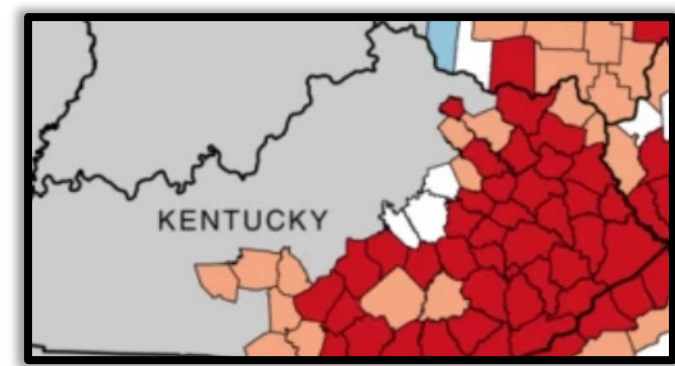


Sex Moderates the Effect of Depressive Symptoms on Diet Quality Among Rural Informal Caregivers of Individuals with Chronic Illnesses

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BACKGROUND

- Caregivers face risks related to depressive symptoms and poor lifestyle behaviors, including unhealthy diets.
- Rural caregivers, lacking social and healthcare resources, are particularly at risk.
- Although about 75% of caregivers are female, the role of sex in the relationship between depressive symptoms and diet quality among rural caregivers remains unclear.
- Thus, we aimed to determine whether sex moderates the relationship between depressive symptoms and diet quality in rural caregivers of patients with chronic illnesses.



METHODS

- Baseline data from a randomized controlled trial targeting cardiovascular disease risk reduction in rural caregivers

Inclusion Criteria	Exclusion Criteria
1) providing care for the patient for more than 6 months without a plan for transfer of care	1) chronic drug abuse
2) able to speak and understand English	2) current active cancers other than isolated skin cancer
3) live in rural area (Rural-Urban Commuting Area codes 4-10)	3) physical or emotional impairment
	4) cognitive impairment

- Diet Quality:
 - Healthy Eating index-2020 (HEI-2020)
 - A valid tool to measure how closely an eating pattern matches the Dietary Guidelines for Americans
 - Comprised of 13 components: 9 adequacy and 4 moderation components
 - Higher HEI score indicates closer conformance with dietary guidance and healthier diets (range: 0-100).

- Depressive Symptoms
 - Patient Health Questionnaire-9 (PHQ-9)
 - A higher score indicates a higher level of depressive symptoms (dichotomized at a cutoff of 10).
- Data Analysis
 - Welch's two-sample t-test or Pearson's chi-squared test was used to compare sample characteristics between male and female groups.
 - PROCESS macro was used to conduct a moderation analysis.

Table 1. Sample Characteristics (N=294)

Variables	Male (n=70)	Female (n=224)	P-value
Age, years	55.67 (14.6)	55.38 (13.0)	0.883
Race			0.061
White	65 (92.9%)	220 (98.2%)	
Marital status			0.635
Married/cohabitated	56 (80.0%)	171 (76.3%)	
Others	14 (20.0%)	53 (23.7%)	
Education level			0.848
High school or less	22 (31.9%)	76 (34.1%)	
>High school	47 (68.1%)	147 (65.9%)	
Financial status			0.688
More than enough	21 (30.0%)	57 (25.4%)	
Enough	39 (55.7%)	128 (57.1%)	
Not enough	10 (14.3%)	39 (17.4%)	
Employment status			0.793
Employed	25 (35.7%)	86 (38.4%)	
Others	45 (64.3%)	138 (61.6%)	
BMI, kg/m ²	32.94 (5.7)	33.53 (7.8)	0.488
Comorbidities	1.33 (1.9)	1.30 (1.9)	0.911
Smoking status			>0.999
Current	15 (21.4%)	46 (20.5%)	
Previous/never	55 (78.6%)	178 (79.5%)	
Adherence	29.41 (10.8)	29.21 (9.5)	0.890
Social Support	72.56 (22.0)	70.83 (19.5)	0.558
Caregiving burden	20.09 (15.5)	29.13 (16.3)	<0.001
Depressive symptoms Mean (SD); n (%)	8 (11.4%)	60 (26.8%)	0.013

