

ABSTRACT  
INTERPERSONAL SYNCHRONIZATION: NEURAL CONNECTIONS IN THE  
EMOTION SYSTEM MODERATED BY EMOTION REGULATION

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Relationships provide the foundation for building strong emotional connections through shared experiences and mutual support. Interpersonal emotion regulation (IER) plays a critical role in these processes, which significantly influences how emotions are experienced and their physiological impacts. For instance, neural mechanisms like brain-to-brain synchronization facilitate social engagement and deeper connections through shared rhythmic responses during interactions. Synchronization involves aligning emotional states—including subjective experiences, behaviors, and physiological responses—which is essential for IER. This process is pivotal in maintaining emotional balance and physiological homeostasis, reflecting both adaptive and maladaptive influences within relationships.

This study explores how IER affects friendship quality by examining the neural correlates of emotional connections and synchronization. Participants included friend dyads ( $N=61$ ) from psychology courses at a Midwestern Jesuit university, who engaged in questionnaires, emotional and neural measurements, and an interaction session. Our findings initially indicated no significant relationships between emotional and neural synchronization and overall friendship quality, suggesting these factors alone do not predict the strength of friendships. Similarly, no direct correlation was found between IER and friendship quality. However, exploratory analyses identified significant relationships within specific friendship functions and IER strategies.

First, specific friendship functions (i.e., self-validation and emotional security) were notably influential for fostering positive neural connections when friends shared personal emotional experiences. Additionally, the friendship function of emotional security was positively related to friends' reliance on IER, and the function of seeking help was specifically associated with reliance on friends for perspective-taking. Furthermore, the use of social modeling was strongly linked to neural connections during these exchanges, suggesting friends who engage in social modeling experience increased synchronization. Together, our results revealed that relying on one another for ER significantly enhances neural synchronization during emotional interactions.

These findings highlight the complex interplay between IER and synchronization mechanisms within friendships. Additionally, specific interpersonal dynamics shape emotional experiences, such as how the friendship functions of emotional security and help facilitate friends' ability to regulate each other's emotions. Our study demonstrates that reliance on friends for emotional support and regulatory strategies is crucial to friendships, reinforcing how interpersonal support enhances the depth of social connections.