groups. They found that close synchronization between rhythm and step frequency in the controls and both Parkinson disease groups suggests the presence of rhythmic entrainment mechanisms even in the presence of basal ganglia dysfunction.[6] A study with 10 hemiparetic stroke patients, who underwent a 6-week, twice daily gait-training program, compared the conventional physical therapy gait program with the addition of RAS. Pre- vs. post-test measures revealed a statistically significant ($p <$ 0 .05) increase in velocity (164% vs. 107%), stride length (88% vs. 34%), and reduction in EMG amplitude variability of gastrocnemius muscle (69% vs. 33%) for the RAS-training group compared to the control group.[7]

The scientific study of the neurology of music serves as the foundation for the new field of Neurologic Music Therapy. Music is applied to patients with cognitive, speech, and sensorimotor dysfunction due to neurological diseases, such as stroke, traumatic brain injury, Parkinson and Huntington diseases, cerebral palsy, Alzheimer disease, and autism.

NEONATOLOGY

Dr. Jayne Stanley, Director of Music Therapy at Florida State University, conducted 10 years of research with premature infants at the Tallahassee Memorial Hospital and Woman Hospital in Baton Rouge, LA. Her research found that recorded lullaby music in the infants isolettes improved oxygen saturation levels, increased weight gain, and shortened the duration of hospital stays. Live singing and multi-model stimulation shortened hospital stays for infants by an average of 11 days. Music was also used to reinforce non-nutritive sucking of infants who had poor sucking endurance due to extended gavage feeding.[2]

In a randomized controlled trial study with 20 low-birth-weight infants of 24 to 30 week's gestational age, who were being oxygenated in a neonatal intensive care unit (NICU), recorded lullaby music had positive effects on oxygen saturation levels. The result indicated statistically significant differences ($p <$ 0 .05) between control subjects (m = 93.8%) and music treatment group (m = 95.8%).[8] Another study with 52 pre-term and low-weight babies suggested that music stimulation significantly reduced initial weight loss by 40.35 g ($p < 0.05$), and length of the NBICU and total hospital stays by 5 days ($p < 0.05$); and increased daily average weight by 23 g ($p < 0.01$), while reducing the daily group mean of stress behaviors by 2.63% ($p < 0.005$).[9]

PEDIATRICS

Dr. Joanne Loewy, Director of Music Therapy at Beth Israel Medical Center in New York City, and faculty member at New York University, has conducted several qualitative research studies in the area of pediatric pain. In her research, 60 pediatric patients were divided into 2 groups. One group received 20 min of sedation with chloral hydrate, the other was assigned music therapy for that period. Results indicated that harmacological intervention may not be necessary in preparing babies and toddlers for medical testing. Music therapy may assist in enhancing the body natural receptors for sedation more effectively, rapidly, and comfortably.

A study of pediatric asthma used live music, imagery, clinical improvisation, and entrainment through wind instrument playing to address the depth of breathing in the body. Heart rates, respiration rates, and spirometry measurements were taken for 65 patients before and after music therapy or regular rehabilitation. Results indicated significant changes in the lung volume capacity, heart rates, and respiration rates of the music therapy group.[10]

Dr. Loewy and her colleagues also developed a music therapy and venipuncture pain assessment tool (the Wong-Baker Faces Scale) to evaluate patients in chronic and acute pain, as well as in procedural pain.[10] A randomized controlled trial study was also done at Florida State University to assess the benefits of live music on the behavior distress levels of pediatric patients. A total of 40 pediatric patients aged 7 years and younger, who experienced a variety of needle insertions in a treatment room and emergency room setting, was divided into a live music experimental group and a control group. Results from time-sampling observations revealed a statistically significant difference in the 2 groups for the pre-needle and post-needle stages ($p < 0.05$) with the music group exhibiting less behavior distress.[11]

PSYCHONEUROIMMUNOLOGY

Dr. Barry Bittman, Director of the Mind Body Well-