Objective. This descriptive study explores motivation of toddlers who are typically developing to persist with challenging occupations.

Method. The persistence of 33 children, 12 to 19 months of age (M = 15.7 months), in functional play and self-feeding with a utensil was examined through videotape analysis of on-task behaviors.

Results. A modest correlation was demonstrated between the percentages of on-task time in the two conditions (r = .44, p < .01). Although chronological age was not associated with persistence, participants' age-equivalent fine motor scores were correlated with persistence with challenging toys (r = .39, p < .03) but not with self-feeding with a utensil. Having an older sibling was associated with longer periods of functional play, t(32) = 3.02, p < .005, but the amount the parent urged the child to eat with a utensil was not associated with persistence in self-feeding.

Conclusion. The modest association between on-task time for functional play and self-feeding with a utensil reveals that factors other than urge to meet perceptual motor challenges lead to children's persistence. The results reinforce the importance of considering not only challenging activities, but also the experienced meaning that elicits optimal effort and, thus, learning.

In addition to the family-created social context, the interaction of the subsystems in the toddlers' development, such as cognition and motor skills, influence emerging skills. Therefore, the framework we used to investigate development of occupations is a blend of DST and the ecological view of development.

Within the sensorimotor learning process, satisfactory occupational performance is achieved by resolving issues of what needs to be done and how (Gentile, 1998). Thus, as the people or events in the environment present novel food textures, toys, or playmates, the young child must reorganize and adapt his or her behavior while repeatedly responding to how. Therefore, a critical issue in understanding skill development is to further appreciate the child's motivation to make repeated attempts, or persist, in a challenging task.

**Literature Review**

Mastery motivation has been defined as "a psychological force that stimulates an individual to attempt independently, in a focused and persistent manner, to solve a problem or master a skill or task which is at least moderately challenging" (Morgan, Harmon, & Maslin-Cole, 1990, p. 319). Persistence is typically measured as "the percentage of time in which the child was engaged in task-directed behaviors" (Yarrow, Morgan, Jennings, Harmon, & Gaiter, 1982, p. 134). In addition, moderately challenging tasks have been proposed as ideal situations in which to elicit mastery motivation (Redding, Morgan, & Harmon, 1988). A moderately challenging task for young children without disabilities is one in which part but not all of the task is solved within 2 minutes (MacTurk, Morgan, & Jennings, 1995).

The concept of mastery motivation, rooted in psychology, includes the general domains of social, object, and gross motor mastery and posits that persistence results from the child's inner drive to be competent (Wachs & Combs, 1995). This perspective suggests that the urge for competence originates from the need to challenge some inner-body systems. For example, a child's goal may be to conquer dexterity challenges, and two occupations with similar fine motor challenges might tap the same intrinsic urge.

In studying occupations, however, the meaning of an activity as experienced by the person is important in understanding his or her motivation for doing the activity (Christiansen, 1994; Clark, Wood, & Larson, 1998). For toddlers, interacting with others, particularly family members, shapes what young children experience as important (Bronfenbrenner, 1979; Vygotsky, 1978). Occupational meaning and purpose must be inferred, as the developmental status of the toddler's subsystems and unique experiences with family members determine the internal perspective. If occupational meaning for the child goes beyond developing competence in intrinsic abilities, such as dexterity, two occupations that share commonly observed characteristics could emerge from uniquely different motivations.

Occupational therapy has applied to intervention the perspective of developmental psychology's grand theories (Coster, 1995). Consistent with a Piagetian framework, some researchers suggest that specific fine motor abilities and means–end understanding are prerequisites for performance of complex play and self-care tasks (Case-Smith, 1995; Exner, 1996; Henderson, 1995). Guided by the presumed link of fine motor skills and occupational performance, Case-Smith (1996) conducted a descriptive, correlational study of weekly intervention for 26 preschool-aged children (mean age = 4.7 years) with mild to moderate fine motor delays. At the beginning and end of the school year, she measured the accuracy and speed of the preschooler's in-hand manipulation, tool use, eye–hand coordination, and grasping strength. Case-Smith used the Pediatric Evaluation of Disability Inventory (PEDI; Haley, Coster, Ludlow, Haltiwanger, & Andrelos, 1992) to measure functional performance in self-care, mobility, and social function. Her findings suggested a moderate association at the end of the year between increased dexterity in tool use and motor accuracy and self-care abilities ($r = .44–.61$). She proposed that opportunities to practice fine motor skills in therapy and the classroom generalized to better performance of self-care activities at home.

