The Effect of Model Similarity on Girls’ Motor Performance

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This investigation examined the effect of model similarity on girls’ acquisition, retention, transfer, and transfer strategies of a novel motor task. Forty girls (mean age = 10 years) were randomly assigned to conditions in a 2 (model skill level) × 2 (model sex) factorial design using four treatment groups: (a) male skilled, (b) male learning, (c) female skilled, and (d) female learning. Quantitative data were collected throughout all phases of the investigation. ANOVA results for transfer strategies revealed a significant main effect for model skill level and model sex. Participants observing a female model or a learning model transferred significantly more learning strategies than did participants observing a male or skilled model. After quantitative data collection, qualitative data were obtained via structured interviews and assessed through content analysis. Results from the interview analyses underscored the need to include models of similar sex, as well as learning models, when instructing girls in motor skills.

Key words: physical education instruction, teaching strategies, observational learning

One of the most salient means of conveying information to learners is through visual demonstrations. Physical education practitioners consistently use visual demonstrations or modeling throughout motor-skill instruction. Modeling, also referred to as observational learning, is the process whereby observers attempt to replicate a demonstrated behavior or action (McCullagh, Weiss, & Ross, 1989). The modeling process is regarded by many as one of the most powerful means of transmitting behaviors, beliefs, and values (Bandura, 1986). Furthermore, modeling is a complex process and could be influenced by a number of factors, such as specificity of demonstration, psychological factors, model characteristics, spacing and timing of the demonstration, perceptual information, augmented information, verbal cues and rehearsal, and characteristics of the learner (see Gould & Roberts, 1981; McCullagh & Weiss, 2001; Weiss, Ebbeck, & Wiese-Bjornstal, 1993, for reviews). In addition, these factors are influenced by the learner’s cognitive function. In fact, cognition is one of the central components of observational learning (Bandura, 1986).

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Bandura’s social learning theory (1977) provides a framework for examining the relationships among cognition, modeling, and motor performance. Bandura’s theory suggests that learners symbolically code a desired behavior. Once the desired behavior is coded, it is then used to guide later performances. Bandura’s social cognitive theory, (1986) a revision and expansion of social learning theory, explains that the learner selectively attends to certain features of the skill being modeled then transfers those features into a cognitive representation that is used to guide future performance. Social cognitive theory assumes the individual is actively engaged in the learning process, and it has served as a theoretical framework for numerous investigations examining the relationship between modeling and motor-skill performance (for a complete review see McCullagh & Weiss, 2001).

Findings of modeling research based on Bandura’s theories (McCullagh et al., 1989) have indicated that various characteristics of the model might serve to heighten the learner’s attention and motivation. It was suggested that the increase in attention and motivation might be because of the similarity perceived between the learner and the model. Research examining model similarity has found characteristics such as model status (McCullagh, 1986), skill level (Hebert & Landin, 1994; Lee & White, 1990; Martens, Burwitz, & Zuckerman, 1976; McCullagh, 1987; McCullagh & Caird, 1990; McCullagh & Meyer, 1997; Pollock & Lee, 1992; Weir & Leavitt, 1990), and model sex (George, Feltz, & Chase, 1992; Gould & Weiss, 1981) influence the effectiveness of observational learning. Specifically, McCullagh (1986) found that participants performed better after viewing a high-status model (a peer held in high esteem) rather than a low-status model. Teachers typically use correct, skilled models during physical education instruction. Therefore, research examining the effect of a model’s skill level on motor performance offers interesting and perhaps challenging insights into the use of skilled and learning models (Adams, 1986; Hebert & Landin, 1994; Martens et al., 1976; McCullagh & Caird, 1990; McCullagh & Meyer, 1997).

