Determinants of Stress, Depression, and Suicide Ideation in Florida Farmers as Leverage Points for Agricultural Communicators and Extension

Recent attention has identified compounding stressors in agriculture and the impact they are having on the mental health of agricultural producers, their families, and those they employ (Grocke-Dewey et al., 2023; Truchot & Andela, 2018). The American Institute of Stress (n.d.) reports that job stress reached new heights in the years following the COVID-19 pandemic. This was further supported by nationwide data indicating that 77% of individuals experience work-related stress (American Psychological Association, 2023). When work-related stress is persistent or unchanging, impacts can significantly influence worker health and safety. Farming often blurs the line between livelihood and lifestyle, meaning work demands and the stress that comes from the job is often interwoven with personal challenges. Research indicates the experience of stressful life events, burnout, and a lack of perceived job control (Oh et al., 2023) are significantly associated with suicidal behaviors and ideation. Over the past decade, research on stress, anxiety and depression, and suicide risk among farmers has grown steadily. Empirical evidence suggests the suicide rate among those working in the agricultural, forestry, fishing, and hunting (AFFH) industries, specifically males, is significantly higher than the general working-age population (Peterson et al, 2020). In a study of Georgia farmers, researchers shared that almost half of their sample experienced sadness or depression and nearly a third ideated suicide in the past year (Basey et al., 2022). While some studies have explored mortality and suicide risk in farming populations (de Oliveira Santos et al., 2021), Florida lacks baseline data on farmer wellbeing, including stress, depression, and suicide ideation. The state's regulatory environment, inclination to natural disaster, and diverse commodity profile pose potential risks for compounding stress (Lindsey et al., 2023). Therefore, our study aimed to examine critical health indicators pointing to the current state of farmer wellbeing in Florida. Findings and recommendations are relevant for agricultural communicators and industry leaders, health professionals, Extension educators, and policymakers partnering to address farmer mental health through legislation, education programs, communication, and outreach.

Purpose and Objectives

The purpose of this study was to determine the current state of Florida farmers' wellbeing with the intent of obtaining comprehensive baseline data to inform strategic plans for addressing risks and preventing mental health crises in the coming years. We accomplished this using the following objectives:

1. Describe perceived stress in farmers, including significant differences in outcomes, based on demographics and farming-related factors.
2. Identify factors predicting perceived stress in farmers.
3. Describe experiences of sadness and depression in farmers, including significant differences in outcomes, based on demographics and farming-related factors.
4. Identify factors predicting sadness and depression in farmers.
5. Describe experiences with suicide ideation in farmers, including significant differences in outcomes, based on demographics and farming-related factors.
6. Identify factors predicting sadness and depression in farmers.

Theoretical Framework

We used Lazarus and Folkman's (1984) transactional theory of stress and coping as the theoretical frame. This theory focuses on how individuals assess, perceive, and respond to stressors in their environment (Lazarus & Folkman, 1984). Further, it recognizes positive and negative impacts of stress, including the emotional response processes and threat assessment that occurs when presented with a stressor (Lazarus & Folkman, 1984). The transactional theory of stress and coping emphasizes the dynamic relationship between stress and coping and propose when stress outweighs an individuals' ability to cope, it triggers cognitive appraisals that label the existing interaction or engagement with stress as a threat (Lazarus & Folkman, 1984). This theory is one of the most widely used theories in stress research and has been applied recently in studies to assess stress, coping, and resilience among farmers (Holmstrom et al., 2023; Mangi et al., 2023).

Methods

This study used a cross-sectional survey design to examine the mental wellbeing of Florida farmers. The findings focused on farmer-specific mental health outcomes were a part of the Mind Your Melon Farmer survey. The survey included demographics, farming-related items, pre-existing scales, including the widely used-perceived stress scale (PSS-14, $\alpha = 0.88$; Cohen et al., 1983), and other researcher-developed items informed by refereed literature and pilot testing. The survey was developed using Qualtrics and took approximately 20 minutes to complete. We collected data from August-November 2024 using protocols co-created with our industry partners. The survey was distributed via email and social media using Dillman et al.'s (2014) tailored design method for survey design and recruitment. Additionally, our research team attended seven annual meetings during the data collection window and employed a modified venue-based sampling approach, which is cited as effective for hard-to-reach populations, like farmers (Muhib et al., 2001). We used PSS-14 (Cohen et al., 1983) to measure farmer stress; and single-item binary variables to assess experiences with sadness and depression and suicide ideation. We analyzed data using SPSS Version 29.0. We utilized frequencies and percentages to characterize demographic information. To address objectives one and two, we used a mean sum and standard deviations for PSS scores; independent t-tests and one-way ANOVAs to compare means; and a multiple linear regression to predict stress. We employed Chi-square analyses and binary logistic regressions to address objectives three through six.

