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Factors Influencing Farmers' Use of Adaptive and Maladaptive Coping Strategies

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ABSTRACT

Objectives: Chronic stress is associated with a variety of negative outcomes for farmers in the United States (U.S) and worldwide, who face near-constant exposure to internal (e.g. family conflict) and external (e.g. weather) stressors. Research indicates that farmers' stress may be reduced by engaging in adaptive coping strategies and avoiding maladaptive coping strategies. However, little is known about what predicts their coping strategy use. Informed by the transactional theory of stress and coping, the present manuscript seeks to identify factors associated with U.S. farmers' use of adaptive and maladaptive coping strategies.

Methods: U.S. farmers ($N = 135$) completed survey assessments of factors theorized to be associated with coping strategy choice (maladaptive beliefs about farm stress management, farm stress management self-efficacy, age, and sex) as well as measures of adaptive and maladaptive coping.

Results: Farm stress management self-efficacy was a significant, positive predictor of adaptive coping, and maladaptive beliefs about farm stress management were a significant, positive predictor of maladaptive coping. Maladaptive beliefs about farm stress management and farm stress management self-efficacy interacted to predict maladaptive coping, such that the positive relationship between maladaptive beliefs about farm stress management and maladaptive coping was significant at higher levels of self-efficacy. Sex was unrelated to coping strategies, and age was negatively associated with maladaptive coping strategies but unassociated with adaptive coping strategies.

Conclusion: The findings point to the utility of increasing farm stress self-management self-efficacy to increase farmers' adaptive coping and reducing maladaptive beliefs about farm stress management to reduce maladaptive coping. Efforts to promote adaptive coping by increasing self-efficacy should also target maladaptive beliefs farmers hold toward stress management, because increasing self-efficacy may also increase the likelihood of maladaptive coping when maladaptive beliefs are present.

KEYWORDS
Coping; farmers; self-efficacy

Introduction

Agricultural producers in the United States (U.S.) face a variety of internal and external stressors, such as poor weather for growing crops, challenging interpersonal interactions, and economic concerns; subsequently, they are at risk for experiencing chronic stress.[1–4] In the present paper, we refer to this population of interest as U.S. farmers, defined by the United States Department of Agriculture (USDA) as operators who produce or sell at least $1,000 of agricultural products during a given year.[5] Farmers' chronic stress has been associated with negative outcomes such as substance abuse, poor physical health, greater risk of injury, and suicide.[1,6,7] Indeed, rates of psychological distress and suicide are higher for farming than most other occupations.[8]

Coping is defined as a process in which cognitive and behavioral efforts are continuously changed to handle external and/or internal demands that exceed the person's resources.[9] A variety of coping strategies are available to manage stress and may be characterized as adaptive or maladaptive.[10] Adaptive strategies are functional and provide both short-term and long-term relief, whereas maladaptive strategies are dysfunctional and, at best, may provide only short-term relief from problems. Though some research has identified predictors of coping strategies in the general population, little examines precursors to *farmers*' choice of coping strategies, despite their unique sources of stress and higher rates of suicide.[11]

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Previous research on farmers' coping strategy selection has focused on the influence of demographic characteristics such as farmer sex and age, though findings have been mixed.[11,12] Informed by Lazarus and Folkman's transactional theory of stress and coping,[9] we examine two additional variables that may predict farmers' coping strategy choice. First, farmers may face barriers to adaptive coping strategy uptake, including *maladaptive beliefs about farm stress management*,[13,14] conceptualized in the present study as maladaptive beliefs about the roles of stoicism and self-reliance in managing stress, which may also facilitate maladaptive coping behaviors. Theory and research indicate that other factors, such as self-efficacy, can help people overcome psychological barriers to engaging in healthy behaviors.[15] Here, *farm stress management self-efficacy*, one's perception of competence in managing farm-related stress, is examined as a potential moderator of relationships between farmers' maladaptive beliefs about farm stress management and their use of adaptive and maladaptive coping strategies. Pragmatically, knowing what predicts farmers' use of coping strategies can inform tailored educational and/or outreach efforts to help them cope more effectively with stress. For example, if maladaptive beliefs about farm stress management and/or farm stress management self-efficacy are associated with coping, those who aim to enhance farmers' mental wellbeing (e.g., researchers, university extension staff, mental health professionals) may be sensitive to those characteristics in developing strategies to help farmers manage their stress. In the next section, we discuss adaptive and maladaptive coping strategies.