One of the early studies investigating the use of skilled (correct) and learning models (incorrect or simulated learning) was conducted by Martens et al. (1976). The researchers used four modeling conditions: a correct (skilled) model, an incorrect (learning) model, a simulated learning model, and a control (no model, only physical practice). The results indicated that participants observing the skilled and simulated learning models were more accurate and implemented more advanced strategies than the participants observing the incorrect model or no model. Adams (1986) extended the Martens et al. study by manipulating the participants’ access to knowledge of results (KR) provided to the model. The conclusion of this study was that observing a learning model combined with KR improved performance more than not observing a model or observing a learning model without access to the model’s KR. Similar conclusions were made by McCullagh and colleagues (McCullagh & Caird, 1990; McCullagh & Meyer, 1997) and Hebert and Landin (1994).

Taken collectively, studies examining the influence of learning models on motor performance suggest that learning models might benefit motor-skill acquisition (Adams, 1986; Hebert & Landin, 1994; Martens et al., 1976; McCullagh & Caird, 1990; McCullagh & Meyer, 1997). Lee, Swinnen, and Serrien (1994) discuss this phenomenon in terms of cognitive effort that might be exerted throughout the modeling process. Learning models (those who improve over practice) provide the observer an opportunity to problem solve, thus exerting an increase in
cognitive effort that could be beneficial throughout the learning process. Increasing one’s cognitive effort could positively influence participation in the learning process paralleling Bandura’s (1986) depiction of an active learner.

In addition to the skill level of the model, another characteristic shown to influence the learner’s perceptions of similarity is model sex. An investigation conducted by Gould and Weiss (1981) examined model similarity via manipulation of the sex of the models. These researchers investigated the effects of model similarity (i.e., male or female) on self-efficacy of the participants when performing a muscular endurance task. Female participants were randomly assigned to one of two modeling manipulations (i.e., nonathletic female, athletic male). Results indicated that the participants observing a similar model (i.e., nonathletic female) demonstrated superior performance on the leg-extension task, as compared with participants who viewed a dissimilar model (i.e., athletic male). These researchers concluded that the model similarity as determined by the sex of the model had a strong impact on performance.

One of the weaknesses of the Gould and Weiss (1981) study was that the skill level and sex of the models were confounded. In 1992, George et al. replicated and extended the Gould and Weiss investigation by examining the model’s skill in addition to the model’s sex. Specifically, additional treatment groups included adding an athletic female and a nonathletic male. The inclusion of these treatment groups aided in determining which model characteristic participants perceived as most meaningful (model sex or model skill level). These researchers employed the same muscular endurance task that Gould and Weiss used. The female participants who observed a nonathletic model, regardless of sex, demonstrated superior performance. Researchers concluded that athletic skill level of the model superseded any similarity perceived in regards to model sex. Consequently, the researchers suggested that coaches and teachers might want to use models of similar skill levels.

Although much research has been conducted on the influence of model characteristics on the effectiveness of observational learning (Adams, 1986; George et al., 1992; Gould & Weiss, 1981; Hebert & Landin, 1994; Martens et al., 1976; McCullagh & Caird, 1990; McCullagh & Meyer, 1997), it is important to note that these studies have been limited to adult participants. Research investigating the effectiveness of model similarity on children’s motor performance is limited. The research examining model similarity on children’s performance in academic settings, however, generally supports the contention that model skill level is the most salient characteristic in regards to children’s perceptions of model similarity (Schunk, Hanson, & Cox, 1987). Weiss, McCullagh, Smith, and Berlant (1998) investigated the effect of model similarity (via mastery and coping models) on children’s performance. Few investigations in the motor-behavior domain, however, have directly examined the impact of model similarity via model skill level and model sex on children’s motor performance.

Understanding variables that positively effect children’s motor performance is crucial to promoting children’s participation in lifetime physical activity. Using models that could strengthen children’s perceived similarity between the model and themselves has the potential to enhance children’s motor-skill performance. Specifically, using models of similar sex might help minimize gender stereotypes, whereas learning models have the potential to contribute to children’s perceptions of ability. “Beliefs about gender appropriateness and conceptions of ability have
been identified as powerful influences on beliefs about competence” (Solmon, Lee, Belcher, Harrison & Wells, 2003, p. 261). Positive competence beliefs have the potential to facilitate participation in physical activities across the lifespan. Girls tend to perceive physical education as an activity for boys (Solmon, 1997). When girls perceive an activity as being for boys, they are less likely to participate in that activity. Therefore, it is important to understand factors that influence girls’ participation and perceptions in physical education classes. For these reasons and to avoid confounding results of the models’ sex with the participants, only females were used for the current study. The use of only females is consistent with previous research (George et al., 1992; Hebert & Landin, 1994; McCullagh & Meyer, 1997; Weiss, Ebbeck & Rose, 1992).

