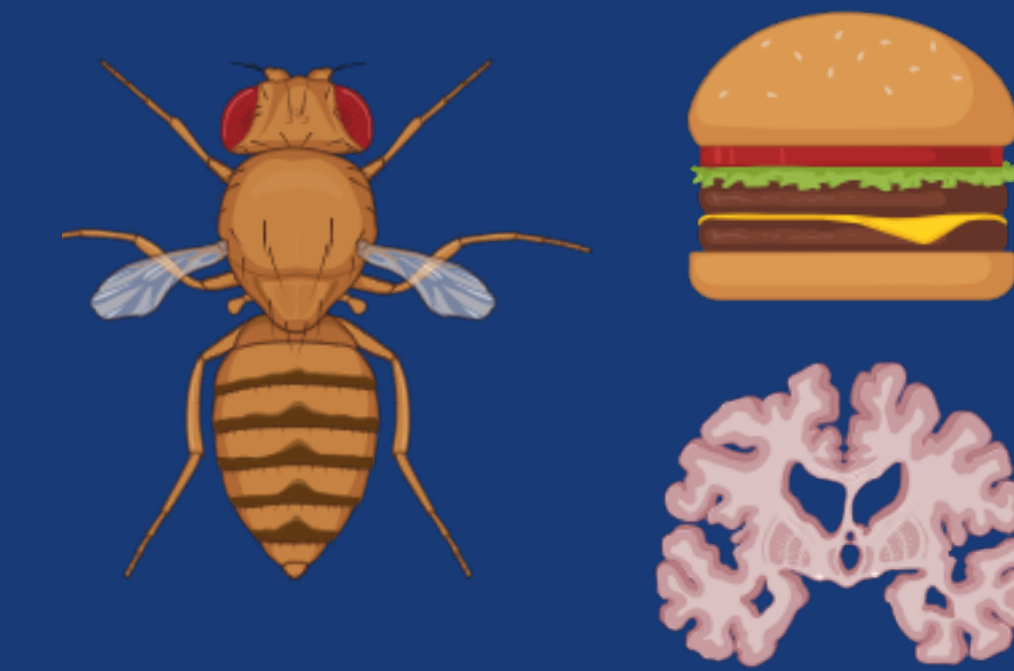




High Sugar (HS) and High Fat (HF) Diets Alter Alzheimer's Related Behaviour in Drosophila

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WHY STUDY DROSOPHILA, DIETS AND ALZHEIMER'S?

- Alzheimer's Disease (AD) and Dementia was the greatest cause of mortality in 2024¹
- Evidence to suggest HS and HF diet's are linked with AD
- Drosophila have 75% of our disease-causing genes² making them an ethical, cost effective and rapid in vivo model
- 2 copies of the APOE-4 allele increases AD risk by 7-22 times³
- Decreased Drosophila locomotion (larval crawling and adult climbing) reflects loss of motor and sensory neurons which also degenerate in AD pathology