Ways of coping

Adaptive strategies such as active coping, use of social support, positive reframing, and acceptance are positively associated with goal commitment and progress, whereas maladaptive coping strategies such as denial, substance use, and behavioral disengagement are negatively associated with goal commitment and progress.[16] Research indicates that adaptive coping strategies are ultimately more effective and are associated with better short-term and long-term outcomes than maladaptive coping strategies.[17–20]

Farmer's coping strategies

In past research, farmers have reported using both adaptive and maladaptive coping strategies.[1,2,4,11,21] Qualitative research findings suggest that maladaptive coping strategies (e.g., self-blame) play a role in suicide risk among farmers.[22,23] However, most research on farmers' coping strategies is conducted outside of the U.S., such as in Australia, Canada, and South Asia.[11,21,24] As noted by Proctor and Hopkins,[2] there is a deficit in research on U.S. farmers' coping strategies, despite high rates of mental illness and suicide in this population.

Little is known regarding the antecedents of farmers' coping strategy choice. The transactional theory of stress and coping posits that the resources people have available and the constraints that prevent them from utilizing those resources affect their selection and use of coping behaviors.[9] According to Lazarus and Folkman,[9] coping resources include health, positive beliefs, problem-solving skills, social skills, and material resources. Constraints may be personal (e.g., culturally-derived values and beliefs) or environmental (e.g., competing demands for resources). Directed by previous research and the transactional theory of stress and coping, we focus on the effect of two personal factors on farmers' choice of coping strategies: maladaptive beliefs about farm stress management and farm stress management self-efficacy.

Maladaptive beliefs about farm stress management (constraint)

Barriers to adaptive coping due to harmful beliefs and attitudes toward mental illness and adaptive coping strategies may be exacerbated in farm communities. Amongst farm families, a stigma surrounds mental health, which may lead farmers to avoid adopting some adaptive coping strategies, particularly those that involve reaching out to others (e.g., visiting a therapist, talking openly to friends and family).[7,13,14,25,26] Agrarian values, stoicism and independence are also key facets of U.S. farm culture.[14] Though a variety of maladaptive beliefs about farm stress management exist, in the present study, maladaptive beliefs about farm stress management refer to farmers' beliefs that they should remain stoic, not letting others see

their stress, and that they should manage stress solely on their own. Past research suggests such beliefs are more prevalent in farm communities than others. For example, a study in rural South Australia comparing farmers to non-farmers found that farmers have a greater need for independence and control than non-farmers, which prevents them from engaging in the adaptive coping strategy of seeking help for stress.[27] Researchers in another study interviewed 12 people in Australia who had lost a close male farmer to suicide. They found that maladaptive coping strategies such as "wearing a mask" – that is, concealing one's true selves and emotions which are deemed unsuitable in social settings – were key aspects of adhering to masculine norms of socialization for farm owners.[23] Loved ones reported that farmers who died by suicide were also engaged in other maladaptive coping strategies, such as increased alcohol consumption.[23]

Judd et al. focused on one form of adaptive coping for mental health issues, help-seeking from mental health professionals.[6,28] Their study recruited from a rural population in Australia. Though not all farmers, those in rural populations often uphold some of the same agrarian beliefs that may hinder uptake of adaptive coping strategies and promote maladaptive strategies.[14] Judd and colleagues predicted that perceived stigma and stoicism would be negatively associated with professional help-seeking.[6,28] Perceived stigma was defined as negative attitudes toward mental illness. Stoicism was defined as a lack of emotional involvement, a dislike of free emotional expression, and an ability to endure emotion. Of these, stoicism was negatively associated with help-seeking.