The purpose of this investigation was to examine the effect of model similarity on girls’ acquisition, retention, and transfer of a novel motor task. Additionally, the transfer of learning strategies was also examined. Specifically, the present investigation was designed to examine the impact of two characteristics, model sex and model skill level, in a simulated physical education setting. Based on previous investigations (George et al., 1992; Gould & Weiss, 1981; Hebert & Landin, 1994; McCullagh & Caird, 1990; McCullagh & Meyer, 1997; Schunk et al., 1987) and social cognitive theory (Bandura, 1977, 1986), it was predicted that girls presented with a learning model would demonstrate superior performance regardless of the sex of the model.

The primary purpose of the transfer phase was to determine how many transfer strategies participants employed during their attempts rather than to determine whether the participants could perform the task. All of the demonstrations included presentation of externally imposed learning strategies (Singer & Chen, 1994). For example, the demonstrations included mastery of one-, then two-, followed by three-scarf juggling, verbally rehearsing task components, and placing scarves in a specific color order. Singer and Chen suggest that learners should be given varied opportunities to use cognitive strategies. Additionally, they suggest that researchers should determine to what extent learners would spontaneously use these strategies in future learning situations. This concept of teaching learning strategies is consistent with the National Association for Sport and Physical Education (NASPE) standards for a physically educated individual (NASPE, 2004), who should be able to demonstrate the ability to understand “strategies and tactics as they apply to the learning and performance of physical activities” (p. iv). Consequently, an additional dependent measure was used to assess cognitive strategies employed during transfer.

**Method**

**Participants**

The participants for this study were fourth grade girls ($N = 40$, mean age = 10 years, $SD = 2.5$ months) enrolled in local elementary schools who volunteered to participate in the investigation. Participants were recruited from four local elementary schools. All four schools were private religious-based schools. The children enrolled in these schools came from similar demographic backgrounds. Specifically 97% of the children were from middle-class socioeconomic backgrounds. The combined racial backgrounds of the children were 88% Caucasian, 6.6% Hispanic, 1.3% African American, 2% Indian, and 2% Asian. All of the
children who served as participants in this investigation, however, were Caucasian children from middle-class socioeconomic backgrounds. Results of previous research examining the feasibility of task mastery in a reasonable time frame demonstrated fourth grade children as appropriate participants (Meaney, 1994).

**Task**

Juggling was the task for this investigation because many people consider it a novel task, and individuals tend to be highly motivated to learn the skill. Additionally, juggling is not typically considered to be a boys-only or girls-only activity (Meaney, Dornier, & Owens, 2002). Participants juggled nylon scarves during the acquisition and retention phases and beanbags during the transfer phase.

**Conditions**

The investigation employed a 2 (model sex) × 2 (model skill) factorial design, resulting in four groups: male skilled model (MS), female skilled model (FS), male learning model (ML), and female learning model (FL). The participants were randomly assigned to one of four groups (\(n = 10\)). All participants observed videotaped instruction specific to their experimental protocol.

Skillful demonstrations by physical education instructors are often the norm in an elementary school setting. The present investigation enabled all of the participants to observe skillful demonstration by an adult teacher model. In an attempt to simulate real-world physical education instruction and maintain consistency, the adult models provided demonstrations across all four modeling conditions. Manipulation of the skilled and learning model was executed via the child models. Whereas the participants in the MS and FS groups observed the child model acquiring the skill error free, participants in the ML and FL groups observed the child model demonstrate mistakes throughout the learning process.

