We examined caregiver awareness of the American Academy of Pediatrics’ prone play recommendation, determined the primary sources of the recommendation, and examined why some infants are not provided “tummy time.” Of caregivers, 25% were not aware of prone play recommendations, and one-fourth of that group was not aware of potential complications from limited tummy time. The primary sources of prone play information and potential complications were printed materials, then pediatricians. Of infants, 53% received ≤30 min; 35% were intolerant of the prone position. This study indicates that many caregivers are not aware of tummy time and complications that can occur if it is not provided. Health care professionals, including therapists, must educate parents on the importance of prone play and provide information on how to increase infant tolerance for prone play time.


In 1992, the American Academy of Pediatrics (AAP) recommended that all infants be placed to sleep in the supine or lateral position to reduce the risk of sudden infant death syndrome (SIDS; AAP, 1992). Since then, the AAP has provided additions and alterations to its initial recommendations. For example, in 1996, the AAP announced that caregivers should provide infants time on their stomachs during waking hours to provide opportunities to facilitate motor milestone development and to prevent flat spots from developing on infants’ heads. In November 2005, the AAP officially changed one of its recommendations, excluding the side position as acceptable for reducing the risk of SIDS because infants are unstable sleeping in the lateral position and have the potential to roll over onto their stomachs (AAP, 2005).

Since the initial AAP recommendations, supine sleeping has reportedly increased (Gibson, Cullen, Spinner, Rankin, & Spitzer, 1995; Pollack & Frohna, 2002), and since the AAP made the original sleep position recommendation, the incidence of SIDS has decreased 50% (AAP, 2005). However, research has suggested that although many parents are informed of the supine sleep recommendations, many are not informed about the importance of “tummy time” or the complications that can occur if tummy time is not provided (Mildred, Beard, Dallwitz, & Unwin, 1995).

According to the Peabody Developmental Motor Scales–2nd Edition (PDMS–2; Folio & Fewell, 2000), healthy infants begin to roll from the supine to the prone position between ages 3 mo and 5 mo, use their arms to move forward from ages 6 to 8 mo, and creep on hands and knees between ages 9 and 11 mo. Many factors affect the acquisition of these prone milestones, including cultural practices, parental expectations, infant temperament, and prone positioning (Abbott & Bartlett, 1999; Cintas, 1995, Mildred et al., 1995; Thomas & Chess, 1977).

Why is the prone position so important? As early as 1960, a U.S. researcher observed that infants were more advanced in their early motor development if they slept in the prone position but were less well developed if they slept in the supine position (Holt, 1960). This observation has been confirmed with recent research. Majnemer and Barr (2006) compared the motor skills of prone and supine sleepers and determined that at age 6 mo, prone sleepers demonstrated significantly higher...
motor scores than supine sleepers, whereas 22% of supine sleepers exhibited gross motor delays. These differences had diminished by the time the infants reached age 15 mo. Prone play time also affects motor skill development (Kuo, Liao, Chen, Hsieh, & Hwang, 2008), and research has revealed that infants who sleep in the prone position typically do not spend as much time in the prone position for play during their waking hours (Davis, Moon, Sachs, & Ortolini, 1998; Dudek-Shriber & Zelazny, 2007).

This research demonstrates that many caregivers avoid placing their infants on their stomachs for play because they are misinformed, believing that prone play time puts their infant at an increased risk for SIDS (Davis et al., 1998; Mildred et al., 1995). Of parents in a study conducted by Davis et al. (1998), 26% reported that they never placed their infants on their stomachs for playtime because of a fear of SIDS. Additional research has indicated that many parents are aware of the tummy time recommendation yet do not choose to position their infants prone for play because of the infant’s resistance to the position (Dudek-Shriber & Zelazny, 2007; Jennings, Sarbaugh, & Payne, 2005).

Since the inception of the prone sleep recommendations, pediatricians and physical and occupational therapists have reported an increase in gross motor delays among babies ages ≤12 mo (Jantz, Blosser, & Fruechting, 1991; Monson, Deitz, & Kartin, 2003; Salls, Silverman, & Garty, 2002). A recent national survey of 400 pediatric occupational and physical therapists revealed that two-thirds of the therapists surveyed reported an increase in infant motor delays in the past 6 yr (Pathways Awareness, 2009).