An alternative explanation for Case-Smith's (1996) findings is that supportive experiences with challenging therapeutic activities and success in these activities positively affected an underlying inclination to work harder at a variety of difficult activities. The result would be that both effort on testing activities and self-help skills would increase as the child perceives himself or herself as more competent and tries harder in general. Another alternative explanation is that the children showing the greatest change in both areas experienced a developmental transition in their awareness of the cultural criteria related to occupational performance and organized their behavior to meet newly perceived expectations for performance in both testing conditions and self-care. In either case, change relates to the experience of mastering occupations rather than the inner drive to master fine motor abilities.

Functional object play replaces mouthing and simple visually guided manipulation in the second half of the first year of life (Belsky & Most, 1981; Bornstein, Haynes, Pascual, Painter, & Galperin, 1999). Barrett and Morgan (1995) proposed that this transition to functional play reflects children's increasing awareness of what objects can do and that goal-oriented behavior is a prerequisite for mastery motivation. An example of functional object play is intentionally sliding a door on a busy box. Functional–relational play follows as the child brings together two objects in a manner consistent with a toy's purpose, for example, putting pegs in a pegboard (Belsky & Most, 1981). By selecting toys and engaging children in functional play in a certain manner, parents instill meaning to play and influence what is perceived as successful per-
formance (Uzgiris & Raeff, 1995). Compared with other cultures that may put greater stress on social play, North American parents especially encourage functional play (Bornstein et al., 1999), which likely increases the meaningfulness of this form of play.

Learning to use utensils for self-feeding reflects a child's response to culturally determined expectations of performance in self-care (Henderson, 1995). Although Gesell and Ilg (1943) described the emergent and changing behaviors of self-feeding decades ago, little attention has been paid to how children come to acquire skilled abilities to use utensils. Connolly and Dalglish (1989) initially purported that the acquisition of spoonfeeding abilities, as influenced by the neuromaturational process, occurs in a fairly universal developmental sequence for children who are typically developing. In a second study on the emergence of tool-using skills, Connolly and Dalglish (1993) concluded that there are distinct individual differences consistent with a more dynamic system perspective of learning tool use.

The ecological view of development recognizes the social context, specifically experiences in the family, as a source of individual differences in young children (Bronfenbrenner, 1979). This influence is not accidental; rather, parents actively create an ecocultural niche based on interconnected values, expectations, and meanings (Gallimore, Weisner, Kaufman, & Bernheimer, 1989). Two strategies are used to capture variations in parenting. Direct observations of adults' behaviors can reveal how parents support toddlers' activities and communicate meaning (Drucker, Hammer, Agras, & Bryson, 1999; Rogoff, Mosier, Mistry, & Goncu, 1993). Alternatively, parental value systems are affected by ethnic background and educational levels that offer an indirect measure of the ecocultural niche parents create (Humphry & Thigpen-Beck, 1997). In addition to parenting practices, siblings can play an important role in young children's experiences (Lamb, 1988; Tei, Bond, & Gibbs, 1988). Therefore, describing parents' background and family structure reflect the social contexts of toddlers.