The same male models (adult and child) were used in both male conditions, and the same female models were used in both female conditions. The adult models were graduate teaching assistants at a major university in West Texas. Both adults were Caucasian and ranged in age between 21-23 years. The child models were both 10 years of age and Caucasian. All of the models were given instruction on juggling 2 weeks before the filming of the instructional tapes. To ensure the models had mastered the juggling task, the models were held to the same criteria as the participants for one-, two-, and three-scarf juggling. These criteria are described in detail in the Procedure section.

The MS treatment group included video presentation of the male adult teacher instructing and demonstrating juggling techniques skillfully with one, two, and three scarves. After the male adult teacher’s instruction and demonstration, the male child model proceeded through the juggling task (one, two, and three scarf) error free. Similar to the MS condition, the FS condition included a female adult teacher instructing and demonstrating skillful juggling techniques with one, two, and three scarves. After the female adult teacher’s demonstration, the female child proceeded through the juggling task (one, two, and three scarf) error free.

The ML model condition included presentation of the male teacher instructing and demonstrating the juggling techniques skillfully with one, two, and three scarves. After the male adult teacher’s instruction and demonstration, however, the male child model proceeded to exhibit scripted mistakes during one-, two-, and
three-scarf juggling. The male adult teacher did not provide corrective feedback, but did provide an additional demonstration of the juggling tasks. The number of teacher demonstrations was held constant across all treatment groups. Finally, the FL condition included a female adult teacher who instructed and demonstrated juggling skillfully. Similar to the child model in the ML group, the female child model proceeded to exhibit the same scripted mistakes during one-, two-, and three-scarf juggling. Once again, the female teacher did not provide corrective feedback, but did provide an additional demonstration. Throughout both the ML and FL conditions, the child models consistently improved their juggling performance. The final juggling demonstration by each child model in the ML and FL groups was error free.

Procedure

Permission to participate was obtained from the University Human Subjects Review Board, the schools, participants’ parents or guardians, as well as the participants themselves. Testing took place during the regularly scheduled physical education class. The children who volunteered to participate were individually tested in a classroom in close proximity to the gymnasium. Upon a potential participant’s entry into the classroom, the investigator explained to the student that the purpose of this activity was to teach them how to juggle. If the potential participant reported prior experience with juggling, the experimenter allowed the child to juggle scarves and beanbags and then escorted the child back to the gymnasium. If the potential participant reported no prior juggling experience, the experimenter proceeded by informing the participant that in order to juggle three scarves successfully, they would first learn one- and two-scarf juggling. Each participant was taught to juggle individually via videotaped instructions specific to their experimental protocol (e.g., MS, FS, ML, and FL).

Acquisition. The acquisition phase of the investigation began with participants viewing a videotape of one-scarf juggling. After viewing the video, participants juggled one scarf. Once one-scarf juggling was mastered, the participant then repeated the process, juggling two and then three scarves. In order to enable the participant to master the movements necessary to juggle three scarves, criteria were established for one- and two-scarf juggling (Meaney, 1994). For one-scarf juggling, participants were expected to perform five continuous lifts and catches of the scarves using alternating hands. After every five unsuccessful attempts, participants received videotaped instructions again. The criterion for two-scarf juggling was five continuous lifts and catches of the scarves using alternating hands. After the participants reached the criterion for two-scarf juggling, they received two demonstrations of three-scarf juggling. The criteria for mastery of three-scarf juggling were nine continuous lifts and catches of the three scarves. After every five unsuccessful attempts at three scarf juggling, the participants observed the videotaped instructions again. This procedure was repeated until the participants juggled three scarves for nine continuous lifts and catches. The dependent variable for acquisition was the number of three-scarf juggling trials to reach criteria.

Retention. The retention phase of the experiment was initiated immediately after successful completion of nine continuous lifts and catches of the three scarves. Subsequent to nine continuous lifts and catches of the scarves, each child participated in a 5-min filled retention interval in which the participant was asked
to complete a word puzzle. The child’s participation in the filled retention interval was intended to draw cognitive focus away from the juggling task and minimize the possibility of the participants developing new strategies not provided by the model. After the 5-min filled retention interval, each child was asked to juggle three scarves as was done during the original acquisition phase of the experiment. Participants did not receive additional visual demonstrations of three-scarf juggling. Retention was measured by counting and averaging the number of lifts and catches across five trials.