Similar to Judd and colleagues' findings for rural Australians, we predict that U.S. farmers' beliefs that they must be stoic and solely manage their own stress may operate as constraints to adaptive coping strategies and/or facilitators of maladaptive coping strategies. Thus, we predict that:

H1: Maladaptive beliefs about farm stress management are negatively associated with the use of adaptive coping strategies.

H2: Maladaptive beliefs about farm stress management are positively associated with the use of maladaptive coping strategies.

Farm stress management self-efficacy (personal resources)

In a general sense, self-efficacy refers to individuals' beliefs about their ability to develop and enact plans of action to manage events and situations.[29] Judd and colleagues found that rural Australians' self-efficacy was negatively associated with help-seeking (a form of adaptive coping).[6,28] That is, rural residents were less likely to seek help when they had high levels of self-efficacy. Their study focused on general self-efficacy, or overall feelings of confidence to achieve one's goals. However, self-efficacy should be contextualized to improve predictive power.[29]

Previous studies examining specific, contextualized self-efficacy indicate that people's beliefs regarding their coping abilities are positively related to adaptive coping and negatively related to maladaptive coping in several non-farming contexts.[30,31] In the present study, we assess farmers' farm stress management self-efficacy, which is defined as one's confidence in managing farm-related stress. We expect that this form of self-efficacy will facilitate adaptive coping strategy use and reduce maladaptive strategy use. Therefore, we predict that:

H3: Farm stress management self-efficacy is positively associated with adaptive coping.

H4: Farm stress management self-efficacy is negatively associated with maladaptive coping.

Interactive effects of maladaptive beliefs and stress management self-efficacy on coping

Research findings in other contexts suggest that self-efficacy may buffer the negative impact of maladaptive beliefs on health behavior.[30,31] Though those studies have been conducted in contexts with conceptually different forms of

efficacy and different populations than examined in the present study, the findings suggest a potential interaction between maladaptive beliefs and stress management self-efficacy which has not yet been considered in the farm context. That is, farm stress management self-efficacy may buffer the negative impact of maladaptive beliefs on coping strategy selection, such that greater self-efficacy in farm stress management weakens both the negative association between maladaptive beliefs and adaptive coping and the positive association between maladaptive beliefs and maladaptive coping. Thus, we advanced two research questions:

RQ1: Will farm stress management self-efficacy moderate the association between maladaptive beliefs about farm stress and adaptive coping?

RQ2: Will farm stress management self-efficacy moderate the association between maladaptive beliefs about farm stress and maladaptive coping?

Demographic factors

Demographic characteristics such as biological sex and age have been examined as predictors of coping strategy use in previous research focused on farmers.[11,12] These demographic factors were also included in the present study.

Sex. In the present study, we focus on differences in coping by biological sex, consistent with other research on farmers' coping strategies. Research in general populations has identified some sex differences in coping strategy usage. For example, a meta-analysis of 50 studies indicated that women tend to engage more than men in several forms of both adaptive and maladaptive strategies such as support seeking, avoidance, venting, and positive self-talk.[32] Studies examining sex differences in *farmers'* coping strategies typically focus on formal and/or informal help-seeking to the exclusion of other strategies. For example, in-depth interviews of Canadian farmers suggest that women are more likely to seek formal mental health supports than men, but that women have less peer support.[26] Similarly, semi-structured interviews among Australian male and female farmers suggested that male farmers were perceived to be less effective in seeking support than female farmers.[33] However, another study that examined 156 African American male and female farmers aged 50 and older in Kentucky and South Carolina found that there was no significant difference by sex in terms of adaptive coping strategies.[12] Likewise, a study examining farmers in career transition found no significant difference between male and female farmers in terms of individual coping strategy usage.[34]

Due to mixed findings for sex as a predictor of farmers' coping strategy uptake, we proposed these research questions:

RQ3: What is the relationship between farmers' sex and their adoption of adaptive coping strategies?

RQ4: What is the relationship between farmers' sex and their adoption of maladaptive coping strategies?