This study assumes that the meaning that parents and children ascribe to the performance of occupations in addition to an inherent drive to overcome a perceptual motor challenge contribute to the child's persistence. The issue of motivation is made relevant because persistence toward a goal ensures practice and potentially affects the child's emerging quality of performance in play and self-care. Therefore, the goal of this study was to expand our understanding of how two different occupations are associated with the persistence demonstrated by toddlers who are typically developing. We used a descriptive, correlational design to capture the relationships among several variables that cannot be manipulated experimentally (Isaac & Michael, 1995). The questions specifically addressed in this study are as follows:

- Is there a correlation between persistence in object manipulation during functional play and in self-feeding with a utensil among toddlers?
- What is the size of the association between the standardized measure of fine motor skills and persistence in functional play and self-feeding with a utensil?
- What is the association between measures of social contexts and the toddler's persistence with challenging occupations?

Method

Participants

Thirty-five children who were typically developing participated in this study. Videotapes from 2 children could not be scored due to lack of cooperation with the methodology. Of the 33 remaining toddlers, 18 (55%) were boys. The average age of the children was 15.7 months (SD = 2.0, range = 12–19 months).

Most of the children (88%) came from two-parent families, and 13 (41%) had older siblings. The average age of the participants’ mothers was 33 years (SD = 4.9), and the fathers’ average age was 35.8 years (SD = 5.8). The participants’ parents were generally well educated. Mothers completed an average of 17.36 years (SD = 1.71) of school, and the fathers completed an average of 17.51 years (SD = 2.56) of school.

Toddlers and their families were recruited from the community. Parents were informed of the study through announcements placed in the newspaper; fliers at play groups, day-care centers and housing areas; and word of mouth. When a family indicated interest in the study, a screening call was made to ensure the child’s fit with the participation criteria, which were the following: (a) chronological age between 12 and 19 months, (b) no known developmental delay, (c) parental report of some experience with utensils but not proficiency, and (d) at least one English-speaking parent. The age range was selected as a period of emerging spoon use based on norms from the PEDI (Haley et al., 1992).

Data Collection

Three data collection procedures were used: The child was administered the fine motor portion of the Peabody Developmental Motor Scales (PDMS; Folio & Fewell, 1983); a videotape was made of the child during functional play; and another videotape was made of the self-feeding session. Two of the researchers with at least 4 years experience with pediatric standardized assessments administered the PDMS. Initially, they co-scored four PDMS evaluations and compared age equivalence scores, which were the same in all conditions. It was believed that this level of agreement reflected sufficient interrater reliability of the PDMS.

The four researchers formed two separate coding teams of two persons each for viewing the videotapes of func-
tional play and self-feeding with a utensil. Thus, each team was blind to the toddlers' percentage of time spent persisting in a moderate challenge in the other mastery situation. For data coding, the coding team watched a videotaped session and identified the moderately challenging situations. Each coder then individually timed with a stopwatch and documented the total amount of time the child was presented with moderate challenges as well as the amount of time the child was on task during the moderate challenges. The coders discussed their total and on-task times and negotiated concordance. If a greater than 5-sec discrepancy existed on a videotape, observation and timing were repeated until agreement was reached.

For the functional play session, functional and functional–relational play were considered on-task behaviors. Off-task behavior consisted of engaging in any of the following behaviors for more than 5 sec: visual inspection; mouthing, banging, patting, or shaking the toy; or looking away. In the play session, unanticipated interruptions did not occur. In the self-feeding session, children were considered to be off-task if they engaged in any of the following behaviors for more than 5 sec: finger feeding, banging or setting down the utensil, playing with the food, or looking away. Unlike the uninterrupted play sessions, distractions occurred during the self-feeding sessions (e.g., father walked into the room). In these situations, the time during the distraction was not coded as part of the overall session.

At the end of observing the self-feeding videotape, the coders rated the parent's behavior on a scale of 1 to 5 regarding how much prompting the toddler was given to use the utensil (i.e., 1 = none or only a few prompts to use the utensil, 3 = 5–7 prompts, 5 = > 10 prompts). The ratings for amount of prompting were coded independently, and differences were negotiated between coders.

