



Depression, Anxiety and Stress Among Young Farmers and Ranchers: A Pilot Study

Josie M. Rudolphi¹ · Richard L. Berg² · Ajay Parsaik³

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Abstract

Agriculture has been identified as a stressful industry and there is evidence that chronic stress may contribute to the development or progression of mental health disorders, specifically anxiety and depression. Young adult farmers and ranchers may be at increased risk of mental health disorders when compared to more experienced counterparts due to additional stressors. The objectives of this study were to identify the occupational stressors of young adult farmers and ranchers in the Midwest and estimate the prevalence of anxiety and depression among this population. An online survey consisting of reliable and valid instruments was used to identify the sources of stress and prevalence of anxiety and depression among the young farming and ranching population. The survey included items related to stress, anxiety, depression, general health, and farm/personal demographics. A total of 170 young farmers and ranchers responded to the survey. The mean age of the sample was 28.9 (SD 4.4) years. Approximately 71% of respondents met the criteria for Generalized Anxiety Disorder (GAD-7 score ≥ 5) and 53% met the criteria for Major Depressive Disorder (PHQ-9 score ≥ 5). Of seven presented stress domains, personal finances and time pressures were the sources of greatest concern. Personal finances, time pressures, economic conditions, and employee relations were associated with anxiety and depression. The burden of depression and anxiety is high among young adult farmers and ranchers. Stressors commonly affiliated with farming and ranching are associated with anxiety and depression. Additional research should further explore the burden of mental health disorders among the population and examine protective factors for mental illness and opportunities for interventions.

Keywords Agricultural safety and health · Mental health · Depression · Anxiety

Introduction

Agriculture is recognized as one of the most hazardous industries with a considerable amount of attention focused on the physical health and safety of farmers. The current evidence suggests that farming and ranching may also contribute to poor mental health (Ellis and Albrecht 2017; Fraser et al. 2005; Gregoire 2002; Hounscome et al. 2012; Morgan et al. 2016).

Agricultural work is often characterized by manual labor, long hours, and high stress. Commonly reported occupational stressors among farmers include unfavorable environmental conditions, variable market prices for crops and livestock, environmental regulations, and time pressures (Kearney et al. 2014; Booth and Lloyd 2000). Young adult farmers and ranchers may experience additional stressors beyond that of their more experienced counterparts. These stressors include limited access to land, capital, and affordable healthcare, maintaining an off-farm job and working to establish themselves in the industry (Ahearn 2011). Additionally, the younger farmers on an intergenerational family farm may experience more stress as a function of managerial control and support compared to the older generation (Weigel et al. 1987; Marotz-Baden and Mattheis 1994). There is accumulating evidence that chronic stress may contribute to the development and progression of mental health disorders, specifically depression and anxiety (Habib et al. 2001).

✉ Josie M. Rudolphi
josier@illinois.edu

¹ Department of Agricultural and Biological Engineering, University of Illinois, 1304 W. Pennsylvania Avenue, Urbana, IL 61801, USA

² Marshfield Clinic Research Institute, Marshfield, WI, USA

³ Department of Psychiatry, Marshfield Clinic, Marshfield, WI, USA

Examinations of the burden of mental illness, specifically depression among farmers in the Midwest are inconsistent ranging from 7.4 to 35% depending on the state. Among male farmers, the prevalence of depression was 35% in Ohio (Belyea and Lobao 1990), 26.1% in Missouri (O'Brien et al. 1994), and 12.2% in Iowa (Scarath et al. 2000). While these studies contributed novel information to the body of knowledge of farmer's mental health, they are dated and, importantly, focused on experienced farmers only (Scarath et al. 2000). If young adult farmers and ranchers are experiencing more stress than the older experienced farmers, concern for their mental health should be a priority for early intervention. Within agriculture, anxiety and depression have been associated with work-related injuries, unsafe work behaviors, impaired work performance and lost productivity (Stallones and Beseler 2004; Haslam et al. 2005). This suggests that identifying and treating the anxiety and depression among young farmers is important to ensure the health, safety, and productivity of the agricultural workforce.

