

RESULTS

The results of sex stratified models for paternal semen quality characteristics with continuous pregnancy outcomes are included in the [Supplementary Tables SI and SII](#). Among male births ($n = 110$) ([Supplementary Table SI](#)), sperm head length was associated with lower birth weights ($P = 0.02$), and % elongation factor ($P = 0.02$) was associated with smaller head circumference, although higher birthweight was correlated to % elongation factor ($P = 0.004$) and both sperm head elongation factor ($P = 0.012$) and width ($P = 0.03$) were associated with longer birth length. Earlier gestational age at delivery was associated with higher measures of sperm motility, including straight line velocity ($P = 0.02$), amplitude head displacement ($P = 0.001$) and % motility ($P = 0.02$), as well as % acrosome of head ($P = 0.003$), and % coiled tail was associated with later gestational age at delivery ($P = 0.02$). Smaller head circumference was associated with sperm head length ($P = 0.02$) and perimeter ($P = 0.02$).

Among female births ($n = 116$) ([Supplementary Table SII](#)), lower birth weights were associated with measures of normal morphology including % normal morphology (traditional criteria, $P = 0.02$). Birthweight was positively associated with % high DNA stainability ($P = 0.02$). Sperm head area was also associated with a larger infant head circumference ($P = 0.04$), in addition to sperm perimeter ($P = 0.02$), and higher % neck/midpiece abnormalities ($P = 0.04$). Birth length was associated with higher sperm length ($P = 0.04$) and lower % elongation factor ($P = 0.01$), poorer morphology, including normal morphology (strict criteria, $P = 0.01$; traditional criteria, $P < 0.01$), amorphous ($P = 0.05$) and % taper ($P = 0.03$) sperm, neck/midpiece abnormalities ($P = 0.003$), and cytoplasmic droplet ($P < 0.001$). Birth length was also positively associated with both DNA fragmentation index ($P = 0.02$) and high DNA stainability ($P = 0.04$). Ponderal index was greater for higher sperm concentration ($P = 0.04$) and % hypo-osmotic swelling test ($P = 0.02$).