

Canine Cognitive Dysfunction: An Unexpected Twist in the One Health Paradigm

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Contrary to expectations, there was an inverse relationship between neighborhood disadvantage and canine cognitive dysfunction.

BACKGROUND

- A One Health model suggests that a neighborhood's health impacts the health of its residents and their pets.¹
- The effect on pets is both direct and through the owner-pet bond.
- In humans, residing in a more disadvantaged neighborhood is associated with an increased risk of cognitive dysfunction.^{2,3}
- Is neighborhood disadvantage associated with canine cognitive dysfunction?**

Methods

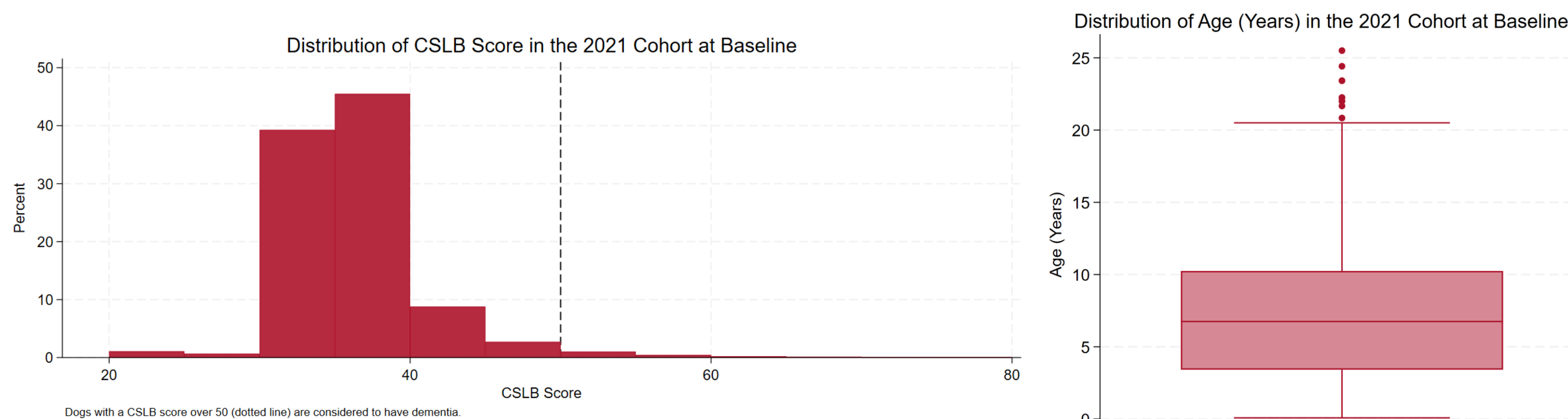
- The Dog Aging Project (DAP) is a large, nationwide cohort of dogs in the US.⁴
- 24,061 dogs had completed a baseline survey before December 31, 2021, and a CSLB score ≥ 20
- The disadvantage index is derived from 5 ACS measures at the census tract level
- \uparrow disadvantage index indicates \uparrow neighborhood disadvantage.
- Canine cognitive dysfunction is measured using the Canine Social and Learned Behavior (CSLB) tool.
- \uparrow CSLB scores indicate \uparrow canine cognitive dysfunction.
- CSLB Scores greater than or equal to 50 indicate canine dementia.

Statistical Analyses

- Cross-sectional analyses at baseline
- Neighborhood Disadvantage and Canine Cognitive Dysfunction
 - Linear Regression
 - Outcome: CSLB Score
 - Covariates: Age and Breed Purity/ Breed*
- Neighborhood Disadvantage and Canine Dementia
 - Logistic Regression
 - Outcome: Dementia Diagnosis (CSLB ≥ 50)
 - Covariates: Age and Breed Purity/ Breed*

*Both analyses were conducted in the whole population with breed purity being a covariate and then repeated in only the purebred dogs with breed being a covariate.

About the Population



Only 2% of the dogs had a CSLB score ≥ 50 , indicating canine dementia. Most dogs had CSLB scores between 30 and 40.

Overall, the dogs in this study were from more advantaged neighborhoods (mean: $-.51$).

		N (%)
Canine Dementia Diagnosis	No Canine Dementia (CSLB <50)	23, 581 (98%)
	Canine Dementia (CSLB ≥ 50)	480 (2.0%)
Pure Breed Status	Pure Breed	12,031 (50.0%)
	Mixed Breed	12,030 (50.0%)

Results

Neighborhood Disadvantage and CSLB Score

Linear Regression in the Whole Cohort (N= 24,061)				Linear Regression in Only Purebred Dogs (N= 12,031)		
		Coefficient	95% CI		Coefficient	95% CI
Disadvantage Index (.1 increase)		-.01	-.02, 0	Disadvantage Index (.1 increase)	-.01	-.02, 0
Age		.38	.37,.40	Age	.40	.38,.42
Pure Breed Status	Mixed Breed	Reference		Due to the large number of breeds, breed specific coefficients are not reported here		
	Pure Breed	-.21	-.32, -.09			

A 0.1 increase in the neighborhood disadvantage index was associated with a .01 decrease in the dog's CSLB score. A similar decrease was seen when limited to only pure-bred dogs.

Neighborhood Disadvantage and Dementia Diagnosis

Logistic Regression in the Whole Cohort (N= 24,061)				Logistic Regression in Only Purebred Dogs (N= 12,031)		
		POR	95% CI		POR	95% CI
Disadvantage Index (.1 increase)		1.0	.99, 1.0	Disadvantage Index (.1 increase)	1.02	.99, 1.04
Age		1.67	1.61,1.73	Age	1.68	1.59, 1.79
Breed Status	Mixed Breed	Reference		Due to the large number of breeds, breed specific PORs are not reported here		
	Pure Breed	1.28	1.03, 1.58			

No association was seen between disadvantage and having a CSLB score greater than or equal to 50.

Conclusion

- The results of the linear regression showed that disadvantage have a negative impact on cognitive function in dogs.
- The logistic regression results, however, show that this impact is not be strong enough to warrant a diagnosis of dementia.
- The results of this analysis are limited by its cross-sectional nature
 - Neighborhood disadvantage was assumed to be static
 - Likely dynamic across the life of the dog
 - Does not account for exposure over time

Future Directions

- Examine the relationship via longitudinal analyses
- Determine the causality of any relationships seen
 - Specific elements of disadvantage
 - Causal mechanisms

Acknowledgements and References

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