Age. Broadly, age has been associated with coping strategy choice amongst farmers, though in an inconsistent fashion.[35] For example, Gunn and colleagues' study of South Australian farmers and their spouses indicated that older farmers use more adaptive strategies and younger farmers use more maladaptive strategies.[11] However, another study suggested no age difference in terms of an adaptive coping strategy (i.e., positive framing) between African American farmers aged 50–65 and 65 and older in the U.S.[12] Thus, to gain a better understanding of how age may be associated with farmers' coping strategies, we proposed the following research questions:

RQ5: What is the relationship between age and the adoption of adaptive coping strategies among farmers?

RQ6: What is the relationship between age and the adoption of maladaptive coping strategies among farmers?

Methods

Participants and procedures

Participants were agricultural producers in the U.S., as defined by the USDA: an operator who produces or sells – or who normally would have produced and sold – at least $1,000 of agricultural products during a given year.[5] Other eligibility criteria included being at least 18 years of age and able to read and write in English. Participants were recruited via multiple methods, including in-person at meetings of agricultural producers (e.g., university extension events); online via agriculture-related groups' social media and/or email lists (e.g., Farm Bureau); and word-of-mouth. A total of 135 farmers participated in the survey in Fall 2020. Participants who self-identified as meeting the eligibility criteria via an initial screening survey were interviewed by phone briefly to ensure they met the inclusion criteria. Participants were compensated with a $40 Amazon gift card for completing two surveys (the data reported here are derived from the first survey only). After removing two incomplete responses, 133 cases were used for analysis. All procedures were approved by the author's Institutional Review Board.

Most participants (90.2%) farmed in a Midwestern state where recruitment efforts were focused. They were on average 46.51 years old (*SD* = 12.57, *range* 21–75). Men comprised 47.4% of the sample; women comprised 52.6%. Most participants were White (95.5%); 2.3% reported multiple races, and less than 1% reported they were Hispanic/Latino or American Indian/Alaskan Native, respectively (1 person chose not to respond). Most participants were married (79.7%), and they had on average 3.05 children (*SD* = 1.83). Describing their farm operation, 36.1% reported crops only; 15.8% reported livestock only, and 48.1% reported having both crops and livestock.

Measures

Maladaptive beliefs about farm stress management were assessed with 3 items modified from a scale published by Williams and Pow.[36] Participants were asked to focus on farmers as a population (as opposed to people in general) and rated their agreement with items on 5-point Likert scales (e.g., "As a farmer, it's best not to tell anyone about your stress", 1: Strongly disagree, 5: Strongly agree). A composite was calculated by averaging the items, α = .86, *M* = 1.93, *SD* = 1.01.

Farm stress management self-efficacy was assessed with a validated 10-item stress management self-efficacy scale.[37] Participants were asked to focus specifically on their farm-related stress when responding to items such as: "I feel confident in managing my stress well". Items were rated on a 5-point Likert scale (1: Strongly disagree, 5: Strongly agree). A composite was calculated by averaging the items; α = .90, *M* = 3.43, *SD* = 0.82.

Ways of coping were assessed with the Brief COPE measure,[38] which can be utilized to assess situational coping and has been useful in predicting clinically-relevant outcomes across diverse stressors and populations.[39] It has been used with a U.S. farmer population in previous research.[22] The Brief COPE includes two items to measure each of 14 theoretically-identified coping responses, which can be classified as adaptive or maladaptive.[39,40] Adaptive strategies include active coping, use of emotional support, use of instrumental support, positive reframing, planning, humor, acceptance, and religion. Maladaptive strategies include denial, substance use, venting, self-distraction, behavioral disengagement, and self-blame. Participants were asked to report the extent to which they had used each strategy to cope with farm stress over the past month on a 4-point scale ranging from *I haven't been doing this at all* (1) to *I've been doing this a lot* (4).

Perceived stress was assessed as a covariate in analyses testing hypotheses and examining research questions. It was measured using the validated 10-item Perceived Stress Scale,[41] which assesses symptoms of stress over the past month. Participants responded to items such as "In the past month, how often have you felt nervous and stressed?" on a 5-point scale bounded by 1 = *never* and 5 = *very often*. Items were averaged to create a composite score, α = .87, *M* = 3.04, *SD* = .65.