METHODS

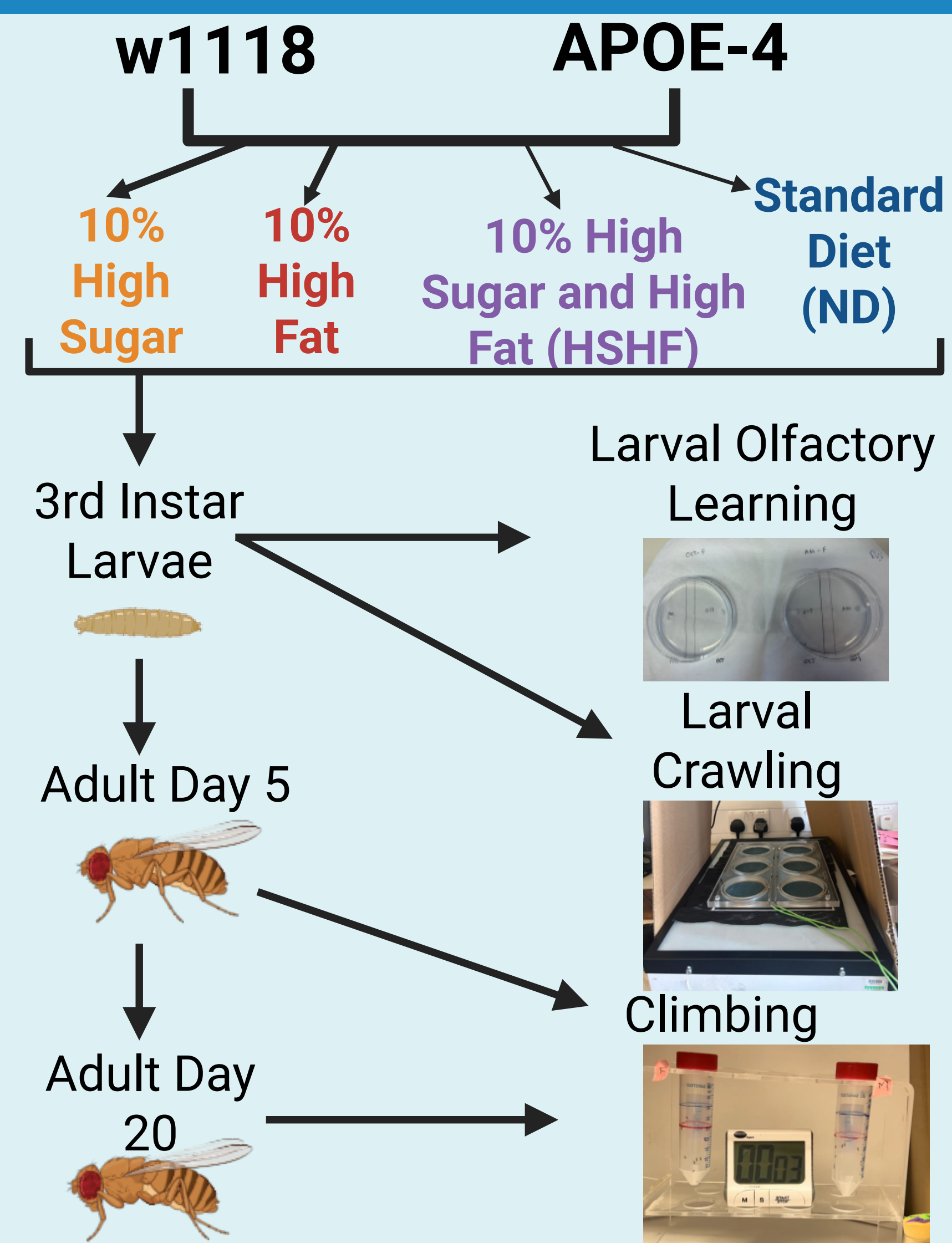


Fig 1: Drosophila fed on each dietary composition were tested using the Assays for Drosophila AD Behavioural Phenotypes.