Transfer. Following the retention phase, participants took part in transfer testing. Each participant was asked to juggle three beanbags without the aid of any instructions or demonstrations. Participants were told that they had 5 min to practice with the beanbags. At the end of 5 min, each participant was given five attempts to juggle the beanbags. Performance during transfer was measured by averaging the number of beanbags juggled during the final five trials.

Transfer Strategies. Transfer strategies were assessed by totaling the number of observable learning strategies demonstrated during beanbag juggling. The dependent variable for transfer strategies was the number of observable strategies used to learn beanbag juggling (see Table 1). Each of the strategies was demonstrated during the initial modeling acquisition phase. The children’s performances during all phases of the juggling task were videotaped. Videotaping enabled two of the investigators to independently code acquisition, retention, transfer, and transfer-strategy data. Because of the discrete nature of the dependent variables (i.e., lifts and catches of the scarves, observable transfer strategies), there were no discrepancies between the coders.

Qualitative. A structured interview followed the transfer phase of the investigation. Specifically, each participant was asked to respond to the following three questions: (1) Did the instructions given by the model help you learn how to juggle? (2) Do you think you would have learned better if you saw a male (if the participant had observed a female, if the participant had observed a male the wording was reversed) show you how to juggle? and (3) Do you think you learn better by watching someone else learn to juggle or by watching an expert show you? The interview enabled the researcher to further examine the impact of the model’s sex (i.e., male, female) and skill level (i.e., skilled, learning) on the learning process.

Table 1 Checklist for Observable Transfer Strategies

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiates practice with three beanbags</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practices with one beanbag</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practices with two beanbags</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practices with three beanbags</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Places beanbags in specific color order prior to practicing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engages in verbal rehearsal strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The length of the interviews ranged from 15 to 30 min, averaging approximately 20 min per interview. The interviews were audiotaped and transcribed. To enhance trustworthiness of the data, member checks were conducted at the end of each interview. Member checks consisted of the interviewer summarizing the participant’s responses and asking for verification and/or clarification of any of the participant’s responses.

Data Analysis

Acquisition, retention, transfer, and transfer-strategy data were analyzed in separate ANOVAs. Responses to the interview questions were transcribed and coded via content analysis (Patton, 2002). The focus of each of the three questions serves as the overall organization of the children’s responses. Within each question, similar answers were grouped and frequency counts calculated. These subcategories are discussed within each of the major areas of skill, sex, and learning. For example, the participants were asked how the instructions helped them learn to juggle, how they perceived the male or female model, and how they perceived the learning or skilled model. The researchers independently read the responses many times to identify respective subcategories for each question. Subsequent to the independent coding of the subcategories, the researchers collectively identified and discussed the subcategories. Responses were then coded and frequency distributions calculated. After the researchers had individually and collectively reviewed the responses and subcategories again, an external reviewer was asked to perform a confirmability audit. A confirmability audit strengthens the trustworthiness of the data by enabling an external reviewer to classify the respondents’ quotes into the subcategories previously established by the researchers (Erlandsen, Harris, Skipper, & Allen, 1993). Interrater reliability for the external review was .86, which was considered acceptable.

Results

Quantitative Analyses

The data were analyzed using four separate 2 (model sex) \times 2 (model skill level) ANOVAs for acquisition, retention, transfer, and transfer strategies. Means and standard deviations for these four dependent variables are displayed in Table 2. In an attempt to maintain the Type I error at the .05 level, alpha was set at .0125 for each ANOVA (Vincent, 1999). The results of the ANOVAs for acquisition, retention, and transfer did not indicate any significant main effects or interactions, \( p > .0125 \). The results of the ANOVA for transfer strategies revealed significant main effects for model skill level, \( F(1, 39) = 14.57, p = .001 \), and model sex, \( F(1, 39) = 9.08, p = .005 \). Participants who observed the female models transferred significantly more strategies than participants observing the male models. Additionally, participants observing the learning models transferred significantly more strategies than participants observing the skilled model. The interaction was not significant.