Results and Findings

Of the 671 survey responses, 373 identified their primary role as farm owner ($n = 294$), farm manager/supervisor ($n = 58$), or farmworker ($n = 21$). This paper focuses on that sample. We had varying levels of response to demographic items and percentages reflect those differences. The majority of farmers were white ($n = 348$, 94.5%), married ($n = 267$, 77.4%), males ($n = 221$, 61.2%), without children in the household ($n = 183$, 52.4%), between 35-54 years old ($n = 84$, 40.6%). Our sample was highly educated, with majority holding a bachelor's ($n = 136$, 39.0%) or graduate/professional degree ($n = 78$, 22.3%). The greatest proportion reported a household income of $200,000 or more ($n = 93$, 26.6%) but did not rely on the farm as their family's sole income source ($n = 258$, 72.1%). Most had generational farming backgrounds ($n = 240$, 69.6%). The greatest percentage of respondents farmed full-time ($n = 211$, 57.2%) on

small family farms (n = 172, 51.3%). A wide variety of industry sectors and commodity groups in Florida were represented. Beef production (f = 178) was the most represented sector.

Objective 1: Farmer Stress and Significant Differences

Farmers reported moderate levels of stress (M = 23.61, SD = 8.19). T-tests indicated stress was higher among females (p = .002), unmarried individuals (p = .012), those with farm-only income (p < .001), living off the farm (p = .038), and frequently unhappy in their role (p = < .001). One-way ANOVA results identified significant difference in stress between age groups (F(3, 175) = 10.910, p = < .001), farm roles (F(2, 307) = 5.614, p = .004), farm type (F(3, 302) = 6.241, p = < .001), and weekly hours worked (F(2, 307) = 5.614, p = .004), Tukey post hoc tests indicated stress among those aged 18-34 (M = 27.21, SD = 6.72) was significantly higher than those aged 55-74 (M = 19.13, SD = 9.09, p < .001) and those 75 and older (M = 15.67, SD = 6.98, p < .001). Similarly, stress was higher among those aged 35-54 (M = 23.59, SD = 6.87, p < .001), relative to farmers 55-74 years (p = .005) and 75 years and older (p = .020). Stress among farmworkers (M = 27.71, SD = 8.51) was significantly higher than farm owners (M = 22.82, SD = 8.12, p = .043). Stress among farm managers/supervisors (M = 26.04, SD = 7.65) was significantly higher than farm owners (p = .029). Regarding farm type, stress was significantly lower for those on small family farms (M = 21.72, SD = 8.00), relative to those on midsize family (M = 25.42, SD = 7.18, p = .027), large family (M = 25.73, SD = 8.04, p = .002), and non-family farms (M = 25.83, SD = 8.67, p = .049). Those who worked 0-20 weekly hours (M = 19.79, SD = 8.84) reported significantly less stress relative to those working overtime at 61-80 hours (M = 25.33, SD = 8.37, p = .008) and 81-100 hours (M = 25.56, SD = 6.94, p = .006). Similarly, those working part-time at 21-40 hours (M = 19.32, SD = 7.59) also reported significantly less stress relative to those working 41-60 hours (M = 23.74, SD = 7.67, p = .035), 61-80 hours (p = .001), and 81-100 hours (p = .006).

Objective 2: Predicting Farmer Stress

To identify predictive stress factors, we first checked to ensure the data did not violate regression assumptions. The Q-Q plot supported normality and VIF values less than 2 indicated no significant signs of multicollinearity. Durbin-Watson statistic (DW = 2.18) fell within the acceptable range, suggesting independence of errors assumption had been met. Finally, an insignificant Breusch–Pagan test χ^2 = .755, p = .796, indicated the assumption of homogeneity of variance was met. Our regression model predicting stress explained a significant amount of variation in farmers' (n = 268) perceived stress, F(26, 259) = 6.939, p < 0.001, R^2 = .411. Accounting for the number of predictors, the adjusted percentage of variance explained was 35.1%. When examining individual predictors, results indicated age (p < .001), relationship status (p = .016), income source (p =.005), job satisfaction (p < .001), and weekly hours worked (p = .013) were significant predictors of perceived stress scores in Florida farmers. Holding all other variables constant, increase in age was associated with an average, statistically significant decrease in perceived stress score (t = -3.759, p < .001). Perceived stress for divorced or separated farmers was statistically significantly higher than married farmers by 4.55 (t = 2.421, p = .016). Those with farm-only income had significantly higher perceived stress than farmers with other income streams by 2.968 (t = 2.808, p =.005); and those who indicated they were frequently unhappy with their role had significantly higher perceived stress than those who were

satisfied in their role by 6.963 (t = 8.001, $p < .001$). Finally, farmers who worked part-time at 21-40 hours reported significantly less stress than those working on average 41-60 hours a week by 3.837 (t = -2.502, $p = .013$).