The objectives of this study were to identify the occupational stressors of young adult farmers and ranchers in the Midwest and estimate the prevalence of anxiety and depression among the farming and ranching population.

Methods

This cross-sectional study was approved by the Institutional Review Board of Marshfield Clinic Health System.

Participants

Young adult farmers and ranchers were invited to participate in the study if they met the following inclusion criteria; (1) between the ages 18 and 37 years at the time of the survey, and (2) reported farming and/or ranching as a primary occupation.

Survey Instrument

An online survey consisting of reliable and valid instruments was used to identify the sources of stress and symptoms of anxiety and depression among the young adult farming and ranching population. The survey included items related to stress, anxiety, depression, general health, and farm/personal demographics.

Anxiety

The Generalized Anxiety Disorder-7 item scale (GAD-7) was employed to identify the self-reported symptoms of anxiety among young farmers and ranchers. The GAD-7 is a commonly used screening tool for anxiety in population-based

studies (Kroenke et al. 2007). The GAD-7 has good sensitivity, specificity, reliability and cross-cultural validity as a measure of anxiety (Cronbach's $\alpha=0.91$) (Kroenke et al. 2007). Participants responded to seven unique statements that queried the frequency of anxiety-related symptoms as experienced in the past 2 weeks. Response options were assigned a point-value; not at all = 0, several days = 1, over half the days = 2, nearly every day = 3. The response option point-values for each of the seven unique anxiety-related symptoms were added for an individual's total score. The possible GAD-7 score range was 0 to 21 with the following cut points and severity classification: 0–4 = none/minimal, 5 to 9 = mild, 10 to 14 = moderate, and 15 to 21 = severe anxiety (Kroenke et al. 2007).

Depression

Self-reported symptoms of depression were assessed using the Patient Health Questionnaire (PHQ-9), a 9 item questionnaire that has been used to estimate the prevalence of depression in population-based studies (Kroenke et al. 2001). The PHQ-9 has good internal validity, sensitivity, and specificity (Cronbach's $\alpha=0.92$) (Kroenke et al. 2001). Participants responded to the nine statements that queried the frequency of depressive symptoms experienced in the past 2 weeks. Response options were assigned a point-value; not at all = 0, several days = 1, over half the days = 2, nearly every day = 3. The response option point-values for each of the nine unique depression-related symptoms were added for an individual's total PHQ-9 score. The possible score range was 0–27 with the following cut points and severity classification: 0–4 = none/minimal, 5–9 mild, 10–14 = moderate, 15–21 = moderately severe and 21–27 = severe depression (Kroenke et al. 2001).

Stress

A modified Farm Stress Survey (Eberhardt and Pooyan 1990) was used to identify the sources of stress among young farmers and ranchers. The original Farm Stress Survey has 28 items categorized into six subscales (personal finances, time pressure, weather conditions, geographic isolation, hazardous working conditions, and general economic conditions) to measure six dimensions of stress. The Farm Stress Survey was modified to include another section—interpersonal relations—and some items within the original subscales were modified to reflect the current agricultural issues (e.g., input costs). Modifications were made after an initial pilot test of the original instrument and follow-up questions by researchers to members of the target population. After items were modified and the section on employee relations was added, the instrument was pilot tested a second time with members of the target

population. Participants were asked to indicate the extent to which each of the items of the Farm Stress Survey was a source of worry or concern in the past 2 weeks. The internal consistency of the Farm Stress Survey subscales was high (Cronbach's α ranged from 0.84 to 0.88).

Personal Demographics

Participants responded to items about personal demographic characteristics including gender, age, education level, marital status, role on the farm, veteran status, household income from farming, off-farm employment status, medical history, family medical history, previous diagnosis of depression or anxiety disorder, and current treatment for anxiety or depression (if any).