Results

Preliminary analyses

An exploratory factor analysis (EFA) was conducted to determine whether the factor loadings

for the Brief COPE were consistent with the theoretical measurement model.[39] Humor, religion, and self-distraction were excluded from further analysis because they cross-loaded on both the adaptive and maladaptive scales. The remaining subdimensions loaded onto the appropriate factor. Composite variables were calculated by averaging the items; $\alpha_{adaptive} = .76$, $M_{adaptive} = 2.55$, $SD_{adaptive} = .56$; $\alpha_{maladaptive} = .75$, $M_{maladaptive} = 1.73$, $SD_{maladaptive} = .57$. The distribution of the variables was appropriate for running regression analyses. Bivariate correlations between variables were examined prior to data analysis (See Table 1 for a correlation matrix).

Tests of hypotheses and research questions

To test hypotheses and research questions, model 1 in the PROCESS macro 4.1 with SPSS was used.[42] Process macro is a tool used in statistical analysis for conducting mediation, moderation, and conditional process modeling. Model 1 in the macro examines the moderation effect of a single moderator variable on the relationship between the independent variable and the dependent variable. We set maladaptive beliefs about farm stress management as the independent variable, with farm stress management self-efficacy as the moderator. We included sex, age, and perceived stress as covariates. Adaptive coping strategies and maladaptive coping strategies were examined as a dependent variable, respectively. Each model explained a significant proportion of the variance in the corresponding dependent variable: for adaptive coping, $R^2 = .30$, $F(6, 123) = 8.87$, $p < .001$, and for maladaptive coping, $R^2 = .50$, $F(6, 123) = 20.26$, $p < .001$. See Table 2 for full results of these analyses.

H1 and H2 examined the main effect of maladaptive beliefs about farm stress management on adaptive and maladaptive coping, respectively. A negative relationship between maladaptive beliefs and adaptive coping (H1) and a positive association between maladaptive beliefs and

Table 1. Correlations, means, and standard deviations among key variables.

Variables	*M*	*SD*	1	2	3	4	5	6	7
1.Sex			-						
2.Age	46.51	12.57	.04	-					
3.Perceived stress	3.04	0.65	.15	-.09	-				
4.Beliefs[a]	1.93	1.01	-.29**	-.08	.17*	-			
5.Self-efficacy[b]	3.43	0.82	-.08	.11	-.58**	-.12	-		
6.Adaptive coping	2.55	0.56	.07	-.03	-.22*	-.13	.51**	-	
7.Maladaptive coping	1.73	0.57	-.05	-.23**	.53**	.45**	-.28**	-.08	-

$N = 133$. [a]Maladaptive beliefs about farm stress management, [b]Farm stress management self-efficacy. Sex was dummy coded as 0 = male; 1 = female.
***$p < .001$; **$p < .01$; *$p < .05$.

Table 2. Results of regression tests examining hypotheses and research questions.

				95% CI	
Effect	b	*SE*	*t*	*LL*	*LH*
Adaptive coping					
Maladaptive beliefs	-0.03	0.05	-0.55	-0.12	0.07
Stress management self-efficacy	0.42	0.07	6.44***	0.29	0.55
Maladaptive beliefs × Stress management self-efficacy	-0.06	0.05	-1.38	-0.15	0.03
Perceived stress	0.11	0.08	1.31	-0.06	0.27
Sex	0.10	0.09	1.05	-0.08	0.27
Age	-0.00	0.00	-1.38	-0.01	0.00
The overall model: $F(6,123) = 8.87$, $p<.001$, $R^2=.30$					
Maladaptive coping					
Maladaptive beliefs	0.18	0.04	4.55***	0.10	0.26
Stress management self-efficacy	0.01	0.06	0.17	-0.10	0.12
Maladaptive beliefs × Stress management self-efficacy	0.15	0.04	3.73***	0.07	0.23
Perceived stress	0.41	0.07	5.72***	0.27	0.55
Sex	-0.02	0.08	-0.25	-0.17	0.13
Age	-0.01	0.00	-2.38 *	-0.01	-0.00
The overall model: $F(6,123) = 20.26$, $p<.001$, $R^2=.50$					

b = Unstandardized coefficient. ***$p < .001$, **$p < .01$, *$p < .05$.

maladaptive coping (H2) were predicted. The association between maladaptive beliefs about farm stress management and adaptive coping was insignificant, $b = -0.03$, $t(128) = -0.55$, $p = .59$, 95% CI [-0.12, 0.07]. However, maladaptive beliefs about farm stress management were positively related to maladaptive coping, $b = 0.18$, $t(128) = 4.55$, $p < .001$, 95% CI [0.10, 0.27]. The data were inconsistent with H1 but consistent with H2.