APOE-4 strain consistently crawls a greater distance

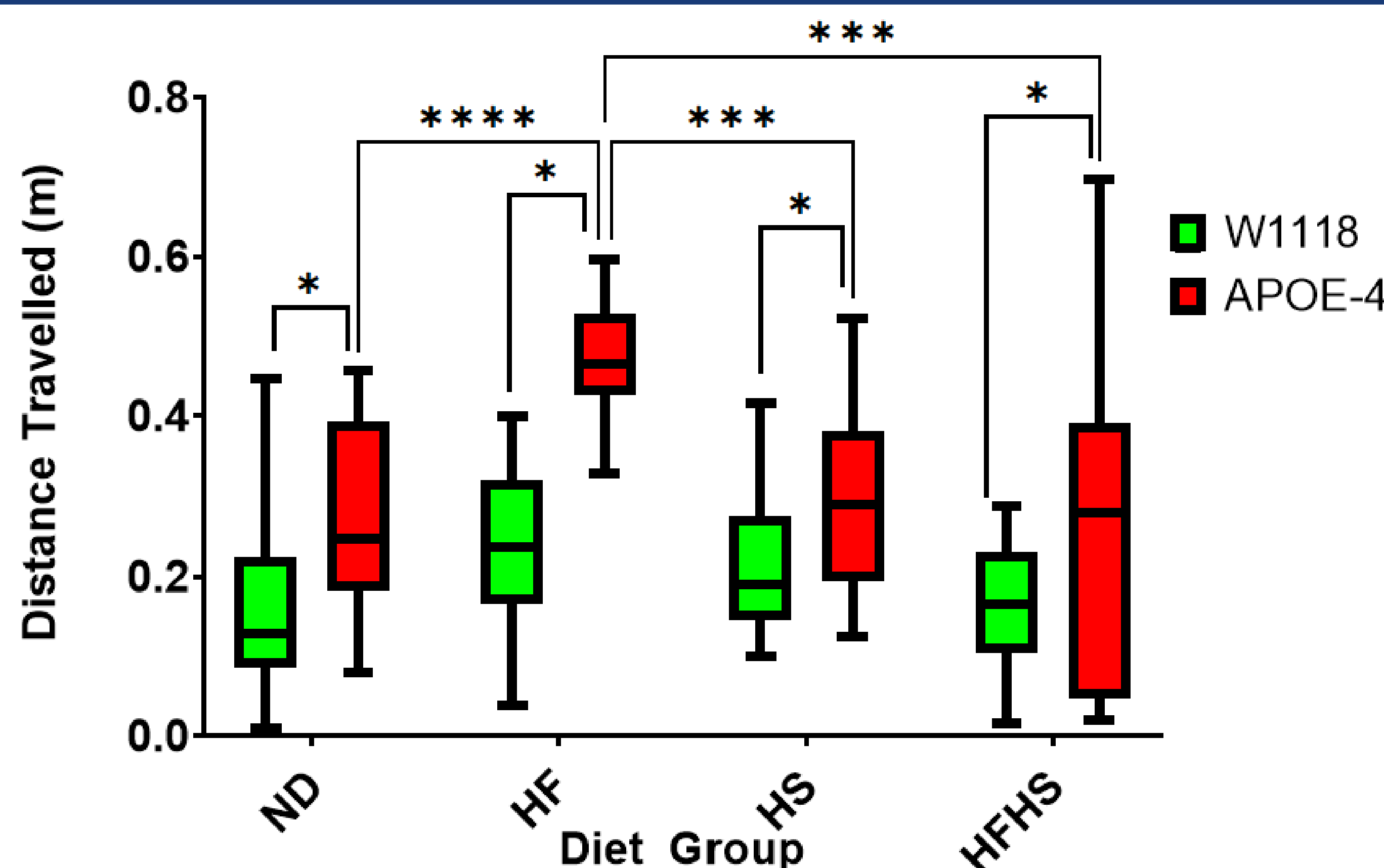


Fig. 2: Distance traveled by w1118 and APOE-4 larvae under ND, HF, HS and HSHF diets. Boxes show median and IQR; whiskers range; n ≈ 18; two-way ANOVA with post-hoc test. p > 0.05 not shown, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001. **** p ≤ 0.0001.

