A Statement on State and Feeding Efficiency

Jeffrey R. Alberts
Indiana University, NFI Science Committee, Associate Editor for Science


As every NIDCAP practitioner or student knows, a behaving infant continuously presents troves, if not torrents of observational information. The science and art of NIDCAP observations reside, in part, in the extraction of meaningful portions of these behavioral data.

A recent report by Griffith, Rankin, and White-Traut (2017) illustrates the principle that behavior provides a wealth of information. At times, there may be such a storehouse of riches that a database can be tapped for knowledge beyond that which inspired the original investigation! Indeed, the present Target Article is such a “secondary analysis”. Originally, there was conducted a large, randomized control study (RCT) of a developmental intervention for preterm babies. For the present report the authors extracted quantitated observations made in the one-minute prior to the major manipulation that was being studied. From the data in that pre-trial period and in part of the feeding data, the present study was created.

Thus, Griffith et al. examined "The relationship between behavioral states and oral feeding efficiency in preterm infants". With this secondary analysis, they were able to make some valuable contributions. I’ll discuss a few points that might be of interest to Developmental Observer readers. The end-point in their analysis was oral feeding efficiency, measured in mL/min. The results were taken from the first 10 min of the 30 min feeding period in the RCT. They limited the interval for the measure to avoid contamination by fatigue in some of the fragile babies. Babies were held and fed by bottle by the research nurse. This was part of numerous steps of careful standardization.

From video recordings of the 1-min pre-test period, each baby’s state was independently encoded by two trained observers, blind to the purpose of the study; inter-observer reliability was excellent (> 98%). For each 15-second segment of observation, the dominant (> 8-seconds) behavioral state (e.g., alert, sleep, drowsy, crying states) was determined. From these data, the proportion of time spent in each state was quantified and then examined in relation to the baby’s feeding efficiency.

The researchers used a couple of different “regression” statistics to analyze the results. These methods enabled them to determine whether there were statistically significant relations between singular and combined variables for each baby and that baby’s feeding. Although these are all correlational measures (and we understand that correlations do not prove causation), the various levels of each behavioral state as well as different characteristics of the babies (e.g., age, weight, risk assessment scores, etc) were built into the tests. This greatly strengthened the interpretive power of the correlational results.

The outcomes were clear: the more time a baby was in alert states in the minute before feeding, the greater the feeding efficiency.

Conversely, the greater the time spent in a sleep state in the pre-feeding minute, feeding efficiency was proportionately diminished. Take a look at the paper: Figure 1 shows that when a baby spends about 45 seconds of the pre-feeding minute in an alert state, feeding efficiency is about 50% greater than if they are in an alert state for 10 seconds!

The authors were able to make some assertions concerning the meaning of their findings for NICU practice: Careful assessment of infant behavioral state is vital for effective, developmentally-supportive feeding. Avoid feeding when infants are sleeping; if a baby is in a drowsy state, use interventions such as sensory stimulation to help the baby transition to an alert state before attempting to feed orally. You will appreciate the value of NIDCAP observational skills in this context.

It is worth noting that babies born preterm typically present a distinct “sleep architecture” that differs from that of term babies. Young, prematurely born babies spend far more time in active sleep and, importantly, their development is marked by important changes in sleep-wake distributions as well as transitions between states. Again, NIDCAP skills and sensitivities will serve you and the babies well for achieving superior support and care.

There is more to absorb from the article; hopefully, this commentary is informative and will motivate you to read the full paper. You are certainly invited to discuss it on one of our forums. Visit: [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5269441/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5269441/) to access the full target article.