Procedure

A home visit was scheduled for a time when the parent anticipated the child would become hungry. At the beginning of the home visit, an interview with the parents was completed to obtain informed consent, demographic information, and details about the child's typical meal-times. When possible, the PDMS was completed before the feeding session. At times, the feeding session was videotaped first if the parent believed that the child was hungry. For the functional play session, toys were selected by the researcher to present varying levels of fine motor challenge. Many of the toys included a cause-and-effect element (e.g., popup figures busy box, shape sorter with sound). Three levels of difficulty were selected to represent a 12-month to 13-month level of challenge, a 14-month to 16-month level of challenge, or a 17-month to 19-month level of challenge. For example, round shapes for the one-hole shape sorter represented the lowest level, whereas the four-shape sorter represented the highest level.

Parents were asked to identify one parent to sit on the floor near the child during the play session, and siblings were asked not to participate with or distract the participant. Frequently, parents selected times when someone else would be available to watch older children; otherwise, the second researcher would engage the sibling somewhere else in the room. Parents were asked to minimize interactions with their child during videotaping. A warm-up period with toys not used in the study allowed the child to become comfortable with the researcher who presented the child with the toys. Videotaping began as the child was presented with a toy the parent reported as novel and at the level of difficulty thought to be moderately challenging on the basis of the age equivalence score from the PDMS. However, if the child was able to complete the entire task within 2 min, he or she was considered competent, and an alternative toy was introduced. The opportunity to play with a toy was terminated if the child demonstrated competence, refused the toy, or was off task for more than 20 sec. Although times varied, effort was made to videotape 10 min of play with moderately challenging toys.

For the feeding session, the child was seated in his or her usual mealtime location and used the utensil reported to be typical for his or her meals. The food consistency selection was based on earlier parental interview. The children were thought to experience a moderate challenge if they spilled food from the utensil in the first two bites. To ensure a moderate challenge, the food consistency or utensils were altered if the child was initially proficient. The range of food consistencies used to ensure a challenge included pudding or yogurt at the easy level, applesauce at the moderate level, and small cooked vegetables or cereal in milk at the difficult level. Some older toddlers demonstrated remarkable proficiency with a spoon, so novel utensils, such as an adult-sized teaspoon, mother-care spoon, or fork, were introduced to create a challenging self-feeding condition. Although the criteria for a challenging feeding condition was the same across participants, parental preferences and input were considered in making any modifications; therefore, standardizing food among the children was not possible. During videotaping, the parent was asked to hand the toddler the utensil and give one verbal cue as each new food was presented or when the child dropped the utensil or began to finger feed, but to avoid other feedback. The length of videotape for the self-feeding sessions varied on the basis of the toddler's appetite and amount of food consumed, although effort was made to videotape 10 min of moderate challenge.

Data Analysis

Data were analyzed using the SAS statistical solution (SAS Institute, 1999). Pearson product-moment correlations were used to investigate the relationships between persistence in the two observational situations and to address the
questions related to possible factors affecting how long children continued with moderately challenging activities. A t test was used to compare persistence between children grouped according to sibling status. The correlations between gender and chronological age and the children's persistence did not reveal significant associations.

Results

Because each child varied slightly in the length of time in the functional play and self-feeding situations, a means of finding a comparable unit of measure was important. Persistence in each occupation was calculated as the percentage of time the child was on task while presented with moderate challenges. The sample of functional play ranged from 5 min to 10 min of moderately challenging tasks. Average persistence was 84% (SD = 11) of the time. The range of time children were presented with moderately challenging self-feeding tasks was 1 min to 10 min. On average, they persisted in feeding themselves with a utensil 50% (SD = 22) of the time.

The relationship between persistence in functional play with a challenging toy and persistence in self-feeding with a utensil was examined first. A modest, but significant correlation was found between the observed percentage of on-task time across the two occupations (r = .44, p < .01). This finding suggests an underlying variable affecting persistence in both activities to a modest degree.