HS+HF Combined had the greatest impact on climbing ability from 5 to 20 days

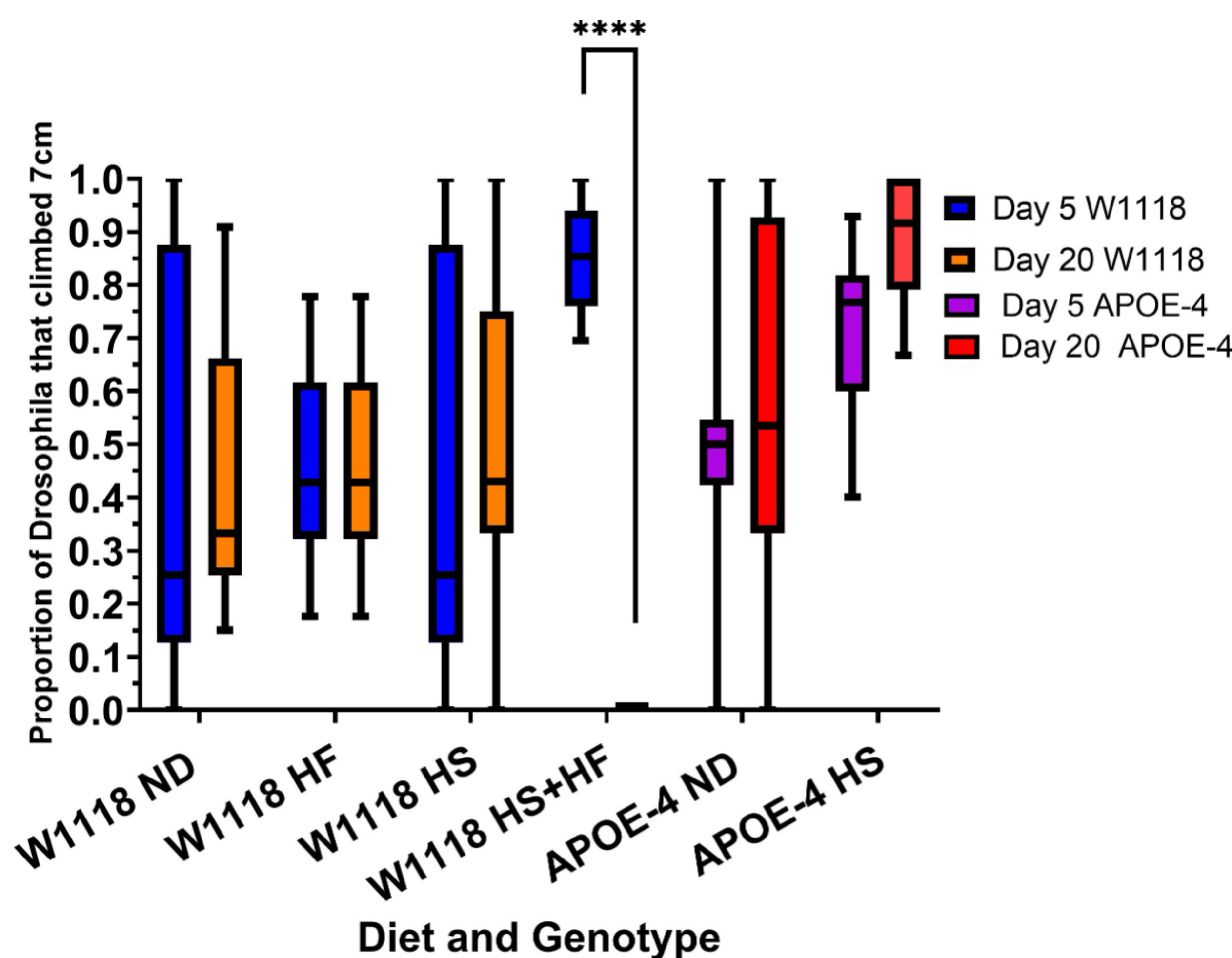


Fig. 3: Climbing ability by w1118 and APO-E adult drosophila under ND, HF, HS and HSHF diets. Boxes show medians and IQR, whiskers range (n=4-45 flies); two-way ANOVA post-hoc test for Day 5- Day 20 difference. p > 0.05 not shown, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001. **** p ≤ 0.0001.