Additional research has indicated that lack of tummy time is affecting infants’ motor development. For example, infants who sleep supine yet are exposed to prone play time score higher on motor milestone achievement scales than do infants who sleep supine and are not placed prone while awake (Dudek-Shriber & Zelazny, 2007; Jennings et al., 2005; Kuo et al., 2008; Monson et al., 2003). A study by Jennings et al. (2005) revealed that at ages 6 mo and 18 mo, the average PDMS–2 locomotion scores of babies consistently positioned prone were significantly higher than those of infants who were not regularly positioned prone. Kuo et al. (2008) determined that the duration of time that an infant spends prone to play significantly affected the acquisition of the following motor milestones: rolling, crawling on abdomen, crawling on all fours, and sitting up. Monson et al. (2003) reported that gross motor performance scores were more advanced in infants who slept supine and had been positioned prone when awake than in infants who slept supine with no exposure to prone play time.

Exactly what is it about tummy time that affects motor development? Infants who are positioned prone use muscles that are necessary for head control, pulling up, reaching, crawling, and other developmental milestones. Tummy time provides the infant opportunities to strengthen the muscles that are necessary for these milestones, such as arm, shoulder girdle, and neck muscles (AAP, 2000; Bertenthal & Van Hofsten, 1998; Freedland & Bertenthal, 1994; Goldfield, 1989; Ratcliff-Schaub et al., 2001). In fact, Dudek-Shriber and Zelazny (2007) concluded that infants who are provided tummy time for ≥80 min daily achieved greater success in acquiring many prone and supine motor milestones than did infants who were exposed to less prone play time.

Besides the possibility of affecting milestone development, a limited amount of tummy time for play has been correlated with infants being diagnosed with flat spots on their heads (Hutchison, Thompson, & Mitchell, 2003; Johns, Jane, & Lin, 2000; Kane, Mitchell, Craven, & Marsh, 1996; Littlefield, Reiff, & Rekate, 2001; Persing, James, Swanson, & Kattwinkel, 2003). Referrals for treatment of cranial asymmetry during the 2-yr period after the AAP’s recommendations increased sixfold compared with the previous 13 yr (Kane et al., 1996). Because of the increased occurrence of cranial asymmetry in the years after the supine sleep recommendation, the AAP released a report (Persing et al., 2003) specifying guidelines regarding the prevention of cranial asymmetry related to positioning issues; it suggested that caregivers alternates the head position of an infant sleeping in the supine position and, once again, recommended tummy time.

Although the AAP has emphasized the importance of tummy time, minimal research has examined caregivers’ awareness of the tummy time recommendations (Davis et al., 1998; Mildred et al., 1995), and no research has been performed related to awareness of the subsequent complications, such as positional plagiocephaly and a decrease in gross motor skills, that can occur if prone play time is not provided. Information is also limited regarding the amount of time that caregivers are placing their infants prone to play. Mildred et al. (1995) included a question regarding how often tummy time was provided to infants, but the answer was limited to a response of always, sometimes, or never. Jennings et al. (2005) included survey responses of seldom, sometimes, frequently, and routinely regarding time spent in the prone position. A more recent study included the amount of prone play time measured in 1-hr increments (Dudek-Shriber & Zelazny, 2007). Our study provided the option to choose from the following increments regarding time spent in the prone position during waking hours: ≤15 min, 16–30 min, 31–60 min, 1–2 hr, or ≥2 hr.

The current study focused on five questions:

1. Are caregivers in the sampled region who are aware of the AAP supine sleep recommendations being educated regarding the importance of prone play time?
2. Are caregivers who are aware of prone play recommendations aware of the complications that might occur as a result of not providing supervised tummy time?
3. For those caregivers aware of prone play and possible complications, what was the source of information for each?
4. What amount of tummy time is provided to the infants in the sampled region?
5. How much tummy time is provided to infants who do not tolerate the prone position?

Method

The study took place from November 2005 through July 2006 at four pediatric clinics in southwest Tennessee: an urban...
private pediatric office serving predominantly European-American (EA) children from middle- and upper-income households, an urban private pediatric practice serving predominantly African-American (AA) children from middle- and low-income households, and two rural private pediatric clinics serving EA and AA children from middle- and lower-income households. None of the practices reported having a formal educational protocol regarding tummy time recommendations, leaving education regarding the recommendations to the individual discretion of the clinic physicians and other health care providers. We obtained approval for the study from the University of Memphis Institutional Review Board and informed consent from each caregiver.