Farm Demographics

Participants responded to items inquiring about farm characteristics including primary farm commodity, secondary farm commodity, and farm type (family farm, non-family farm).

Survey Delivery

Participants were recruited from Iowa, Kansas, North Dakota, and Wisconsin through each state's Farm Bureau Young Farmer and Rancher program, a nationwide career/professional development organization with state-based affiliations for young adult agricultural producers. Farm Bureau Young Farmer and Rancher program coordinators in each state distributed the online survey to their young farmer and rancher members. The state coordinators sent the study information with a link to the online survey to their young farmers and ranchers via email, via an e-newsletter, or via the organization's social media outlets (Facebook, Twitter).

The survey was administered online using REDCap electronic data capture tools. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support research studies (Harris et al. 2009). A modified Dillman et al. (2009) method for improved survey response was employed. Dillman's method encourages personalized and repeated contact to encourage survey response (20). Study participants were reminded three times via email, newsletter, or social media over the course of the study period to complete the questionnaire. The study period lasted 2 months, February through March 2018.

The survey was designed to be completed within 20 min and could be completed on a smartphone, tablet, or computer.

Statistical Analysis

Descriptive analyses were performed to calculate the frequency and percent of categorical variables and means and standard deviations of continuous variables.

The GAD-7 and PHQ-9 scores were categorized with established limits. Pre-determined cutoff points for the GAD-7 were used to classify subjects into those with anxiety symptoms (GAD-7 score ≥ 5) and those without anxiety symptoms (GAD-7 score ≤ 4). Pre-determined cutoff points for the PHQ-9 were used to classify subjects into those with depressive symptoms (PHQ-9 score ≥ 5) and those without depressive symptoms (PHQ-9 score ≤ 4). The overall prevalence for these conditions was estimated and summarized together with 95% confidence limits.

Farm Stress Survey subscale scores were calculated by determining the mean response to the items within each subscale. Scores ranged from 0 to 4, with the higher score indicating more personal concern or worry by a participant. Means with 95% confidence limits were summarized for the overall scores and separately for those with and without anxiety and/or depressive symptoms.

Descriptive analyses were performed to calculate the frequency and percents of categorical variables (demographic characteristics, farm variables), and means and standard deviations were calculated to describe continuous variables including individual GAD-7 scores, PHQ-9 scores, and Farm Stress Survey subscale scores.

In some cases, individual results were skipped or missed by a few respondents. For the results reported here, the numbers of total respondents with data range from 167 (98% complete) to 170 (100% complete).

Fisher's exact test was used to examine the association between Farm Stress Survey subscale scores and anxiety and depression, separately. The five response options for stress were collapsed into three categories due to small counts: none/very little (0 and 1), some (2), and quite a bit/a great deal (3 and 4). Anxiety and depression were dichotomized (yes/no) using the score of 5 or greater on the GAD-7 and PHQ-9 to indicate a positive case.

Standardized Cronbach's α coefficients were calculated to examine the internal consistency of the GAD-7, PHQ-9, and seven stress domains.

Results

A total of 170 young adult farmers provided useable responses to our survey. The mean age of the sample was 28.9 (SD 4.4) years. About half of respondents were male (53.3%) and about half were married (45.9%). Almost half (48.5%) of participants were either the principal owner or partner owner of a farm operation. Primary farm

commodities identified by respondents included crops (35.3%) dairy cows (35.9%), and beef cattle (20.6%) (Table 1).

Mean scores and ranges of different domains of the Farm Stress Survey are reported in Table 2. Of the seven presented stress domains, personal finances (mean score = 2.6) and time pressures (mean score = 2.2) were the sources of

greatest concern among young adult farmers and ranchers. Hazardous working conditions and social isolation were identified as causing the least amount of worry or concern.