Effect sizes were calculated for transfer strategies by subtracting the means of the respective groups and dividing the pooled standard deviation. An effect size of \( \pm 0.40 \) was considered small, an effect size of 0.41–0.70 was considered moderate,
Table 2. Mean Scores and Standard Deviations for Modeling Conditions for Acquisition, Retention, Transfer, and Transfer Strategies

<table>
<thead>
<tr>
<th>Stage</th>
<th>Model skill</th>
<th>Male model</th>
<th>Female model</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>19.4 (4.40)</td>
<td>15.8 (4.80)</td>
<td>17.6 (4.84)</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>18.0 (4.44)</td>
<td>16.2 (3.85)</td>
<td>17.1 (4.15)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18.7 (4.36)</td>
<td>16.00 (4.24)</td>
<td>17.35 (4.46)</td>
<td></td>
</tr>
<tr>
<td>Retention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>7.06 (2.41)</td>
<td>8.67 (4.64)</td>
<td>7.86 (3.69)</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>9.36 (4.08)</td>
<td>10.42 (4.19)</td>
<td>9.89 (4.06)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8.21 (3.47)</td>
<td>9.54 (4.40)</td>
<td>8.87 (3.97)</td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>1.74 (0.33)</td>
<td>1.89 (0.41)</td>
<td>1.81 (0.37)</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>1.70 (0.39)</td>
<td>1.81 (0.40)</td>
<td>1.75 (0.39)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.72 (0.35)</td>
<td>1.85 (0.40)</td>
<td>1.78 (0.38)</td>
<td></td>
</tr>
<tr>
<td>Transfer strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>3.20 (0.63)</td>
<td>4.10 (1.10)</td>
<td>3.65 (0.99)**</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>3.90 (0.74)</td>
<td>4.90 (0.57)</td>
<td>4.40 (0.82)**</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.55 (0.76)**</td>
<td>4.50 (0.95)**</td>
<td>4.02 (0.97)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Lower scores represent better performance.
**Significantly different at \( p < .0125 \).

and an effect size of 0.71 or greater was considered large (Thomas & Nelson, 2001). Effect sizes for learning model as compared with the skilled-model groups was .82; for female-model compared with male-model groups, the effect size was 1.10.

Qualitative Analyses

The categories that resulted from the questions posed were technical instruction, model sex, and model skill level. The qualitative results are reported by categories followed by representative quotes of subcategories.

Technical instruction. Technical instruction refers to the demonstration, order, and pattern of the scarves. When asked to respond to the question, “Did the instructions that were given by the model help you learn how to juggle?” all of the participants, regardless of modeling group, stated that watching the demonstration assisted them with learning to juggle. For example, “um, the instructions were o.k., but I liked better how they showed me how to move my hands and catch it and stuff, because it was easier to learn,” “I watched how the scarves went up,” and “where to throw the scarves and how to catch them.”

Another aspect of technical instruction evidenced across modeling groups was attending to the order of the scarves. Nineteen participants were reported as saying the colors aloud, (i.e., rehearsing aloud pink, yellow, orange). Additionally, 13 participants attended to the order of the scarves by watching the colors. Statements like, “basically it is a color pattern that she gave me and hand motion, but
mainly the color pattern,” “um, it just showed me how to put like the pink scarf in
the right hand and then the yellow and the orange and stuff,” and “the, um, colors
and how they went into the air.” A total of 6 participants also reported attending to
the pattern of the scarves. “They showed me when to throw and when to catch and
how to pattern my hands,” “I watched how they threw them up and down and how
to make an ‘X’ with your hands,” and “how they threw the scarves in a pattern,
cross on way up, claw on way down.”

