OBJECTIVE. We examined the effects of a guided imagery intervention on perceived stress in pregnant adolescents.

METHOD. Thirty-five pregnant adolescents recruited from a local alternative education program participated in a guided imagery intervention. Participants listened to a pregnancy-specific guided imagery recording on four separate occasions during their pregnancies. Perceived stress was measured immediately before and after each session using the Perceived Stress Measure–9 (PSM–9).

RESULTS. Participants' pre- and postsession PSM–9 scores for three of the four sessions demonstrated a significant reduction in stress. Participants' baseline stress levels also decreased significantly across the four listening sessions. The greatest reductions in stress within and between sessions occurred in the early sessions, with effects diminishing over time.

CONCLUSION. Pregnant teens experienced initial short- and long-term stress reduction during a guided imagery intervention, supporting the use of guided imagery to reduce stress in pregnant adolescents.


Teen pregnancy rates have steadily declined over the past two decades but remain high; more than 270,000 children were born to girls ages 15–19 in the United States in 2013 (Martin, Hamilton, Osterman, Curtin, & Mathews, 2015). Support services available to pregnant and parenting teens are limited, and it is important to develop interventions tailored to the unique needs of this vulnerable population. Managing stress during pregnancy is crucial for maintaining the mother's and child's health and well-being.

Pregnancy during adolescence can intensify the typical stressors that pregnant women experience, such as dealing with a new body image, coping with strong emotions, and facing uncertainties about their abilities as a mother or how life will change after the child’s birth (Beers & Hollo, 2009). Adolescence is a transitional period from childhood to adulthood that is associated with high levels of perceived stress, and adolescent girls are more vulnerable during this transition than their male counterparts (Brooks, Harris, Thrall, & Woods, 2002; Byrne, Davenport, & Mazanov, 2007; Hampel & Petermann, 2006). Pregnant adolescents face the dual role changes of child to adult and daughter to mother (Turnage & Pharris, 2013) and are likely to experience high levels of stress from economic strain, family stress, risk of medical complications, decreased peer social supports, and interrupted development (Beers & Hollo, 2009; East, Slonim, Horn, & Reyes, 2011). Furthermore, lack of support because of stigma surrounding teen pregnancy increases perceived stress (Wiemann, Rickert, Berenson, & Volk, 2005).

Maternal Stress and Child Development

Chronic maternal stress negatively affects the physical development of offspring, often resulting in low birthweight and preterm birth (Bolten et al., 2011; Borders, Grobman, Amsden, & Holl, 2007; Rice et al., 2010). In pregnant adolescents
specifically, high levels of psychological stress are associated with lower gestational age at birth, and high levels of cortisol are related to low birthweight (Spicer et al., 2013). Low birthweight infants are more likely to experience decreased growth and a hyperresponsive reaction to stress during infancy and childhood (Beers & Hollo, 2009; Colman, Ataullahjan, Naicker, & Van Lieshout, 2012) and are at increased risk of depression and anxiety in adolescence (Colman et al., 2012). Moreover, prenatal stress and anxiety are associated with delayed fetal nervous system maturation and reduced gray matter in children’s brains, making them more vulnerable to cognitive and intellectual impairments as well as neurodevelopmental and psychiatric disorders (Buss, Davis, Muftuler, Head, & Sandman, 2010; Sandman, Davis, Buss, & Glynn, 2011).

Children born to women who experienced high levels of prenatal stress display cognitive and motor impairments as early as age 8 mo (Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003; Zhu et al., 2014). Psychological and psychosocial effects of stress during pregnancy include temperamental and behavioral problems in children as well as an increased risk of attention deficit hyperactivity disorder and anxiety (Gutteling et al., 2005; Rice et al., 2010). Therefore, high levels of stress during pregnancy can negatively affect a child’s development, with lasting effects into adulthood.

