The development of throwing movements in early childhood from the perspective of health sociology

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要旨

日本の幼児は投動作がうまくできない。この状況は保育士や保護者が子どもの頃に既に発生しており，保育士や保護者は，自身がうまくボールを投げられないだけでなく，子どもたちにボールの投げ方を教えたり見本を見せたりすることができない。本研究は，そんな保育士や保護者が子どもたちの投動作を改善する方法の検討を目的として行った。11 名の園児にテニスボールを投げさせて観察したところ，うまく投げられない子は，視線が下を向いていて，ボールを投げたい方向に顔を向けられていない，足が揃えられているので重心移動ができない，横から投げているので肩が回っていないことが分かり，視線，足，肩が幼児の投動作の改善点であるとの知見を得た。そこで，子どもたちに「顔をあげてボールを投げたい方を見る」，「ボールを投げる手と反対の足を前に出す」，「肩を回して上から投げる」という口頭での指示を与えた。その結果，子どもたちの投動作は劇的に改善し，11 人中 7 人の子どもの投距離が延びた。この研究で用いた口頭での指示は，子どもたちに投動作の見本を見せられない保育士や保護者にも行うことができ，幼児の投動作の改善に有効であると考えられる。日本では保育所の園庭や家の庭がとても狭いか，そもそも庭が無く，公園ではボール投げが禁止されていて，子どもも大人もボールを投げる機会がとても少ない。すなわち，幼児の投動作の発達の遅れは，健康社会学上の問題であり，この状況への対処には，政府や地方自治体による健康社会学的なアプローチが必要である。

キーワード

指示，園児，ボール投げ，投動作，投距離

Introduction

In Japan, young children's ball-throwing ability has declined[1), 2)] (Figure 1). This situation began more than 30 years ago (see Figure 1); therefore, preschool teachers, majority of whom are young females, and parents, especially mothers cannot teach children how to throw balls.

Throwing is one of the fundamental motor abilities and is important not only for throwing a ball but also for developing to obtain other sports skill; for example, throwing competitions such as the javelin throw and racket sports such as tennis or badminton which needs the object control and shoulder rotation[3)].

This study aimed to identify the characteristics of throwing movements of children who did not excel at throwing balls and to determine instructions on throwing for children, which could be provided by preschool teachers who are not good at throwing balls. The study also aimed to consider the delay in the development of the throwing movement from the perspective of health sociology.

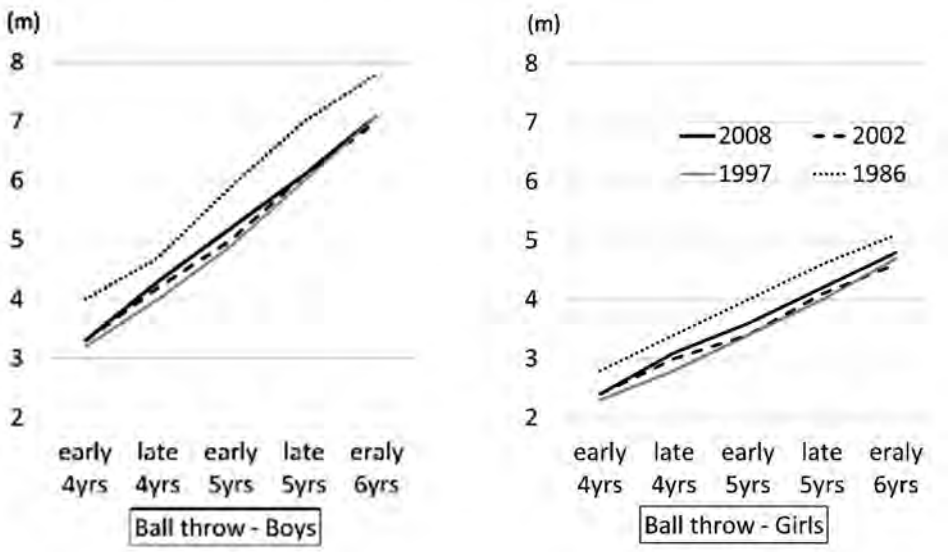

Figure 1. Changes of Preschool Children's Throwing a Ball Distance
Note: *Graphs were drawn by referring to Sugihara et al.[1] and Mori et al.[2].

Methodology

The participants were 11 preschool children aged 5–6 years. The children's tasks were as follows: 1) throw a tennis ball, 2) listen to verbal instructions according to their performance evaluations (i.e., the movement and distance of their throw), and 3) throw a tennis ball again. The ball-throwing test was conducted according to the implementation guidelines of the Ministry of Education, Culture, Sports, Science and Technology Japan[4].