Objective 3: Sadness and Depression and Significant Differences

Aside from stress, we were interested in how often farmers experienced negative role-related emotions and mental health outcomes, with a particular emphasis on sadness/depression, and suicide ideation. Results indicated 66.9% of item respondents reported feeling sad or depressed at some point in the past three months. Of those, 32.1% experienced sadness or depression less than once per month, 19.4% at least once a month, 11.2% at least once a week, and 4.2% felt sad or depressed daily. We aimed to identify if there were significant differences in experiencing sadness and depression based on personal demographics and farm-related factors. Chi-square analyses indicated significant relationships between experiencing sadness and depression and job satisfaction ($p < .001$), farm type ($p = .004$), living arrangements ($p = .011$), and income source ($p = .002$).

Objective 4: Predicting Sadness and Depression

We used these findings to model predictive factors for sadness and depression. First, we used a Box-Tidwell test ($p = .849$) and VIF values (all < 2) to ensure data did not violate assumptions. The logistic regression model using farmers' ($n = 305$) perceived stress, job satisfaction, farm type, living arrangements, and income source as explained predictors of sadness and depression, was statistically significant, $\chi^2(9) = 136.756$, $p < .001$, Nagelkerke's $R^2 = .494$. Job satisfaction ($p < .001$), and perceived stress ($p < .001$) predicted sadness and depression. Every unit increase in perceived stress increased the odds of reporting feelings of sadness or depression by 1.192 ($p < .001$); and those who were unhappy in their role were 3.869 times more likely to report feelings of sadness or depression ($p < .001$), all other things held equal. Additionally, while the effect of industry role as an overall variable was not significant, results suggested a significant effect for farm managers and supervisors (Exp(B) = .376, $p = .037$), which indicated managers and supervisors were 62.4% less likely than farm owners to report feelings of sadness and depression, all other variables held constant.

Objective 5: Suicide Ideation and Significant Differences

Suicide ideation was less prevalent, but present. Of item respondents, 10.3% reported suicide ideation in the past three months. Of those who had thoughts of suicide, 2.4% reported having suicidal thoughts more than once a month. We aimed to identify if there were significant differences in suicide ideation based on personal demographics and farm-related factors. Chi-square analyses identified significant relationships between suicide ideation and age ($p = .024$), relationship status ($p = .023$), and job satisfaction ($p < .001$).

Objective 6: Predicting Suicide Ideation

We used these findings to model predictive factors for suicide ideation. We used Box-Tidwell ($p = .923$) and VIF values (< 2). The logistic regression model using farmers' ($n = 246$)

perceived stress, age, relationship status, and job satisfaction as explained predictors of suicide ideation was statistically significant, $\chi^2(6) = 39.642$, $p < .001$, Nagelkerke's $R^2 = .345$. In our model, age ($p = .044$), relationship status ($p = .003$), and perceived stress ($p < .001$) predicted suicide ideation. In our model, all other things held constant: every unit increase in perceived stress increased the odds of reporting suicide ideation by 1.173 ($p < .001$); those who were 18-34 ($p = .009$), 35-54 ($p = .017$), and 55-74 ($p = .007$) had significantly lower odds of reporting suicide ideation, relative to those 75 and older; and those who were married or lived with a partner were 81.9% less likely (Exp(B) = .181, $p = .003$) than all others (e.g. single, divorced, widowed) to report suicide ideation. Job satisfaction did not have a significant effect.

Discussion and Recommendations

Stress and negative mental health outcomes continue to be of concern for Florida farmers. We examined moderate levels of stress and a variety of risk factors, aligning with previous literature and theory (Basey et al., 2022). Lazarus and Folkman (1984) explained the impact of factors like one's environment and ability to cope on stress. Our findings highlight personal and role-related differences in experiences of stress, sadness and depression, and suicide ideation. We identified numerous personal and role-related differences in stress. Stress was higher among women and those who were unmarried or without a partner, both of which generally align with literature. While recent, related studies posited gender was insignificant (Rudolphi et al., 2020), general-population literature supports that women experience higher levels of stress than men (APA, 2023). Currently, much of the focus for intervention and messaging on farm stress has been targeted toward males. Those interventions targeting females often assume a farm spouse lens. Given the rise in female farm ownership and production in Florida (USDA-NASS, 2022), our findings support the need for more messaging and programming focused on helping female farmers manage stress. In our study, this would be especially true for younger, female farmers with children and/or those who might rely primarily on farm income to support their family, given those significant differences identified. The significant, negative relationship we identified between age and stress aligns with recent studies revealing that individuals aged 18-34 and 35-44 reported experiencing more stress than those in other age categories (APA, 2023).

