Humans may lose large amounts of water and electrolytes from sweat during prolonged exercise in a hot climate. Gender and maturational differences for the total sweat electrolyte losses have not been reported. The purpose of this study was to compare sweat electrolyte losses of prepubescent (PP), pubescent (P) and young adult (YA) males and females, under the same environmental conditions and relative exercise intensities. Twenty-five females (8 PP, 9 P, 8 YA) and 26 males (10 PP, 8 P, 8 YA) cycled for two 20-min bouts at 50% of their peak VO2 in a climate chamber (42°C, 18% relative humidity). Sweat was collected from a plastic bag attached to the lower back. Total body sweat loss was calculated from the differences in nude body weight corrected for fluid intake, urine, and respiratory water loss. Sweat [Na+] and [Cl-] tended to increase with maturation while sweat [K+] was lower in YA compared with that of PP. Children had a lower sweating rate than YA, even when corrected for body surface area. As a result, total Na+ and Cl- losses per kg body weight from sweat (mEq·kg^-1·h^-1) were higher in YA compared with those of PP and P; however, no maturational difference was found in K+ losses. Within the same maturational group, there were no gender differences in any of the electrolyte losses. These results may be useful in recommending “optimal” fluid-electrolyte drinks for children exercising in the heat.