Sex Differences in Hypothalamic Volume and Associated Subunits

An MRI-Based Investigation

Study Summary

Purpose: Investigate sex differences in hypothalamic volume and its subregions.

Participants:

- 66 Healthy Right-Handed Individuals
- 34 Males, 32 Females (Implicit)
- Mean Age: 49.42 ± 12.25 years

Methods:

- 3T MRI, 64-channel head coil
- 3D T1-weighted MPRAGE
- Automated segmentation (Deep CNN, FreeSurfer v7.4.1 validated)
- Subunits: a-sHyp, a-iHyp, supTub, infTub, posHyp
- TIV normalization
- MANCOVA analysis

Sexual Dimorphism

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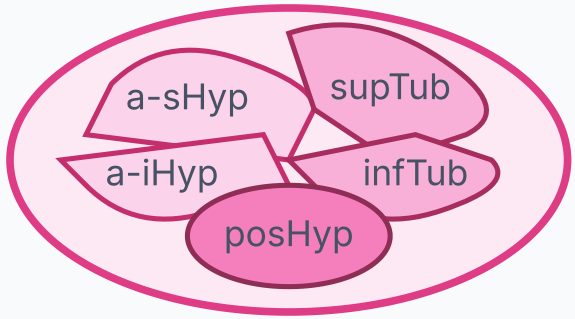
Females exhibited **larger adjusted volumes** across nearly all hypothalamic subunits.

MANCOVA: Wilks' $\Lambda = 0.652$, $F(10,50) = 2.66$, $p = 0.011$, partial $\eta^2 = 0.35$

Hypothalamic Subunits



Simplified representation of hypothalamic subregions.

Age Associations & Other Factors

Age showed modest POSITIVE associations with:

- 📈 Right a-iHyp ($p = 0.042$)
- 📈 Right a-sHyp ($p = 0.035$)
- 📈 Right supTub ($p = 0.049$)
- 📈 Whole Right Hypothalamus ($p = 0.022$)

Not Significantly Associated ($p > 0.05$):

- Body Mass Index (BMI)
- Education
- Handedness
- Sex × Handedness Interactions

Conclusions

Females have larger TIV-adjusted hypothalamic volumes across most subunits compared to males. Certain right-sided hypothalamic subregions show positive associations with age. These findings underscore the importance of considering sex as a biological variable in neuroscientific research and clinical contexts related to the hypothalamus.