Over a third of respondents (35.9%) reported mild symptoms of generalized anxiety disorder, while 18.2% and 16.5% reported moderate or severe symptoms, respectively (Table 3). Similarly, over a third of respondents (35.9%)

Table 1 Demographic characteristics of young adult farmers and ranchers

	N (%) or mean (SD)	Anxiety (GAD-7 \geq 5)* N (%)	Depression (PHQ-9 \geq 5)* N (%)
Gender			
Male	90 (53.3)	62 (68.9)	47 (52.2)
Female	79 (46.7)	57 (72.2)	42 (53.2)
Age	28.9 (4.4)		
Education level			
High school/some college	32 (18.9)	19 (59.4)	16 (50.0)
Associate/vocational	41 (24.3)	30 (73.2)	25 (61.0)
B.S. or B.A.	82 (48.5)	63 (76.8)	43 (52.4)
Graduate degree	14 (8.3)	8 (57.1)	6 (42.9)
Marital status			
Married	78 (45.9)	55 (70.7)	51 (55.4)
Unmarried	92 (54.1)	55 (70.5)	39 (50.0)
Role on farm			
Principal owner	40 (23.7)	27 (67.5)	17 (42.5)
Partner owner	42 (24.9)	32 (76.2)	25 (59.5)
Secondary owner	36 (21.3)	28 (77.8)	20 (55.6)
Child of owner	26 (15.4)	15 (57.7)	15 (57.7)
All other	25 (12.8)	17 (68.0)	12 (48.0)
Primary commodity			
Field crops	60 (35.3)	44 (73.3)	29 (48.3)
Dairy cattle	61 (35.9)	43 (70.5)	36 (59.0)
Beef cattle	35 (20.6)	24 (68.6)	18 (51.4)
All other	14 (8.2)	9 (64.3)	7 (50.0)
Veteran status			
No	166 (98.2)	118 (71.1)	88 (53.0)
Yes	3 (1.8)	2 (66.7)	2 (66.7)
Operation type			
Independent operation	37 (22.0)	26 (70.3)	18 (48.6)
Family operation	126 (75.0)	88 (69.8)	68 (54.0)
Non-family operation	5 (3.0)	4 (80.0)	2 (40.0)
Off-farm job			
No	57 (33.5)	43 (75.4)	33 (57.9)
Yes, part-time	21 (12.4)	15 (71.4)	12 (37.1)
Yes, full-time	92 (54.1)	62 (67.4)	45 (48.9)
Household income from farming			
Less than 25%	59 (34.7)	37 (62.7)	27 (45.8)
25–49%	30 (17.6)	20 (66.7)	17 (56.7)
50–74%	30 (17.6)	22 (73.3)	15 (50.0)
75–99%	27 (15.9)	23 (85.2)	18 (66.7)
100%	24 (14.1)	18 (75.0)	13 (54.2)

*No comparisons statistically significant (all $p > 0.05$)

Table 2 Mean, standard deviation, and range of stress scores by domain

Stress domain	Sample items	Mean (SD)	Range
Personal finances	Repayment of farm loans; financing retirement	2.6 (0.9)	0.0–4.0
Time pressures	Having too much to do and too little time; having too much work for one person	2.2 (1.0)	0.0–4.0
Economic conditions	Government export policy/trade agreements; government farm price supports	2.1 (1.0)	0.0–4.0
Employee relationships	Securing or hiring reliable employees; employer–employee conflict	1.3 (0.9)	0.0–3.9
Weather	Too little OR too much rainfall; early and/or late killing frost	1.5 (1.0)	0.0–4.0
Hazardous work conditions	Operating hazardous machinery; dust, chemical dusts, powders;	1.2 (0.8)	0.0–4.0
Social isolation	Limited social interaction opportunities; distance from shopping centers/opportunities	0.9 (0.8)	0.0–3.4

Scale: 0 = no stress, 4 = overwhelming stress

Table 3 GAD-7 scores by prescribed cutoff points

GAD-7 score	N (%)
None/minimal (0–4)	50 (29.4)
Mild (5–9)	61 (35.9)
Moderate (10–14)	31 (18.2)
Severe (15–21)	28 (16.5)

