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Understanding how social factors influence nervous system function is of great importance. Studies have shown that social status influences the behavior and physiological processes of many social animals. However, the neural mechanisms underlying the capacity of the nervous system to adapt to social changes remain poorly understood. Using zebrafish as a model system, we explored the cellular mechanisms of how social status affects the neuromodulatory system and its regulation of spinal motor circuits (escape and swimming). Based on the empirical results, we built a neurocomputational model by using a system of differential equations. Our integrative approach of empirical and computational analysis will improve our understanding of fundamental principles of neuromodulatory mechanisms that shape nervous system function and motor behavior. (Received September 21, 2018)