Relaxation and Guided Imagery During Pregnancy

Guided imagery, a relaxation technique that uses spoken words and calming sounds to lead users to envision a relaxed psychological or physiological state, has been found to reduce stress in adult pregnant women (Jallo, Bourguignon, Taylor, & Utz, 2008). We found no evidence that a guided imagery intervention has been studied in pregnant adolescents, but research has shown that such interventions effectively reduce stress in non-adolescent pregnant women on both a physiological and psychological level. The use of relaxation-based guided imagery audio recordings during pregnancy lowers heart and respiration rates, decreases blood pressure (DiPietro, 2012; DiPietro, Costigan, Nelson, Gurewitsch, & Laudenslager, 2008; Jallo, Cozens, Smith, & Simpson, 2013; Moffatt, Hodnett, Esplten, & Watt-Watson, 2010; Urech et al., 2010), and reduces perceived daily stress, anxiety, and fatigue in pregnant women (Jallo, Bourguignon, Taylor, Ruiz, & Goehler, 2009; Jallo et al., 2013; Jallo, Ruiz, Elswick, & French, 2014; Urech et al., 2010). Fetal monitoring indicates physiological changes such as decreased fetal heart rate and suppression of fetal motor activity while a pregnant woman participates in guided imagery, suggesting that the fetus participates in maternal relaxation as well (DiPietro et al., 2008; Fink et al., 2011).

Thus, although previous research indicates that guided imagery is an effective intervention for reducing stress in pregnant adults, such interventions have not been studied in pregnant adolescents. In the current study, we examined the effects of guided imagery on perceived psychological stress in pregnant adolescents over time. We hypothesized that a guided imagery intervention would reduce stress in pregnant adolescents.

Method

Design

A quasi-experimental one-way repeated-measures design was used. Data were collected from pregnant teens using the Psychological Stress Measure–9 (PSM–9; Lemyre & Tessier, 2003) as a pre- and posttest over four trials of guided imagery intervention.

Participants

Forty-four pregnant adolescents were recruited via convenience sampling through an alternative education program that offered additional supports for pregnant and parenting teens in the local school district. The primary aims of the alternative education program were to improve parenting skills, increase high school graduation and postsecondary enrollment rates, and prevent repeat pregnancies before age 20. All pregnant students ages 13–21 enrolled in the alternative education program for parenting teens were eligible to participate. Participants were excluded from the study if they delivered their babies before completing four sessions of guided imagery intervention. Participants’ consent or assent was obtained, and guardian consent was obtained for students under age 18. The local school district and university’s institutional review boards approved the study.

Measures and Materials

The PSM–9 consists of nine questions used to assess a person’s current stress level on a Likert scale of 1 to 8. It is used as a general survey of health and well-being in a variety of settings (Lemyre & Lalande-Markon, 2009; Lemyre & Tessier, 2003) as a pre- and posttest over four trials of guided imagery intervention. For the purpose of this study, stress was defined as a state of psychological tension related to both positive and negative events and...
circumstances (Lemyre & Lalande-Markan, 2009), which is consistent with the definition proposed by the authors of the PSM–9. The PSM–9 has been used to effectively measure stress in pregnant adult women (Darwiche et al., 2014) and in college students (McFadden, Healy, Hoversten, Ito, & Hernández, 2012).

The PSM–9 is a reliable and valid measure of stress with strong test–retest stability (.68–.80), internal consistency (.89), and content validity (.35–.95; Lemyre & Lalande-Markan, 2009; Lemyre & Tessier, 2003). The assessment’s responsiveness and normality of distribution give it statistical power in analysis (Lemyre & Tessier, 2003), making it a change-sensitive instrument useful in repeated measures to document progress (Lemyre & Lalande-Markan, 2009).

Procedures

Research team members were provided training by either the principal investigator (Ausderau) or project assistant (Flynn) on the guided imagery intervention protocol and instructions for administering each guided imagery intervention session. In addition, research team members were provided with written instructions on the protocol and instruction to support consistent administration. The guided imagery intervention and subsequent data collection occurred in the alternative education classroom in two waves corresponding with two sequential academic years.

Participants all listened to the same 12-min, 51-s mp3 audio recording of pregnancy-specific guided imagery 4 times during their pregnancy. The goal was for each participant to listen to the guided imagery recording 1–2 times per week until she had listened to the recording a total of 4 times.

A research team member verbally provided instructions, a brief overview of guided imagery, and strategies for participating in guided imagery before each participant’s first guided imagery session, lasting a total of approximately 30 min. For the remaining three sessions, a research team member provided participants with a notecard to review at the beginning of the session with a brief description of guided imagery and related benefits and tips on how to focus; these sessions lasted approximately 16 min.