We collected quantitative data by measuring throwing distance and qualitative data by observing and viewing video-recordings of children's throwing movements. By analyzing qualitative data, we identified the characteristics of the throwing movements of children who were poor at ball throwing. Based on these findings, we determined the checkpoints of children's throwing movements and the instructions that should be provided to children. By comparing each child's throwing distance and movements before and after providing instructions, we confirmed the appropriateness of the checkpoints and advice.

Results and Findings

1. Throwing Movements

From the qualitative analysis of the observations and video-recorded data on children's throwing movements (Figure 2, Subj. No. 2), the movement characteristics of children who were poor at ball throwing were as follows:

(i) They were looking down and their faces were not facing the direction in which they wanted to throw.

（ii） Their feet were parallelly positioned and, thus, their center of gravity did not shift forward.
（iii） They were throwing sideways, and their shoulders were not rotating.

Before instructions

（i）Line of sight was downward；（ii）both feet parallelly positioned；（iii）throwing sideways and no shoulder rotation

After instructions

（i）Facing the direction in which she wanted to throw；（ii）putting the leg opposite to the ball-throwing arm in front, so the center of the gravity shifting forward；（iii）rotating the shoulder

Figure 2. Throwing a Ball Movement Before and After Giving Instructions

From the analysis results, we detected the following points for improvement in the children's throwing movements：（i）line of sight,（ii）feet position, and（iii）shoulders. Therefore, they were provided the following verbal instructions：（I）look up to see the direction in which they wanted to throw the ball,（II）put the leg opposite to the ball-throwing arm in front, and（III）rotate the shoulders. After instructions were given, many of the children's throwing movements improved（Figure 2）.

2. Throwing Distances

After verbal instructions were provided, the throwing distance（Table 1）of 7 of the 11 children（Subj. No. 1–7）increased. All 11 children's averaged value of difference before and after instructions were provided was + 0.11 m. Seven（Subj. No. 1–7）children's average value of the difference before and after giving instructions was + 1.40 m.

Table 1. Throwing Distances Before and After Instructions
(Unit: Meter)

Subj. No. Boy/Girl	Before Instruction (B)	After Instruction (A)	Differences Between (B) and (A)
1 Boy	1.4	4.2	+2.8
2 Girl	3.5	5.5	+2.0
3 Boy	13.0	15.0	+2.0
4 Girl	6.3	7.5	+1.2
5 Girl	6.6	7.6	+1.0
6 Girl	5.5	6.0	+0.5
7 Girl	5.0	5.3	+0.3
8 Boy	10.0	10.0	±0
9 Boy	6.3	6.0	−0.3
10 Girl	9.1	6.0	−2.2
11 Boy	13.5	7.4	−6.1

Discussion

Most children (7 of 11), whose throwing distances increased after instructions were given, showed improved throwing movements (see Figure 2, Subj. No. 2: a representative sample). Therefore, the verbal instructions used in this study—(I) look up to see the direction in which they wants to throw the ball, (II) put the leg opposite to the ball-throwing arm in front, and (III) rotate the shoulders—were helpful in improving children's throwing movements, especially for children unable to throw the ball well. Verbal instructions (I), (II), and (III) can be used by preschool teachers who cannot demonstrate ball-throwing techniques well to provide effective instruction. However, for children who can throw a ball well, stereotyped verbal instructions are not adequate.

