers of different lifestyles: Cluster distribution results revealed that the proportion of the Indoor enjoyable learning cluster was the highest, accounting for the primary population of Taiwanese young children. Regarding the gender distribution, more girls were observed than boys in Home-based parenting, whereas more boys were found in Playing outdoors alone. The results revealed that boys were more independent and girls were passive learners. The contribution of this study lies in providing a reference for young children's lifestyle scales. A series of young children lifestyles will be further explored in following studies.

B. Children's Lifestyle Clusters and Preferences for Toys

Regarding children's preferences for toys, Indoor enjoyable learning children preferred crayons more than did Playing outdoors alone children. The Home-based parenting and Indoor enjoyable learning clusters had greater preference levels for water colors than the Playing outdoors alone cluster. The two clusters spent more time at home than did the Playing outdoors alone cluster. This can be the reason of their higher preference levels for crayons and water colors because both tools (toys) are commonly used indoors. The Home-based parenting cluster had a higher frequency level of playing sand tools than did the Indoor enjoyable learning cluster. The difference in the Relaxed nature factor between the two clusters was the greatest with Home-based parenting at 0.22668 and Indoor enjoyable learning at −1.15022. Higher factor values suggested that the children were less likely to reject activities that may get themselves dirty and more likely to enjoy plays with sticky irregular particles, which are play features associated with sand tools. The results indicated that different lifestyles caused children's differed preferences for toys.

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