A research team member administered the PSM–9 immediately before and after each guided imagery session, providing a total of eight data points for each participant. During each listening session, the researcher minimized distractions and encouraged participants to make themselves comfortable and focus on the recording.

Participants were allowed to keep their mp3 player after completion of the study. If participants delivered their baby before completing all four intervention sessions, they were excluded from the analysis and did not complete the remaining guided imagery sessions, but they were allowed to keep the mp3 player.

Analysis

A one-way repeated-measures analysis of covariance (ANCOVA) was performed with a significance level of α = .05 to test the hypothesis that a guided imagery intervention would reduce participants’ stress over time. Number of days to complete the four listening sessions was used as a covariate. Sum scores were calculated and used to determine pre- and postsession PSM–9 scores for each of the four sessions. Descriptive statistics including means and standard deviations were calculated for each intervention session. Pairwise comparisons with least significant difference were conducted as post hoc analyses to identify any significant differences. IBM SPSS Statistics (Version 20; IBM Corporation, Armonk, NY) was used to analyze the data. Missing PSM–9 data were managed by replacing a missing value with the average of the participant’s scores. Fewer than 2% of data points were missing.

Results

Forty-four pregnant adolescents began the study; 9 girls were excluded because they gave birth before completing all four sessions. Thirty-five participants ages 14–19 (mean [M] = 16.57 ± 1.17) completed the study, and their data were used in the analysis. Means and standard deviations of PSM–9 scores are presented in Table 1. The data were checked and all assumptions met. The duration of the intervention ranged from 7 to 77 days (M = 23.89) and was used as a covariate.

A 2 (pre–post) × 4 (session number) within-subjects repeated-measures ANCOVA indicated a significant main effect for within-session change in stress, $F(3, 31) = 13.10, \ p = .001, \eta^2_p = .284$. The effect size indicated that the guided imagery intervention contributed to approximately 28% of the variance in reported stress before and after each listening session. Additionally, a significant main effect was found for between-session change in

Table 1. Pairwise Comparisons Within Sessions

<table>
<thead>
<tr>
<th>Session</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>$\rho$</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.03</td>
<td>1.43</td>
<td>&lt;.001*</td>
<td>[5.19, 14.87]</td>
</tr>
<tr>
<td>2</td>
<td>6.09</td>
<td>1.19</td>
<td>&lt;.001*</td>
<td>[2.06, 10.11]</td>
</tr>
<tr>
<td>3</td>
<td>5.20</td>
<td>1.02</td>
<td>&lt;.001*</td>
<td>[1.76, 8.64]</td>
</tr>
<tr>
<td>4</td>
<td>3.54</td>
<td>1.21</td>
<td>.168</td>
<td>[−.55, 7.64]</td>
</tr>
</tbody>
</table>

*p < .05.
stress, $F(3, 31) = 3.67, p = .023, \eta^2_p = .262$, suggesting that approximately 26% of the variance in reported stress between sessions was attributable to the intervention. No significant interaction was found between within-session and between-session changes in stress, $F(3, 31) = 0.21, p = .888, \eta^2_p = .020$.

A profile plot of perceived stress before and after each listening session can be seen in Figure 1. Post hoc analyses using least significant difference indicated a significant reduction in stress from pretest PSM–9 scores ($M = 29.56$, standard error of the mean $[SEM] = 1.36$) to posttest scores ($M = 23.35, SEM = 1.01$), $p < .001$, as well as significant reductions in stress within Sessions 1, 2, and 3 as listed in Table 1. Furthermore, an overall reduction of stress was seen in pretest stress scores across the four sessions, with the largest change occurring between Sessions 1 ($M = 33.37 \pm 1.60$) and 2 ($M = 29.86 \pm 1.68$). Stress was significantly reduced between the pretest scores of Sessions 1 and 2, Sessions 1 and 3, and Sessions 1 and 4, as noted in Table 2.

### Discussion

Our findings suggest that a guided imagery intervention reduced stress in pregnant adolescents and that it had both immediate and cumulative effects. The findings affirm the hypothesis that guided imagery is an effective intervention for reducing perceived stress in pregnant adolescents and are consistent with those of previous studies examining the use of guided imagery to reduce stress in pregnant adult women (Jallo et al., 2009, 2013, 2014; Urech et al., 2010).