**Model Sex.** All participants were asked if they remembered whether the
juggling videotape they watched showed boys or girls juggling. Regardless of mod-
eling condition, all 40 participants correctly identified the sex of the observed
models. The participants were then asked, “Do you think you would have learned
better if you saw a boy [if the learner had seen a girl] show you how to juggle?” A
total of 13 participants across modeling groups reported that the sex of the model
would not have made a difference in their learning. The participants implied that
the sex of the model had no impact on their learning with statements like: “No, um
[boys] can teach just as good as girls can,” “Because it doesn’t matter who teaches
you, it’s just basically the same,” “It just wouldn’t matter cause they would teach
you the same steps and stuff,” and “I don’t think it would have made a difference,
cause we are all equal.”

Interestingly, 27 participants across modeling conditions stated that observ-
ing a boy or girl might influence their learning. Five girls in the FL group and three
in the MS group stated that girls are more like themselves. For example: “If they
were girls they might be more like me,” “They [girls] might make the same mis-
takes and stuff and they might do their arms the same,” “I would learn better if I
could see them [girls],” “The girls might do it slower or something,” and “cause
I’m a girl; and if I’m a girl and was trying to do it like the boys, it would have been
more complicated.”

The majority of girls, however, tended to highlight differences between boys
and girls. Representative statements that underscore the participants perceiving a
boy model as different were: “Cause boys aren’t like us when they do things,”
“When boys learn, they learn it different,” “Cause boys learn stuff like math and
football and stuff better, so they are better at stuff like that,” “Well, um, the boys
would teach better, cause they are better at sports and stuff,” “I probably wouldn’t
learn as well cause I would feel I might, you know, should do better,” and “They
[boys] would throw harder and faster and I wouldn’t be able to do it right.”

**Model skill level.** Influence of the model’s skill level on learning was ex-
amined via the following question: “Do you think you learn better by watching
someone else learn to juggle or by watching an expert show you?” Five partici-
pants in the FS condition reported that they didn’t believe that watching a learning
model would have made a difference in their performance. Example statements
include, “Well, um, I know everybody makes mistakes, so I probably wouldn’t get
frustrated,” and “cause I knew I would make some mistakes.” On the other hand,
seven participants in the FL condition stated that watching a learning model might
have helped them learn how to juggle. “Yeah, but when he made mistakes it helped
me know what not to do,” “If I had seen no mistakes, then I probably wouldn’t see
what not to do,” “Maybe [had I not watched her making mistakes] I would have
felt not too good when I messed up,” “I would have [if I had not seen her make
mistakes] felt kind of dumb if I didn’t learn as well,” and “When she threw the
scarves up too high, I knew not to do that.”
The purpose of this investigation was to examine the effect of model similarity on girls’ acquisition, retention, and transfer of a novel motor task. Model similarity effects were manipulated through model sex and model skill level. We hypothesized that girls observing a learning model (regardless of model sex) would demonstrate superior performance throughout all phases of the investigation. Because girls observing learning and female models demonstrated more transfer strategies than girls viewing skilled or male models, this hypothesis was partially supported.

From a theoretical standpoint, effects of model similarity are thought to heighten the observer’s attention during the response-acquisition phase of the modeling process (Bandura, 1977, 1986). According to social cognitive theory, the learner identifies with specific model characteristics that instill a link or bond to the model. For the female children in this investigation, the link or bond was formed by observing either a female or a learning model. Social cognitive theory (Bandura, 1986) proposes that observers actively engage in the modeling process. Perhaps observing a girl or a learning model instilled thought processes that promoted active engagement. Lee and Solmon (1992) suggest that student cognitions are important variables that influence individual achievement and performance in physical education. Additionally, these researchers underscore the importance of examining and understanding students’ cognitions related to instruction.

The responses many of the participants reported in regard to both gender and skill level of the model suggest that the girls were attending to the demonstration and involved in the modeling process. Even though the juggling task was selected based on previous research that identified juggling as a gender-neutral task (Meaney et al., 2002), many of the girls reported identifying with the female model. In fact, many of the participants not only perceived girls as more similar to themselves but also perceived boys as vastly different when learning a new motor task. According to social cognitive theory (Bandura, 1986), this strong identification with the model would indicate that the girls incorporated the sex of the model into the cognitive representation obtained through the observation of the model. The strong transfer-strategies effect size for a female model compared with a male model coupled with the subcategories that emerged from the girl’s responses suggest that observing a female model might have heightened attention to the initial demonstration and, ultimately, resulted in the promotion of transfer strategies.