Table 4 PHQ-9 scores by prescribed cutoff points

PHQ-9 score	N (%)
0–4 (none/minimal)	80 (41.7)
5–9 (mild)	40 (35.9)
10–14 (moderate)	25 (14.7)
15–19 (moderately severe)	17 (10.0)
20–27 (severe)	8 (4.7)

reported mild symptoms of depression, while 14.7%, 10.0% and 4.7% reported moderate, moderately severe, and severe symptoms, respectively (Table 4).

There were no significant differences in the prevalence of depression or anxiety within levels of demographics or farm characteristics (Table 1). Those who reported that personal finances, time pressures, economic conditions, and intrapersonal relationships caused quite a bit/a great deal of stress, reported more anxiety and depression than those who reported the same stressors causing none/very little or some stress (Table 5).

Discussion

The objectives of this study were to identify the occupational stressors of young adult farmers and ranchers in the Midwest and estimate the prevalence of anxiety and depression among the population. Our results are the first to describe the burden of anxiety and depression among young adult farmers and ranchers in the Midwest.

Approximately 71% of respondents met the criteria for Generalized Anxiety Disorder (GAD-7 score ≥ 5). In the U.S., an estimated 18.1% of adults experience an anxiety disorder (National Institute of Mental Health 2018). Women are twice as likely to be affected by anxiety as men (Anxiety and Depression Association of America 2010). However, we did not observe a significant difference in the prevalence of anxiety by gender, which contradicts previous research in which farm women scored less favorably on mental health assessments compared to males in Canada (Jones-Bitton et al. 2019), Australia (Brumby et al. 2012) and the UK (Booth and Lloyd 2000). While our estimates of the prevalence of anxiety among young adult farmers is higher than the estimated prevalence among the general U.S. population, our results align with those of a recent survey of Canadian farmers which found 58% had varying levels of anxiety (Jones-Bitton et al. 2019).

Among our sample of young adult farmers and ranchers, 53% met the criteria for depressive disorder (PHQ-9 score ≥ 5). According to the National Institute of Mental Health, 6.7% of U.S. adults experience at least one major depressive episode annually, defined as a period of 2 weeks or longer during which there is either depressed mood or loss of interest or pleasure, and at least four other symptoms that reflect a change in functioning, such as problems with sleep, eating, energy, concentration, self-image or recurrent thoughts of death or suicide (National Institute of Mental Health 2017). The most recent data from the Behavioral Risk Factors Surveillance Survey (2009–2012) reported 7.9% of Americans aged 18 to 35 years had moderate or severe depression (Pratt and Brody 2009). This estimate is lower than the 29.4% in our sample that experienced moderate or severe symptoms. However, our results are similar to recent estimates of Canadian farmers in which 35% reported symptoms of depression (Jones-Bitton et al. 2019). While comparisons to the general population should be interpreted with caution, our results suggest that the young adult farmer and rancher population may be at increased risk of anxiety and depression. While comparisons with other populations should be interpreted in light of some limitations, other