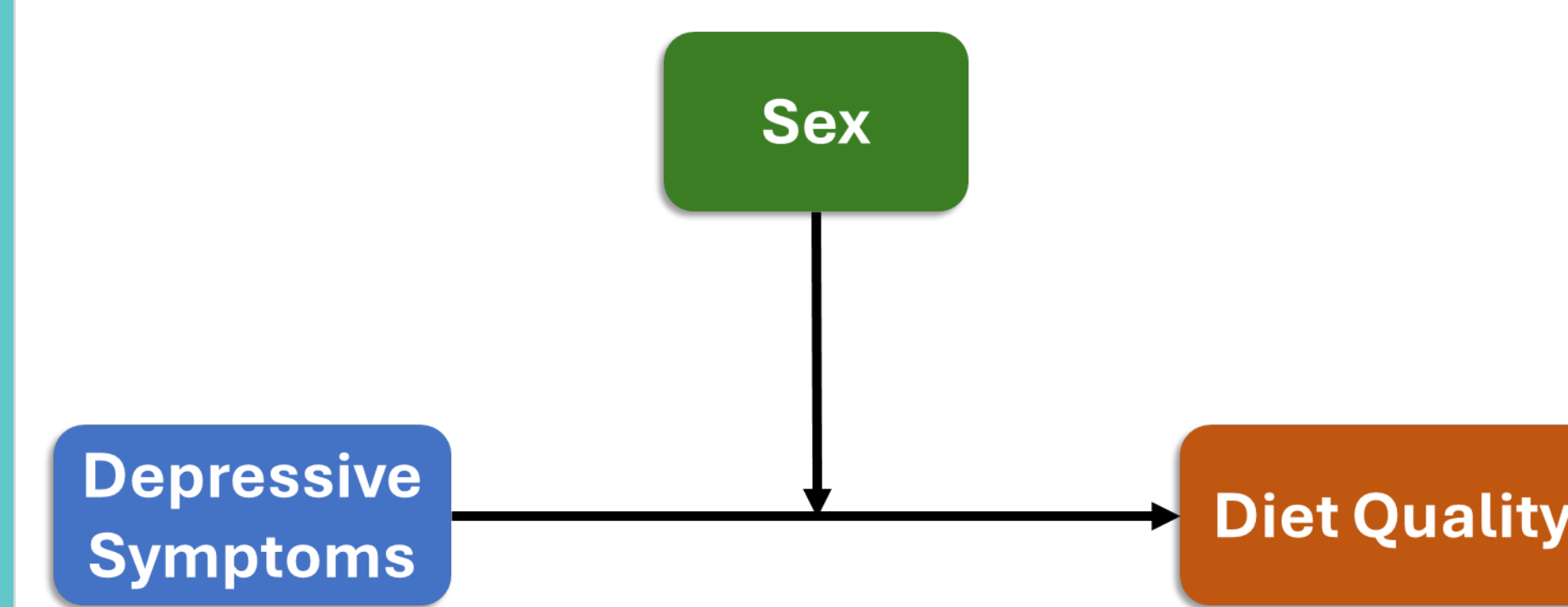


Figure 1. Conceptual Model

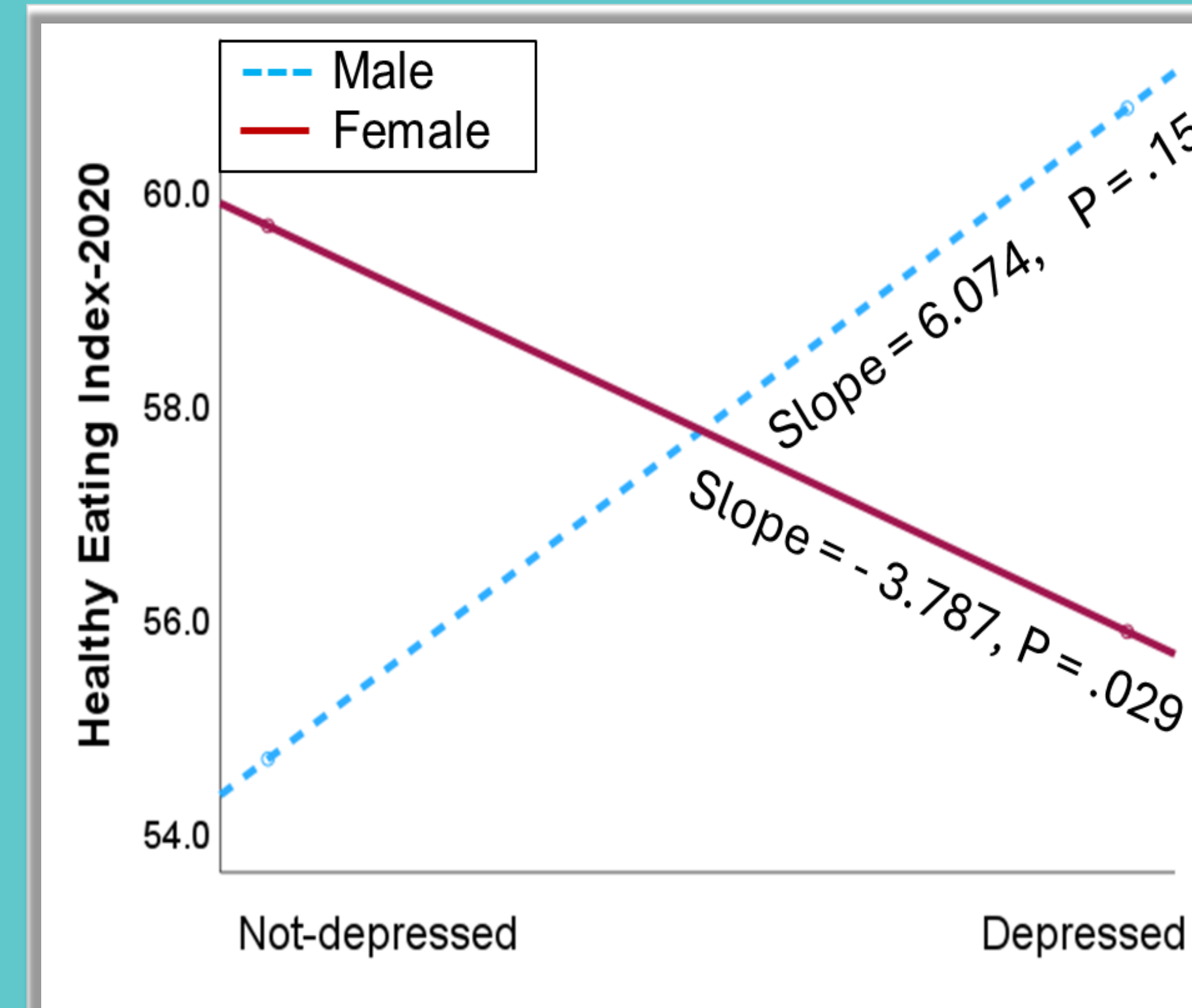


Figure 2. Sex moderates the relationship between depressive symptoms and diet quality

Table 2. The moderation effect of sex in the relationship of depressive symptoms with diet quality

Variables	Coefficient	SE	P-value
Depressive symptoms, Depressed	6.0736	4.239	0.153
Sex, Female	4.976	1.6362	0.003
Depressive symptoms X Sex	-9.8606	4.4293	0.026
Age	0.2357	0.0475	<0.001
Financial status	-4.8957	1.7132	0.005
Caregiving burden	0.0207	0.0425	0.627

RESULTS

- Mean age and body mass index (BMI) of the population were 55 ± 13 years and 33.39 ± 7.3 kg/m², respectively.
- Seventy-six percent were female.
- There were significant differences in caregiving burden (P > 0.001) and depressive symptom scores (P = 0.013) between male and female groups.
- Sex moderated the relationship between depressive symptoms and diet quality, controlling for age, financial status, and caregiving burden (interaction effect = -9.86, P = 0.027).
- Among female caregivers, the depressed group showed lower diet quality ($\beta^{\wedge} = -3.53$, P = 0.032).
- However, in male caregivers, depressive symptom status was not significantly associated with diet quality ($\beta^{\wedge} = 6.07$, P = 0.16).
- The moderation model explained 15% of the variation in diet quality (P < 0.001).

CONCLUSION

- Our findings suggest that rural female caregivers with depressive symptoms are at high risk of consuming lower quality diets.
- Assessing female caregivers for depressive symptoms may identify those who would benefit from interventions to improve diet quality.



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-Hippocrates