We used a questionnaire developed for this study. Pilot testing on 5 respondents was completed to ensure that the questions were clear and that the instrument was not too long. After completion of the pilot study, the questionnaire was reviewed with the caregivers, and feedback related to the questionnaire was obtained. Subsequently, two questions were reworded on the basis of that feedback. The final questionnaire consisted of 5 short-answer questions and 21 multiple-choice questions. It included (1) demographic questions about the caregivers and their infants, (2) whether caregivers had been informed of the AAP tummy time recommendations, (3) the sources of those recommendations, (4) whether they were informed of the possible complications if tummy time is not provided, (5) the amount of tummy time provided to the infant, (6) how well the infant tolerated tummy time, and (7) the primary reason tummy time was not provided if caregivers were aware of the tummy time recommendation.

We recruited 300 caregivers of healthy infants from birth to age 24 mo in the waiting rooms of each clinic and asked them to complete the questionnaire. The caregiver either completed it onsite or took it home and returned it in a self-addressed, stamped envelope. Responses from 205 fully completed questionnaires were entered into a computer database and analyzed using descriptive frequency statistics.

Results

Participant Demographics and Household Characteristics

Of 300 questionnaires distributed, 205 questionnaires (68%) were returned fully completed: 65 from the private-practice urban clinic serving predominately EA children from upper- and middle-income households; 71 from the private-practice urban clinic serving primarily AA children from middle- and lower-income homes; and 30 and 39, respectively, from two private-practice clinics from two separate rural areas with similar demographics. Of all questionnaires, 90% were completed by mothers, 8% by fathers, 1% by a grandparent, and 1% by an “other.” Caregivers’ mean age was 29.1 yr (range = 16–67), and 24.4% reported a household income of ≤$20,000. Eight percent of caregivers did not complete high school, 24% had a high school degree or a general equivalency diploma, 18% had attended college, 26% had completed college, and 24% had a graduate degree. The infants ranged in age from 2 wk to 24 mo; 48% were male, and 52% were female. Of the infants, 57% were EA, 33% were AA, 3% were Asian, 1% were Hispanic, and 6% were other or mixed.

Awareness, Sources of Information, and Compliance

Seventy-five percent (135 of 180) of all caregivers who were aware of supine sleep recommendations reported being aware of tummy time recommendations, and 75% (101 of 135) of those aware of the tummy time recommendations were informed of complications that might occur as a result of limited prone positioning. The primary source of tummy time recommendations was printed materials. The other sources of tummy time recommendations can be seen in Table 1. Of the 135 caregivers who reported being aware of tummy time, only 47% (n = 63) reported that their infants seemed to tolerate tummy time without resistance. The amount of time that the infants spent on their stomachs during waking hours can be seen in Table 2. Of the infants intolerant of tummy time, 44% (32 of 72) spent ≤15 min in the prone position for play during their waking hours.

Discussion

This study’s results suggest that many caregivers are not informed of the importance of prone play time in infancy. Additionally, many caregivers are not aware of the potential complications of limited tummy time exposure, such as motor delays and positional plagiocephaly. Health care providers, including physical and occupational therapists, must communicate to caregivers the importance of supervised prone play time during waking hours, stressing the point that providing infants with tummy time can reduce the risk of developmental motor delays and flat spots on the head.

In examining the amount of time that infants spent in the prone position during waking hours, it became evident that many infants are receiving tummy time ≤30 min per day, which is consistent with research by Dudek-Shriber and Zelazny (2007) and Salls et al. (2002). This finding is significant because Dudek-Shriber and Zelazny (2007) reported that infants who spend ≥80 min in the prone position daily achieved greater success in acquiring many prone and supine motor milestones than infants receiving less tummy time. Interestingly, parents in a study by Jennings et al. (2005) reported being instructed by nurses to provide tummy time for 5–10 min per day.

Table 1. Sources of Information Regarding Tummy Time Recommendations and Possible Complications

<table>
<thead>
<tr>
<th>Topic</th>
<th>Hospital Staff</th>
<th>Pediatrician</th>
<th>Printed Materials</th>
<th>Friends/Family</th>
<th>Media</th>
<th>Nurse</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tummy time, n (%)</td>
<td>18 (8.8)</td>
<td>31 (15.1)</td>
<td>40 (19.5)</td>
<td>21 (10.2)</td>
<td>10 (4.9)</td>
<td>8 (3.9)</td>
<td>7 (3.4)</td>
</tr>
<tr>
<td>Possible complications, n (%)</td>
<td>16 (7.8)</td>
<td>29 (14.1)</td>
<td>31 (15.1)</td>
<td>21 (10.2)</td>
<td>6 (2.9)</td>
<td>7 (3.4)</td>
<td>8 (3.9)</td>
</tr>
</tbody>
</table>

Note. N = 205.
It is important that caregivers understand that tummy time is an important part of an infant’s daily routine and that it can be carried out at many different times throughout the day. It does not have to be limited to placing the infant on the floor but can be carried out while holding, carrying, and even dressing a baby (Coulter-O’Berry, & Lima, 2006). By providing prone positioning throughout the day, the amount of time spent in this position can easily add up to ≥1 hr.