Table 5 Association between stress and anxiety and stress and depression

Stress domain	Stress level	Anxiety (GAD-7 ≥ 5) N (%)	p-value	Depression (PHQ-9 ≥ 5) N (%)	p-value
Finances	None/very little	8 (40.0)	<.001	5 (25.0)	<.001
	Some	28 (50.0)		20 (37.5)	
	Quite a bit/great deal	84 (89.0)		65 (69.1)	
Time pressures	None/very little	19 (47.5)	<.001	13 (32.5)	<.001
	Some	46 (67.6)		33 (48.5)	
	Quite a bit/great deal	54 (88.5)		43 (70.5)	
Economics	None/very little	26 (54.2)	.01	19 (39.6)	<.001
	Some	48 (72.7)		29 (43.9)	
	Quite a bit/great deal	44 (81.5)		40 (74.1)	
Employee relationships	None/very little	69 (63.9)	.002	49 (45.4)	.02
	Some	32 (76.2)		26 (61.9)	
	Quite a bit/great deal	18 (100.0)		14 (77.8)	
Weather	None/very little	47 (61.8)	.10	33 (43.4)	.09
	Some	59 (76.6)		46 (59.7)	
	Quite a bit/great deal	13 (81.3)		10 (62.5)	
Hazardous conditions	None/very little	74 (64.9)	.09	61 (53.5)	.85
	Some	38 (80.9)		24 (51.1)	
	Quite a bit/great deal	6 (85.7)		3 (42.9)	
Social isolation	None/very little	94 (67.6)	.10	70 (50.4)	.43
	Some	22 (88.0)		16 (64.0)	
	Quite a bit/great deal	4 (66.7)		4 (66.7)	

studies tend to confirm the high levels of anxiety and/or depression among the farming community (Gregoire 2002; Booth and Lloyd 2000; Scarth et al. 2000).

We categorized depression and anxiety cases as individuals with GAD-7 and/or PHQ-9 scores greater than or equal to 5. We chose a lower threshold to identify those with mild symptoms (GAD-7 and PHQ-9 scores between 5 and 10). Our more sensitive screening approach for anxiety and depression emphasizes the opportunity for public health interventions, as opposed to clinical intervention. Many people struggling with mental health disorders, such as anxiety and depression, often go unidentified and progress into more severe diseases (Wang et al. 2005). Identifying mental health disorders early in milder form allows for timely interventions before symptoms progress into disabling conditions. Rural and agricultural communities are medically underserved and mental health care providers are not always available or accessible (Andrilla et al. 2018). As such, emphasis should be on early detection of mental health disorders, which are treatable using psychotherapy and other approaches without using psychotropics. Community based public health approaches that encourage self-care, healthy living and promote social support could improve mild to moderate symptoms (Barnett and Gotlib 1988).

Among the seven Farm Stress Survey domains, *personal finances*, *time pressures*, *economic conditions*, and *employee*

relations were associated with anxiety and depression, separately. *Personal finances*, *economic conditions*, and *time pressures* have previously been reported as causing stress among farmers in the United States and Europe (Kearney et al. 2014; Booth and Lloyd 2000; Freeman et al. 2008). Our results further suggest that financial and economic problems among farmers leading to mental health declines are a global concern and should be monitored closely. We also observed an association between depression and anxiety with *employee relationships*. The shift towards hired employees in the dairy industry has been a source of concern among farm owners. Procuring hired labor is a challenge for farm owners who cannot compete with higher wage or less manually intensive jobs (Walter 2018). Additionally, farm owners must shift their individual focus from production tasks to management tasks, something they may not have training or expertise in.

Social and geographic isolation are reported risk factors for poor mental health among farmers (Raine 1999; Caruth and Logag 2002), and unfavorable weather is often cited as a source of stress. However, we did not observe significant associations between *social and geographic isolation or weather conditions* and health outcomes of interest. However, we surveyed young farmers and ranchers in January/February, when weather conditions like too much or too little rainfall might not be a stressor. It would

be beneficial to survey farmers during the growing season to determine if weather is associated with anxiety and/or depression. Additionally, given the absence of association between social isolation and anxiety and/or depression an examination into the social connectedness of the young adult population may inform social interventions for other farming and ranching populations who are more socially isolated.

In the absence of recent published data, our results suggest that the young adult farmer and rancher population may be experiencing high rates of anxiety and depression. Recent data from the 2017 USDA Agricultural Census suggest that 8% of the nearly 3.5 million farm producers in the United States are under the age of 35 years with the youngest producers in the Midwest (USDA 2019). Young adult farmers and ranchers contribute substantially to the agricultural workforce, and it is expected that their participation will increase as older farmers are expected to retire faster than usual rate given the unfavorable agricultural economic and financial climate (Utterback 2014). As the industry becomes reliant on the young adult workforce, immediate attention is needed to manage the occupational stress and improve the mental health of young farmers and ranchers to ensure a sustainable workforce.

