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TITLE:

Heritability of serum brain-derived neurotrophic factor (BDNF) in twins, siblings and adoptees

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ABSTRACT:

Brain-derived neurotrophic factor (BDNF) is a nerve growth factor involved in neuronal processes necessary for learning and memory. BDNF variants, principally the Val66Met variant, as well as circulating levels of BDNF have been evaluated in terms of their association with cognitive performance and decline and possible mediating pathways including BMI and exercise. The heritability of serum BDNF levels has received little attention outside of two family-based studies reporting estimates of .20-.48. We assessed the heritability of serum BDNF in participants from the ongoing Colorado Adoption/Twin Study of Lifespan behavioral development and cognitive aging (CATSLife). CATSLife includes participants from two foundational studies, the Colorado Adoption Project (CAP) and Longitudinal Twin Study (LTS). Serum BDNF was available for 1009 participants representing 619 sibships (158 MZ, 158 DZ, 160 Controls, 143 Adoptive). The average age of participants was 33.04 years (SD=4.85), with 53% females. Intraclass correlations by family type suggested strong heritable components adjusted for age, sex, batch, and fasting: MZ=.48, DZ=.17, Control=.11, Adoptive=.08. An ADCE biometrical model was fitted to twins and sibling trios where the inclusion of adoptees, full-siblings and twins allowed for estimation of both dominance and shared environment. Full model results suggested additive genetic influences (A)=20.5%, dominance (D)=28.6%, shared environment (C)=1.4% and nonshared environment (E)=49.5%. Findings suggest that about half

of the variance is explained by genetic contributions with the remainder influenced by person-specific environmental influences. Whether BDNF levels show shared etiology with health and cognitive phenotypes in CATSLife remains to be examined.

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