Our findings support previous research that has revealed that many parents avoid the prone placement for play because their infant is intolerant of this position (Davis et al., 1998; Dudek-Shriber & Zelazny, 2007; Salls et al., 2002). Therapists and other health care professionals must educate parents on the importance of providing supervised prone play time beginning in the first days of an infant’s life to decrease the risk of infant intolerance to the position (Wallace, n.d.).

Parents should be informed that initial exposure to prone positioning can be implemented in a variety of ways, such as placing the baby on a caregiver’s chest when the caregiver is in a reclined position, placing baby on the caregiver’s lap, holding and carrying the infant in a prone position, and burping the baby in a prone position on the caregiver’s lap. Educators should explain to caregivers that the infant may not tolerate the prone position at first and that the time can gradually be increased as tolerance increases. Suggestions to motivate the infant to tolerate the prone position would also be beneficial, such as getting at the infant’s eye level and communicating by making faces, singing, talking, and the like. Items such as a mirror and colorful toys can also be positioned at the infant’s eye level to provide a distraction as well as stimulation. Caregivers should understand the importance of minimizing time in car seats, carriers, and equipment to foster infant physical development and prevent flat spots on the head.

In addition, the finding that the primary source of tummy time awareness was printed materials is important, because many caregivers may not be exposed to printed materials until after their infant is several weeks or months old, increasing the possibility that the infant will not tolerate the prone position (Jennings et al., 2005). The second most frequently cited source of tummy time information was pediatricians. This source can also pose a problem because most infants do not visit their pediatrician until the 1-mo well-baby check-up. An optimal time to educate caregivers on the importance of tummy time would be before the parent and infant leave the hospital. Information regarding tummy time could even be provided by nurses and physicians as early as prenatal visits. Jones (2004) reported that “childbirth educators and other health care professionals are in an excellent position to inform and educate expectant parents on the importance of infant head positioning and prone playtime” (p. 17). Jennings et al. (2005) have demonstrated that early nurse visits, in combination with written information, significantly increased prone infant placement; therefore, health care professionals’ verbally stressing the importance of prone playtime in addition to providing written information before the infant’s birth or as early in the infant’s life as possible would be beneficial.

### Table 2. Amount of Time Infants Spent Positioned Prone While Awake

<table>
<thead>
<tr>
<th>Group</th>
<th>≤15 Min</th>
<th>16–30 Min</th>
<th>31–60 Min</th>
<th>1–2 Hr</th>
<th>≥2 Hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire sample (N = 205)</td>
<td>61 (29.8)</td>
<td>48 (23.4)</td>
<td>51 (24.9)</td>
<td>27 (13.2)</td>
<td>18 (8.8)</td>
</tr>
<tr>
<td>Parents aware of tummy time recommendation (N = 135)</td>
<td>39 (28.9)</td>
<td>33 (24.4)</td>
<td>38 (28.1)</td>
<td>14 (10.4)</td>
<td>11 (8.1)</td>
</tr>
<tr>
<td>Infants tolerant of tummy time (N = 63)</td>
<td>29 (46.0)</td>
<td>30 (47.6)</td>
<td>35 (55.5)</td>
<td>23 (36.5)</td>
<td>16 (25.4)</td>
</tr>
<tr>
<td>Infants intolerant of tummy time (N = 72)</td>
<td>32 (44.4)</td>
<td>18 (25)</td>
<td>16 (22.2)</td>
<td>4 (0.06)</td>
<td>2 (0.03)</td>
</tr>
</tbody>
</table>

### Study Limitations

This study has limitations that must be considered when reviewing the results. The data may not be generalizable to other populations because of the use of a convenience sample of caregivers to complete the questionnaires. In addition, the caregivers had to rely on memory to answer various questions, such as the amount of time that the infants spent prone to play. Relying on caregiver report, as opposed to direct observation, is a limitation because caregivers may report answers that they feel are in line with the recommendations made by professionals; therefore, sleep and play position choices may have been misreported.

### Conclusion

This research underscores the importance of educating parents and caregivers specifically about why tummy time is important and how it must be implemented early so that infants will tolerate the position. This education is the responsibility of all health care providers, including physical and occupational therapists. It is crucial that all health care workers join together as a team to communicate the “prone-to-play” message to parents and caregivers.

### References