While our results are limited to the Midwest and are subject to limitations, our results are supported by similar research and reports of farmers in crisis. As previously mentioned, a recent cross-sectional study in Canada reported similar prevalence of anxiety and depression and cited comparable sources of stress among farmers (Jones-Bitton et al. 2019). Additionally, farm and popular media has been highlighting stories of farm closures and farmer suicides in recent years, signaling the need for additional research and intervention. The results of this pilot study suggest the need for additional research. We estimated the prevalence of anxiety and depression among our sample of young adult farmers, and explored univariate associations between the sources of stress and health outcomes of interest. These preliminary results warrant additional research to explore the causality of association between stress and anxiety and depression. Furthermore, larger epidemiological studies that explore the distribution of mental health disorders among types of farmers, by commodity or geographical region, would underscore high-risk areas of agricultural and inform interventions.

We recommend continued advocacy for increasing the mental health capacity of rural hospital and clinics to meet the needs of farmers. More importantly, in the absence of available and accessible mental health services, we recommend an emphasis on community based interventions to increase awareness of mental health disorders, and increase the community's capacity to respond. As such, an additional line of research should develop and

test community-based interventions to promote positive mental health among agricultural populations.

Strengths and Limitations

The results of this pilot study should be interpreted in light of some limitations. As a cross-sectional study, it is not possible to identify the causal relationship between different stressors and the mental health outcomes of interest. The study's limited sample size requires that findings be treated cautiously. The passive method of recruitment, including newsletter advertisements and social media postings, limits our ability to calculate a true response rate. While we estimate that each organization has between 300 and 600 members, based on communication with organization representatives. However there is no way of determining how many members were successfully contacted. Regardless, variable response could be due to selection bias. It is possible that individuals with mental health concerns were more likely to respond than otherwise healthy individuals, which may have over-estimated the prevalence of anxiety and depression among young farmers and ranchers. It is difficult to compare our results with other studies on farmers' mental health, due to differences in screening instruments and differing populations. In addition, we cannot assume that all young farmers/rancher participate in their state's Young Farmer/Rancher Program and we do not know that how those that do participate differ from those who do not participate.

Our analysis was largely descriptive and univariate associations between the sources of stress and reported anxiety and depression. We recognize the relationship between stress and mental health disorders is complex and require adjusting for confounders. Ideally, multivariable models would be better method to explore this relationship, however, we were limited in statistical capabilities due to small sample size.

This study has many strengths. Our respondents were similar to census data for young farmers and ranchers throughout the Midwest with the majority male and holding an off-farm job (USDA 2019). Our sample is also similar to those in a report on beginning farmers and ranchers (less than 10 years' experience) who were also primarily male, non-Hispanic/white, with an education beyond high school, and who hold a job off the farm (8). An important contribution of this research is the high internal consistency of the PHQ-9 ($\alpha=0.91$) and GAD-7 ($\alpha=0.92$) among the young adult agricultural population. Additionally, we modified the original Farm Stress Survey (Eberhardt and Pooyan 1990) while confirming the internal consistency of each original stress domain and the additional domain (employee relations). The internal consistency of the seven subscales was also high (Cronbach's α ranged from 0.84 to 0.88).

Conclusion

In conclusion, occupational stressors commonly affiliated with farming and ranching were negatively associated with the mental health of young adults in the industry. The prevalence of depression and anxiety were much higher among young farmers and ranchers compared to general population. The average age of farmers is increasing, creating a demand for younger farmers and ranchers. As the industry becomes reliant on the young adult workforce, reducing stress and improving mental health should be a priority.

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Compliance with Ethical Standards

Conflicts of interest The authors have no conflicts of interest to disclose.

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