H3 and H4 examined the effect of farm stress management self-efficacy on adaptive and maladaptive coping, respectively. A positive relationship between farm stress management self-efficacy and adaptive coping (H3) and a negative association between farm stress management self-efficacy and maladaptive coping (H4) were predicted. Self-efficacy was positively associated with adaptive coping, $b = 0.42$, $t(128) = 6.44$, $p < .001$, 95% CI [0.29, 0.55]. However, the effect of self-efficacy on maladaptive coping was insignificant, $b = 0.01$, $t(128) = 0.17$, $p = .87$, 95% CI [-.0.10, 0.12]. Thus, the data were consistent with H3 but inconsistent with H4.

For RQ1 and RQ2, interaction effects between maladaptive beliefs about stress management and farm stress management self-efficacy on each outcome were tested. The interaction effect on adaptive coping was not significant, $b = -0.06$, $t(128) = -1.38$, $p = .17$, 95% CI [-0.15, -0.03]. The interaction effect on maladaptive coping was, however, significant, $b = 0.15$, $t(128) = 3.73$, $p < .001$, 95% CI [0.07, 0.23]. The positive effect of maladaptive beliefs on maladaptive coping became stronger as self-efficacy increased (Figure 1). Specifically, the positive association between maladaptive beliefs and maladaptive coping was significant under the mean self-efficacy condition, $b = 0.18$, $t(128) = 4.55$, $p < .001$, 95% CI [0.10, 0.26] and the high self-efficacy condition, $b = 0.30$, $t(128) = 6.37$, $p < .001$, 95% CI [0.21, 0.39].

RQ3 and RQ4 tested the effect of biological sex on adaptive and maladaptive coping, respectively. The association between biological sex and adaptive coping was insignificant, $b = 0.10$, $t(128) = 1.05$, $p = .30$, 95% CI [-0.08, 0.27]. Biological sex and maladaptive coping were not significantly associated, $b = -0.02$, $t(128) = -0.25$, $p = .81$, 95% CI [-0.17, 0.18].

In RQ5 and RQ6, the effect of age on adaptive and maladaptive coping was examined. The association between age and adaptive coping was insignificant, $b = -0.00$, $t(128) = -1.38$, $p = .17$, 95% CI [-0.01, 0.00]. Maladaptive coping was significantly associated with age, $b = -0.01$, $t(128) = -2.38$, $p = .02$, 95% CI [-0.01, -0.00], indicating maladaptive coping decreased with age.

Discussion

Summary of findings

Farmers in the U.S. experience high levels of stress, which can lead to devastating outcomes, including