In the current study, the largest short-term reduction in stress occurred within the first listening session, and the immediate effects of the intervention lessened with each subsequent session. This finding differs from that of a meta-analysis conducted by Van Kuiken (2004), which found that in nonpregnant adults, the effectiveness of guided imagery interventions consistently improved with practice for the first 18 wk. Although it is possible that the intervention became less effective over time in our sample of pregnant adolescents, it is more likely that the diminished change in stress was attributable to the lower baseline level of stress seen in each ensuing session. Interestingly, the consistency in posttest scores across the four sessions suggests the existence of a postintervention threshold level for low stress. The postintervention threshold may explain why the change in stress seen in Session 4 was not significant, suggesting the existence of a limit to the amount of stress reduction that can occur within this population using a guided imagery intervention.

In addition to the immediate stress reduction observed within each session, an overall reduction in stress occurred across the four listening sessions, with the largest change occurring between Sessions 1 and 2. Similarly, with pregnant adults, Jallo et al. (2009) found a significant decrease in state anxiety over the course of a 12-wk guided imagery intervention, with the largest decrease occurring early in the intervention. The overall decrease in pretest stress levels may indicate that guided imagery has long-term lasting effects on reducing stress. However, because no interaction effect between the changes in stress was seen within each session and between sessions, other explanations for this trait reduction must be considered. Participants may have anticipated the short-term stress reduction experienced during Session 1, leading to lower levels of perceived stress on pretests in the last three sessions. Furthermore, the decreasing pretest stress levels may have resulted from factors related to the curriculum or supports provided by the alternative education program.

### Limitations and Future Research

Limitations in this study include lack of a control group, variation in the intervention environment, use of a single...
outcome measure, and sample demographics. The classroom in which the intervention took place included interruptions and distractions from typical school day activities, such as school bells and hallway noise. Future studies should strive to create a more controlled environment in which to administer the intervention. Nevertheless, the context of this intervention makes the results more ecologically valid.

The variation in overall duration of the intervention was controlled for in this study, but the timing of the intervention relative to admission to the alternative education program was not. Because the external supports offered by the program may have contributed to the decrease in stress observed over time, future studies should control for program effects. Furthermore, despite efforts to provide a consistent treatment protocol, it is unknown whether each member of the research team provided the intervention in the same manner because of a lack of fidelity checking.

A single outcome measure, the PSM–9, was used to assess the pregnant adolescents’ current stress before and after the intervention sessions. Although participants’ PSM–9 pretest scores continued to decrease over the four sessions, indicating decreased stress prior to the guided imagery intervention, future research should examine whether the effects of the guided imagery intervention were carried over into routine daily activities. Although we did not collect detailed demographic information in this study to ensure participant privacy, future studies should include expanded demographic information to explore the influence of such variables on the effectiveness of a guided imagery intervention.

**Implications for Occupational Therapy Practice**

The findings of this study provide support for occupational therapy practitioners seeking to apply their expertise in lifespan development in an emerging area of practice addressing the well-being of pregnant and parenting adolescents. Guided imagery practices may be integrated into an adolescent’s daily routines before and after particularly stressful events to reduce stress and promote well-being with benefits for the mother and potentially her unborn child. Occupational therapy practitioners can provide insight into when and how a guided imagery intervention may be beneficial to support carryover into real-world situations. The study has the following implications for occupational therapy practice and research:

- A guided imagery intervention to reduce stress may be a useful component of a larger program promoting wellness in pregnant adolescents.
- Occupational therapy practitioners have a role in interdisciplinary teams designing and developing interventions that nurture health and well-being in pregnant adolescents in a variety of settings.

**Conclusion**

Findings from this study on the use of guided imagery to reduce stress in pregnant adolescents offer preliminary support for its effectiveness with this population and provide preliminary evidence that it may contribute to improved health and well-being for both mother and child. By aiming to reduce negative birth outcomes of pregnant adolescents in a school setting, this study exemplifies the emerging niche of prevention and a broader scope of occupational therapy practice in schools. ▲

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