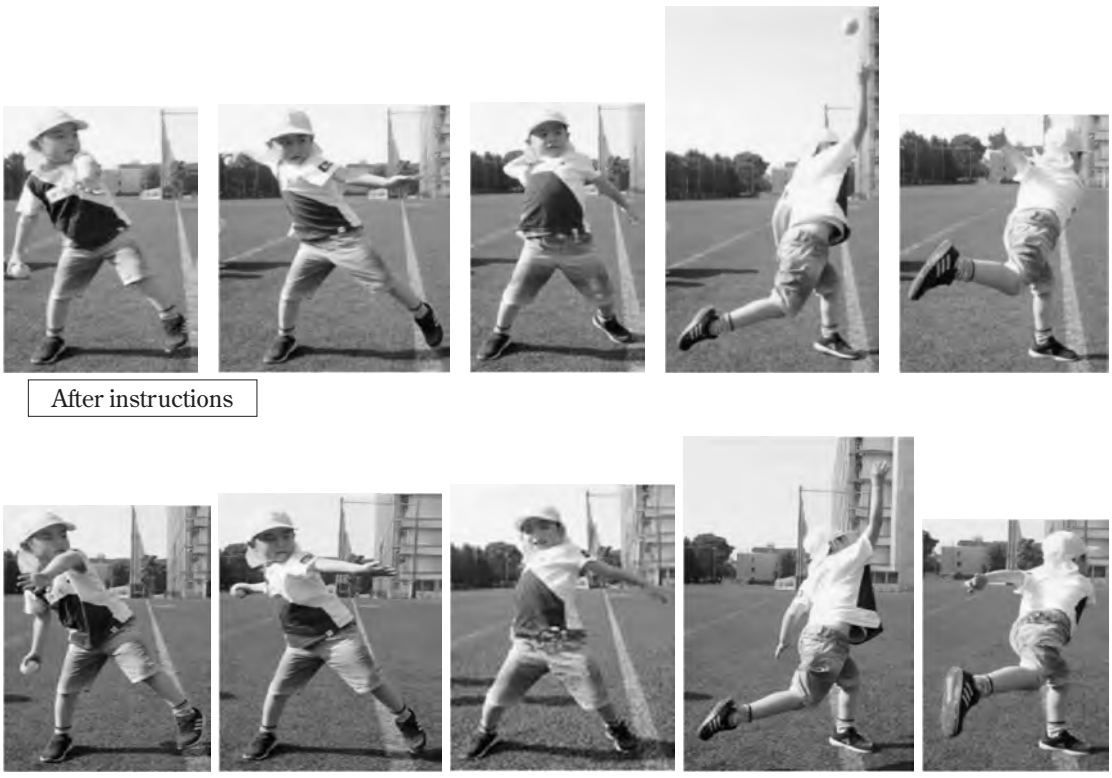

Figure 3. No Change Before and After Giving Instructions

The throwing distance of one child did not change（Figure 3, Subj. No. 8）. His throwing movements remained unchanged. Before giving instructions, he had already cleared almost all checkpoints. Only during the throwing motion, just for a moment, his face was not facing the direction in which he wanted to throw（the third picture of Figure 3）, which was the same before and after instructions were given.

Before instructions

After instructions

Figure 4. Becoming Worse After Giving Instructions

Three children had decreased throwing distances after receiving instructions. Their throwing movements worsened after instructions were given. They had already cleared almost all checkpoints before the instructions were provided; they could perform the throwing movement smoothly and quite well without particular consciousness. However, when instructions were given, they became conscious of the movements that they had previously been able to perform unconsciously, and their movements became awkward (Figure 4, Subj. No. 11: a representative sample).

The verbal instructions (I), (II), and (III) were helpful in improving children's throwing movements and can be used by preschool teachers who cannot demonstrate ball throwing well to provide effective instructions. However, for children who can throw a ball well, giving these instructions to them according to stereotypes would be inadequate and have negative effects[5]. If it cannot be helped that preschool teachers or parents are unable to accurately demonstrate ball throwing, they should be able to determine which of the three points are being met and which are not to each child, and provide only the necessary advice—never uniformity, never in stereotype.

The background factors of delay in children's development of throwing movements are considered to be a health sociological situation. One factor might be that many Japanese preschools have very narrow playgrounds or none at all[6]. Another factor might be that throwing balls is prohibited in several parks. Moreover, houses where children live have very narrow gardens or none. Therefore, there are very few places where children can throw a ball, and children had fewer opportunities to throw balls. Adding that, even if

children can meet the chance of throwing a ball, they do not know how to throw the ball. From those reasons, children's delay of development of throwing a ball movement is health sociological problem. In order to cope with it, health sociological approach by the government and community governments would be necessary; for example, preparing places where children can throw a ball near preschools and children's living areas or providing preschool teachers with training opportunities to teach basic exercises such as throwing movements.

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The development of throwing movements in early childhood from the perspective of health sociology

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Abstract：
Japanese preschool children have poor throwing skills. This situation was similar during the childhood days of today's preschool teachers and parents. Both children and adults have had very few opportunities to throw balls, because preschools and homes in Japan haven't had gardens or are small and playing with balls have been prohibited in public parks. Therefore, they find it difficult to throw balls by themselves and show or teach how to throw balls. This study examined the ways in which preschool teachers and parents can improve children's throwing movements. Eleven children were asked to throw a tennis ball. We observed that children who were unable to throw the ball well were looking down, their faces were not facing the direction in which they wanted to throw, and their feet were together; hence, the center of gravity was not shifted, they were throwing sideways, and their shoulders were not rotating. Therefore, we can conclude that the line of sight, feet, and shoulders improved children's throwing movements. Verbal instructions were given to the children to look upward, place the leg opposite the throwing arm in front, rotate their shoulders, and throw from above. Consequently, the children's throwing movements strikingly improved, and the throwing distance increased in 7 of the 11 children. The verbal instructions used in this study can be used by preschool teachers and parents who are unable to provide accurate demonstrations and are thought to be helpful in improving children's throwing movements. Children's delay of development of throwing a ball movement is health sociological problem. In order to cope with it, health sociological approach by the government and community governments would be necessary.

Key Words：
instructions, preschool children, throwing a ball, throwing movement, throwing distance