Maternal obesity and the use of assisted reproductive technologies (ART) are two suboptimal developmental environments that can lead to offspring obesity and cardiovascular disease. We hypothesized that these environments independently and synergistically adversely affect the offspring’s weight and cardiovascular performance at ~7 weeks of age. Mice were fed either 24% fat and 17.5% high fructose corn syrup (HF) or maintenance chow (5% fat; LF). Dams were subdivided into no-ART and ART groups. ART embryos were cultured in Whitten’s medium and transferred into pseudopregnant recipients consuming the same diet as the donor. Offspring were fed the same diet as the mother. Body weights (BW) were measured weekly and mean arterial pressure (MAP) was collected through carotid artery catheterization at sacrifice (55 ± 0.5 days old). Expression of genes involved in cardiovascular remodeling was measured in thoracic aorta using qRT-PCR, and levels of reactive oxygen species were measured intracellularly and extracellularly in mesenteric resistance arteries. ART resulted in increased BW at weaning. This effect decreased over time and diet was the predominant determinant of BW by sacrifice. Males had greater MAP than females (p=0.002) and HF consumption was associated with greater MAP regardless of sex (p<0.05). Gene expression was affected by sex (p<0.05) and diet (p<0.1). Lastly, the use of ART resulted in offspring with increased intracellular ROS (p=0.05). In summary, exposure to an obesogenic diet pre- and/or post-natally affects weight, MAP, and gene expression while ART increases oxidative stress in mesenteric resistance arteries of juvenile offspring, no synergistic effects were observed.