The association between maturity of fine motor abilities and persistence was explored, using the age equivalence scores from the PDMS fine motor scale. Although no significant association was found between chronological age and persistence in either condition, the PDMS age equivalence score was significantly associated with the percentage of on-task time during moderately challenging functional play (r = .39, p < .03). No significant association was found between the PDMS fine motor score and persistence in self-feeding with a utensil (r = .15, p < .40).

Finally, the relationship between the two measures of persistence and features of social contexts, as defined by demographic characteristics of parents, presence of older siblings, and frequency of verbal prompts to use the utensil, were explored. No association was found between the age or educational background of either parent and the child's persistence in either activity. In comparing participants with siblings to those without siblings, a significant difference was found in percentage of time persisting in functional play and having or not having an older sibling, r(32) = 3.02, p = .005. On average, toddlers with older siblings persisted 90% of the time when confronted with moderately challenging functional play compared with toddlers without siblings, who persisted 79% of the time. No significant difference was found in persistence in self-feeding with a utensil when comparing toddlers with or without a sibling.

Immediate social context was examined by using the rating of how often the parent urged the child to use the utensil. No significant association was found between how often the parent encouraged utensil use and actual percentage of time using the utensil to self-feed (r = -.28, p < .15).

Discussion

The results of this initial descriptive study of typically developing toddlers' persistence in two challenging occupations, if supported in future research with larger samples of children with or without disabilities, suggest implications for occupational therapy practice. Therefore, after a discussion of these results, potential application to therapy will be covered.

The first purpose of this study was to examine the association between persistence in object manipulation during two challenging situations—functional object play and use of a utensil for self-feeding. The findings revealed a moderate, positive correlation between percentage of time persisting in functional play and self-feeding with a utensil. The activities were selected because they shared similar object manipulation characteristics. Thus, an explanation for the finding of a significant correlation is that regardless of the differences in the activities, motivation to master fine motor challenges in any task may organize children's behavior. This explanation is consistent with literature suggesting that mastery motivation is organized in general domains, such as object manipulation (Wachs & Combs, 1995). However, because the size of the correlation was modest, other sources may contribute to persistence. We propose that occupational meaning may contribute to persistence in occupations because, assumably, toddlers would not demonstrate focused effort and remain on task if an activity has no meaning for them.

The next question was whether the level of maturity of a child's fine motor abilities related to persistence. Redding et al. (1988) found that children tend to persist longer with moderate rather than very difficult tasks. In the current study, each activity was tailored to provide a moderate challenge. Therefore, the status of fine motor skills should not have been a factor in the children's persistence. No association between maturation of fine motor skills and how long the toddlers tried to use utensils in self-feeding was found, but a positive correlation between the PDMS age equivalence scores and persistence during functional play was found. Direction or cause of the association cannot be determined in correlational analyses. It may be that despite efforts to match toys with emerging abilities, the protocol was not completely successful, and children with more fine motor abilities worked harder to master the toys. Alternatively, because none of the PDMS fine motor items for this age group are timed, the individual differences in these toddlers' persistence in object manipulation was captured in the fine motor scores. That is, children inclined to work longer with objects in general were more likely to eventually answer the how question of motor learning.

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creates and modifies activities according to the sensorimotor learning, then one-on-one sessions in which the therapist enhances fine motor ability focus on how to provide the just-right challenge in such areas as in-hand manipulation, tactual and intervention at the fine motor level when children experience delays in daily life activities. Interventions designed to address persistence to meet social criteria for performance emerges around 2 years of age. Thus, the lack of association between verbal encouragement and persistence in the current study may be explained by the participants' ages (< 2 years). Toddlers seemed to be motivated by the desire to use utensils to eat like others rather than to please their parents.

