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Developmental tradeoffs: Fruit availability and offspring age influence mother and offspring activity in Bornean orangutans (*Pongo pygmaeus wurmbii*)

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Bornean orangutans' extended life history may be an adaptation to their forest habitat, characterized by dramatically fluctuating fruit availability. We hypothesize that juveniles rest and are carried more when fruit availability is low, spending less time in developmentally important behavior including play and independent travel to conserve energy. We test this using generalized linear mixed models and data derived from 976 follows of infant and juvenile orangutans collected during periods of varying fruit availability. Age ($p<0.001$), but not fruit availability ($p>0.05$) significantly affected offsprings' time being carried ($\beta=-8,1$) and resting ($\beta=-2.6$, $p<0.001$). Younger individuals spent more time clinging and resting regardless of fruit availability. Fruit availability and offspring age interact to affect the proportion of time juveniles play ($\beta=1.5$, $p<0.001$) and travel ($\beta=-0.8$, $p<0.001$). Fruit availability impacts younger juveniles' play behavior more dramatically than older juveniles: younger juveniles play more when fruit availability is high than when it is low, while older juveniles exhibit little variation in time spent playing depending on fruit availability. Juveniles aged 6-8 travel more when fruit availability is medium and high, juveniles aged 2-5 travel slightly less when fruit availability is high, and juveniles under 2 rarely travel independently. We also examined relationships between fruit availability, offspring age, and maternal travel distance using 2065 mother-offspring follows, demonstrating that females travel shorter distances with offspring under four, and when fruit availability is low. Thus, orangutans shift activity in response to fruit availability and throughout development, buffering young orangutans against energy depletion but suppressing developmentally important activities.

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