Perhaps more revealing was the prominent relationships between role-related factors and stress, sadness and depression, and suicide ideation. This indicates that while demographics and other sociocultural factors contribute to stress and more severe negative mental health outcomes, Florida farmers experienced significant work-related stress. In part, we saw those working considerable overtime experienced heightened levels of stress. Further, income source and job satisfaction predicted stress and sadness and depression. Suicide ideation also predicted by job satisfaction in our study. These data support existing literature, which indicates that a unique complication threatening farmer mental health is the inability to detach from work and the pressures of the job (Rudolphi et al., 2020). It also aligns with research citing financial strain as a consistent stressor for farmers (Rudolphi et al., 2020). This research is especially timely given the current volatility of agricultural markets and rising input costs. Further, the number of producers and farms nationally continues to decline (USDA-NASS, 2022). These findings underscore the need to invest in policies and preventative programs that target work-related stressors, reduce financial burdens, and improve overall job satisfaction among Florida farmers. These efforts will be critical to recruit and retain a healthy, sustainable agricultural workforce.

Regarding role, farm employees experienced elevated stress, comparative to owners. Literature on role differences is sparse, but research consistently supports the risk and vulnerability of farmworkers and seasonal farm employees to stress, suicide, and depression (de Oliveira Santos et al., 2022). While a less represented group in our study, farmworkers continue to be an underserved population. Continued provision for healthcare in policies like the Farm Bill, for farm employees, specifically farmworkers, should be considered. Future studies examining stressors by role type could help magnify sources of stress for targeted policies and interventions.

Suicide ideation was lower in our study in comparison to similar studies in Georgia, USA (Basey et al., 2022; Montgomery et al., 2024a), Brazil (de Oliveira Santos et al., 2022), and the United Kingdom (Phalp et al., 2021). Given the potentially sensitive nature of the topic and continued stigma around suicide, it is possible that suicide ideation was underreported and social desirability bias was present—a common limitation in suicidal behavior research (Linehan & Nielsen, 1983). Given the low prevalence of suicide ideation in our sample, generalizations should be made with caution. However, the conclusion that stress predicted sadness and depression and suicide ideation in our sample is also widely accepted in literature (CDC, n.d.). Lazarus and Folkman (1984) recognize that an inability to cope with stress leads to maladaptive coping behaviors that could have more widespread impact on an individual's health. Health practitioners cite connections between mental and physical health and the negative impacts of stress on the body (Shaw et al., 2024). Stress prevention and effective coping could save farmers' lives and improve their overall quality of life. Up until this point, much of the focus nationally and statewide, especially through the reauthorization of regional Farm and Ranch Stress Assistance Networks (FRSANs), has centered on crisis response and suicide prevention for farmers (USDA-NIFA, n.d.). However, our findings indicate Florida farmers would be best served with messaging, mental health resources, and funding that prioritizes stress prevention, rather than crisis response. We recommend framing messaging to address farmer mental health and related issues around sustainable solutions for whole farmer health. We recommend that future studies continue to explore relationships between stress, coping ability, and farmers' physical health.

This collaborative, industry-supported study expanded on pilot testing in Georgia (Basey et al., 2022) and was the first in Florida. This research provided a baseline for longitudinal stress and mental health assessment statewide. We recommend scaling this study for regional, national, and global replication to obtain comparative baseline data. Future studies should adopt a similar industry partnership model to reinforce trust and feedback loops with farmers to ensure recommendations meet local needs. If replicated regionally, data could identify stress and farmer suicide indicators in the Southeast to offer relevant message frames for agricultural communicators and industry stakeholders promoting mental health. Longitudinal data could inform critical intervention points for Extension educators and policy recommendations. More specifically, these findings highlight a pressing need to obtain bipartisan support for a new Farm Bill expeditiously. Without updated legislation in place, farmers remain largely unprotected and vulnerable to risk. We recommend that current health provisions in the Farm Bill continue and encourage the expansion of healthcare allocations to improve mental health outcomes.

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