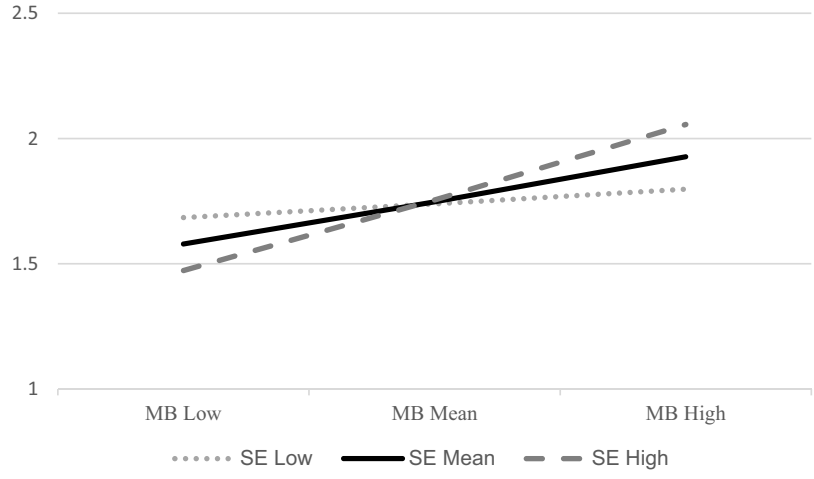

Figure 1. Interaction between maladaptive beliefs and stress management self-efficacy on maladaptive coping. For both variables, Low indicates 1SD below the mean whereas High stands for 1SD above the mean. MB: Maladaptive beliefs about farm stress management, SE: Farm stress management self-efficacy.

mental illness, substance abuse, poor physical health, greater risk of injury, and suicide.[1,6,7] As such, understanding how to address their stress is critical.[2] Previous research results suggest that engaging in adaptive coping strategies and avoiding maladaptive coping strategies is beneficial to farmers' mental health,[22,23] but little is known about what predicts farmers' choice of coping strategies. Research in contexts outside of farming suggests that maladaptive beliefs and self-efficacy regarding farm stress management may be predictive of the types of strategies farmers employ. The present study examined these predictors of farmers' use of adaptive and maladaptive coping strategies, along with sex and age. The results point to several theoretical and pragmatic implications, which will be discussed in the next sections.

Maladaptive beliefs about farm stress management and stress management self-efficacy

Our findings with respect to farm stress management self-efficacy and maladaptive beliefs about farm stress management paint a more complex picture of predictors of farmers' coping strategies than has been detailed in past research, which tends to focus on demographic factors such as age and sex. The significant main effects were as hypothesized: farmers who are high in efficacy to manage stress are more likely to utilize adaptive coping strategies, consistent with research in other contexts.[31] Maladaptive beliefs about farm stress management were positively associated with maladaptive coping, consistent with findings from qualitative research focused on Australian farmers who died by suicide.[23] Stress management self-efficacy was *not* significantly associated with maladaptive coping strategies (in contrast to research in the context of education[30]), nor were maladaptive beliefs significantly associated with adaptive coping strategies (in contrast to research comparing farmers to non-farmers on the adaptive coping strategy of help-seeking)[27]. These findings suggest that for farmers, what predicts coping strategies depends on whether that coping strategy is adaptive or maladaptive. However, these main effects, both significant and not, do not tell the whole story. A significant interaction between self-efficacy and maladaptive beliefs on maladaptive coping strategies adds nuance to the findings of previous research.

Research generally indicates that self-efficacy is a positive trait, but it can lead to negative outcomes, such as when an individual is overconfident.[43] Decomposing the significant interaction in the present study indicated that farmers with low self-efficacy tended to use more maladaptive coping behaviors regardless of their level of maladaptive beliefs about farm stress management. That is, it appears that low self-efficacy is sufficient to promote maladaptive coping. However, for farmers who rank at moderate or high levels of farm stress management self-efficacy, the relationship between maladaptive beliefs and maladaptive coping behaviors is positive and significant. That is, with confidence to manage their farm stress, farmers are more likely to engage in maladaptive coping *if* they also believe they must be self-reliant and stoic. The stigma about mental health prevalent in farming communities may foster beliefs that self-reliance and stoicism are important in this domain,[7,13,14,25,26] and the results of the present study indicate that farmers' agrarian values of self-reliance can backfire.

These significant findings have pragmatic implications for farmers and for those who seek to help them. Of note is the importance of building farmers' self-efficacy to manage their farm stress. This may be of particular importance because many stressors farmers face are outside of their control. Though they may not be able to directly change uncontrollable stressors, they *can* influence how they view the stressor and how they manage resulting stress.[1–4] As such, people developing educational and/or outreach activities focused on stress and mental wellbeing for farm populations (e.g., researchers, university extension staff) may target farmers' self-efficacy to manage their stress. Similarly, physicians and mental health professionals working with this population may consider whether their clients have sufficient self-efficacy to manage the unique stressors associated with farming.