HS+ HF and APOE-4 HS had no significant ability to learn

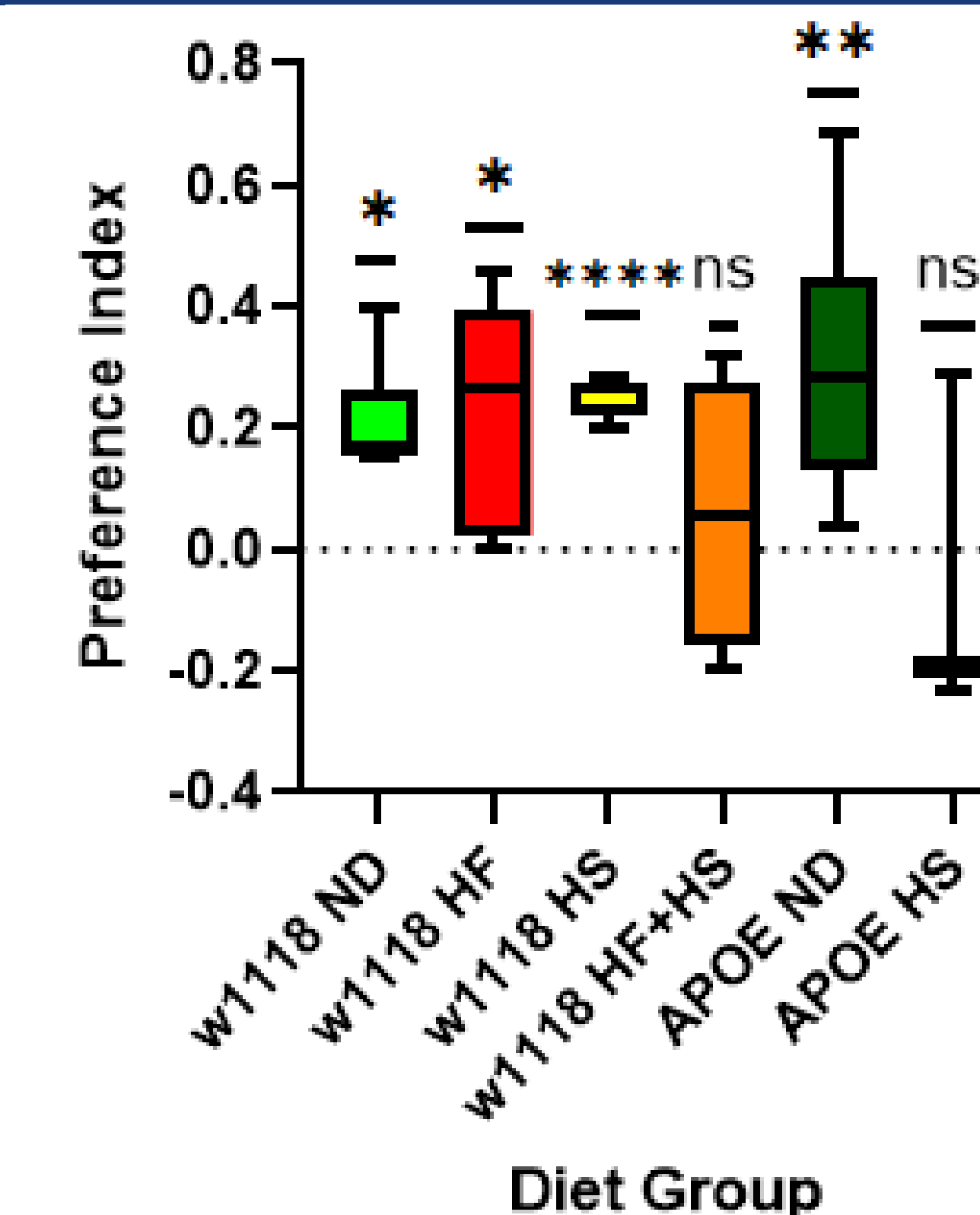


Fig.4: Associative Larval Olfactory Learning Preference Index's by w1118 and APOE-4 (APOE) larvae under ND, HF, HS and HSHF diets. Boxes show median and IQR; whiskers range; n = 6 except APOE HS n=3 with ≈ 20 larvae per test. One Sample T test: p > 0.05 not shown, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001. **** p ≤ 0.0001.

WHAT THIS STUDY SHOWS?

- Diet × Genotype Interaction in Crawling Assay
- ↳ A novel finding
- HSHF combined had **most prominent** AD phenotype in the larval olfactory learning and adult climbing assay
- ↳ Consistent with mice and human studies

FUTURE STUDIES

- Studies to investigate the effect of other AD risk strains on crawling behaviour
- Effect of climbing on a 5% HSHF Diet
- Effect of larval learning and crawling at different concentration of the diet groups
- Effect of diet on an olfactory long term larval memory and adult memory using a T-maze

REFERENCES: (1) UK AsR. Deaths Due to dementia 2022 [cited 2026 05/01/2026]. Available from: <https://dementiastatistics.org/about-dementia/deaths/>. (2) 1.Avila A, Paculis L, Roxana Gonzalez Tascon, Ramos B, Jia D. A large-scale *in vivo* screen to investigate the roles of human genes in *Drosophila melanogaster*. G3 Genes Genomes Genetics. 2024 Aug 9;. (3.)BioBank U. The moderating effect of APOE e4 on lifestyle factors which affect metabolic risk, brain health, neural connectivity, and cognitive ability in later life. UK Biobank2025 [Available from: <https://www.ukbiobank.ac.uk/projects/the-moderating-effect-of-apoe-e4-on-lifestyle-factors-which-affect-metabolic-risk-brain-health-neural-connectivity-and-cognitive-ability-in-later-life/>].