Implications for Occupational Therapy Practice

Findings from this study raise questions about a traditional assumption that enhancement of underlying capacities, such as fine motor abilities, leads to improved occupational performance. This linear assumption leads to evaluation and intervention at the fine motor level when children experience delays in daily life activities. Interventions designed to enhance fine motor ability focus on how to provide the just-right challenge in such areas as in-hand manipulation, tactual processing, or grip. If challenges to a toddler's hand skills are the major factors organizing persistence and enhancing learning, then one-on-one sessions in which the therapist creates and modifies activities according to the sensorimotor challenge may be most effective. However, the current study suggests only modest overlap in the amount of organized effort in two occupations requiring manipulation of objects. Therefore, it appears that what captures interest and relates to persistence is more than challenging hand skills. More recently, therapists have been encouraged to move away from contrived activities as therapeutic means and provide interventions where meaningful occupations in natural context serve as both means and ends (Fisher, 1998; Gray, 1998). In occupational therapy practice, enhanced meaning of the occupation (e.g., realizing other children do the activity) may increase the likelihood that the child will try something challenging and persist to gain greater proficiency. Most specifically, the finding that older siblings are associated with the child's level of persistence in functional play supports the use of siblings or peers as ways to enrich meaning and, thus, effort.

The association between PDMS age equivalence scores and persistence in functional play warrants further consideration. Until further study is completed, therapists may want to consider when using this assessment that in addition to fine motor abilities, test scores may also capture individual differences in intrinsic desire to master manipulation of objects.

Limitations

Several limitations make these findings tentative. First, research procedures create artificial conditions for the children by having strangers (researchers) in their home and asking parents to limit social interactions. Furthermore, this is the first study to address persistence in self-feeding, so credibility of actually capturing mastery motivation is not as well established as with functional play, and other factors such as hunger could organize efforts or distract from the child's utensil use for self-feeding.

Collecting even more information on the toddlers' social contexts is recommended for future studies. For example, the ages of siblings would be useful in determining whether the association between siblings and persistence in functional play differed for various ages. In addition, knowing which toddlers are in day-care would be useful in looking further at any associations between young children's experiences around age-mates and persistence in functional play or self-feeding. Because occupational meaning is constructed in a social context, socioeconomic status and ethnicity of parents in a more heterogeneous group need further investigation to determine their associations with toddlers' persistence.

Differences existed between toddlers in test situations. In some situations, the child was already familiar with some of the research toys, and consequently, those toys were not used with that particular child. In addition, parents' or toddlers' preferences for food meant that complete standardization of procedures was impossible.

Another limitation is that the same researchers con-
ducted the PDMS evaluations, observed the play and self-
feeding sessions, and served on the videotape coding teams. 
Although the PDMS scoring and the videotape coding typ-
ically took place weeks apart, bias could have been intro-
duced. In addition, the videotapes were coded only once, 
so consistency in application of criteria for observations 
was not checked.

Finally, many methods of statistical analysis are linear 
and limited in their ability to investigate the interrela-
relationships in a dynamic system. Sample size limited the use 
of multivariate analyses. The correlational method of analysis, 
however, was beneficial for this initial exploration into the 
degree to which mastery motivation is present in two occup-
ations requiring object manipulation.

Conclusion

Data from this study revealed a significant, but moderate 
correlation between percentage of time toddlers persist in 
functional play and self-feeding with a utensil. This finding 
of a modest correlation suggests that what organizes young 
children’s efforts can only partially be explained by an intrin-
sic drive to master manipulation challenges. We believe that 
the individually experienced meaning of these occupations 
emerges from social context and that many dynamic factors 
determine a child’s persistence. Our findings suggest a special 
role for siblings to serve as models and enrich meaning of 
some activities, contributing to the toddlers’ organized 
efforts in challenging occupations, especially during func-
tional play. If consistent with future work, the results provide 
evidence that occupational therapists may be most effective 
in supporting sensorimotor learning by using actual, not 
contrived, occupations within a peer-rich environment as the 

Additionally, adults should not expect that “verbally instruct-
ing” the toddler to do an activity in a certain way will lead to 
persistent effort that refines skill. Rather than coaching the 
child in an activity, finding ways to enhance meaning may 
lead to greater persistence and greater learning. ▲

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