In addition to observing a female model, girls’ motor-skill learning also benefited from observing a learning model. Previous research suggests that viewing a learning model enables the observer to engage in problem-solving processes and that, in turn, increases cognitive effort throughout the modeling process (Adams, 1986; Hebert & Landin, 1994; Martens et al., 1976; McCullagh & Caird, 1990; McCullagh & Meyer, 1997). The gains in cognitive effort consequently aid the observer in reproducing and learning the observed task. The strong transfer-strategies effect size for a learning model compared with a skilled model coupled with the participants’ responses suggest that observing a learning model was advantageous to girls’ motor-skill learning. The statement “when she threw the scarf too high, I knew what not to do,” and “when he made mistakes, it helped me know what not to do,” implies that viewing a peer making a mistake facilitated the cognitive representation of the juggling task. Early in learning,
knowing what *not* to do might be information more meaningful for novices than knowing what *to* do.

If, as Solmon (1997) stated, girls perceive physical education as an activity for boys, then the possibility exists that using female and learning models might help alter girls’ perceptions. Statements such as “The boys would learn more fast” and “boys are usually better at stuff like that” highlight the perceived disparity between girls’ perceptions of their own competence as compared with their perceptions of boys’. Additionally, using a female model might minimize potential gender-role stereotyping effects girls might have towards their abilities (Solmon et al., 2003).

Perceived similarity between the learning model and the participants might also aid in influencing girls’ perceptions of physical education. The statement, “I think it would have helped [watching a female learning model] because then you don’t feel stupid when you drop the scarves,” suggests that using a learning model might minimize potential negative affective responses resulting from unsuccessful performance. Feeling stupid or not feeling stupid might influence one’s self-efficacy regarding successful or unsuccessful completion of the task. Self-efficacy is a key tenet of Bandura’s social cognitive theory (Bandura, 1986). A limitation of this investigation was the lack of self-efficacy assessment. The responses to the interview questions regarding skill level of the model, however, suggest that observing a learning model curtailed feelings of negative self-efficacy. Future research examining the impact of model similarity on children’s self-efficacy would be beneficial to researchers and practitioners.

Taken collectively, the qualitative and quantitative results of this investigation support previous research that suggests learning models might enhance motor-skill learning (Herbert & Landin, 1994; Lee & White, 1990; Martens, et al., 1976; McCullagh, 1987; McCullagh & Caird, 1990; McCullagh & Meyer, 1997; Pollock & Lee, 1992; Weir & Leavitt, 1990) by influencing the cognitive representation formed during observational learning (Bandura, 1986). Moreover, the findings support the idea that, for children, model sex is a salient characteristic that influences model similarity perceptions. The importance of including the assessment of transfer strategies (NASPE, 2004) is particularly relevant considering this investigation examined the effect of model similarity on children. According to Singer and Chen (1994), there is a difference between acquiring some knowledge and skills and producing these in testing situations. In an ideal situation, performance scores would match proficiency, but performance might not be a reflection of the learning state. Additionally, according to French and McPherson (1999), children’s cognitive functioning (i.e., knowledge and decision making) might develop faster than motor skills.

In summary, this research design provided an interesting initial examination of using observational learning as a means for the transfer of strategies in learning motor tasks. It is unclear, however, whether the children’s use of strategies would change with subsequent changes in their skill levels. Under these circumstances with this population, we found that girls’ motor learning benefited from using demonstrations that included female and learning models. Therefore, physical education teachers should consider diversifying visual demonstrations to include both male and female models who are skilled and learning skills throughout physical education instruction. Future research examining modeling effects on motor learning should explore variations in skill level and sex of both models and students.
References