Our findings echo that of previous research indicating that help-seeking stigma exists in farm populations and must be addressed to promote the

mental wellbeing of those in the agricultural community.[2,26] Thus, people working to address farm stress should also consider targeting unhelpful beliefs about the importance of stoicism and self-reliance in stress management, because efforts to enhance self-efficacy may be less effective when these maladaptive beliefs are prevalent. Finding ways to honor farmers' pride in their independence and self-reliance[44] while also making room for engaging in adaptive coping strategies such as seeking emotional support will be an important goal moving forward.

Prior research indicates that mental health first aid training may be one viable option to increase farmers' understanding of stress;[45] perhaps such curricula could be modified to directly address the importance of enhancing self-efficacy in farm stress management and reducing maladaptive beliefs about farm stress in future interventions. However, it is important to note research indicating that overuse of individual-level efforts to cope with the farm mental health crisis can lead to further negative outcomes.[46,47] As such, efforts to address farm stress at broader levels are still needed.

Farmer sex and age

Though the U.S. farming profession has traditionally been dominated by men, there continues to be an influx of women to this profession,[48] suggesting the importance of continued consideration of whether biological sex is associated with coping strategies. Previous studies have produced mixed results regarding the influence of farmer sex on coping strategy use; here, we found no association between farmer sex and use of adaptive nor maladaptive coping strategies. Though the reason for these insignificant findings is unknown, it is possible that because farming is a relatively masculine industry,[49] the influence of biological sex may be minimized. That is, both male and female farmers may espouse some traditional masculine norms that may be a better predictor of coping strategies than their biological sex (though per Table 1, women were significantly less likely than men to hold maladaptive beliefs about farm stress management, as defined in the present study). More research should continue to unpack this finding, perhaps focusing less on the influence of biological sex and more on constructs such as psychological gender (e.g., masculinity and femininity),[50,51] which have often been more predictive of social behavior than biological sex.[52,53] That men and women did not differ in use of coping strategies suggests that efforts to target farmers' coping strategies may not need to consider separate efforts for these populations.

With respect to age, we found that older farmers were less likely to use maladaptive coping strategies. This finding is consistent with research in the broader population.[35] Pragmatically, our findings regarding age suggest that efforts to reduce maladaptive coping strategies may be most fruitfully targeted toward younger farmers. For example, meetings of young agricultural producers could feature experts in mental health to discuss effective coping strategies.

Limitations and future directions

One limitation of this study pertains to its sample. Agricultural producers willing to participate in an online study about farm stress may differ from farmers unwilling to participate; for example, they may have fewer maladaptive beliefs about stress management and/or more self-efficacy in managing their stress. It is also possible that our participants experienced less stress than other farmers, given their willingness to participate. However, comparison of our sample's PSS scores with a sample of 1132 Canadian farmers in 2019[54] and a sample of 1523 people across 48 countries surveyed in March-May 2020[55] indicates that our participants were significantly *more* stressed than participants in these other studies. Regardless, future research should include a more diverse sample of farmers, along with participants who are affected by farm stress but do not own operations (e.g., migrant workers). This study also included only U.S. farmers, which is both a limitation and a strength, as most research examining farm stress has occurred outside of the U.S.

For the present research, adaptive and maladaptive coping were examined separately as dependent variables in their respective models. However, a given individual may utilize both types of coping strategies. In fact, the relationship between adaptive and maladaptive coping in our sample was nonsignificant, suggesting

that the presence of adaptive coping does not indicate the absence of maladaptive coping, nor vice versa. Future research could consider the interplay between coping types and their effects, providing further insight for researchers and/or practitioners wishing to intervene.

Conclusion

The present study identified key links between maladaptive beliefs about farm stress management, farm stress management self-efficacy, and farmers' reports of adaptive and maladaptive coping strategies. Farm stress management self-efficacy emerged as a significant predictor of adaptive coping, suggesting that enhancing farmers' confidence in their ability to manage stress can promote their uptake of more useful coping techniques. However, when self-efficacy is moderate or high, maladaptive beliefs become a significant predictor of maladaptive coping strategies, suggesting that those with high self-efficacy may be at risk for poor coping if they also believe they must be self-reliant and stoic. These findings can inform future research and educational and outreach efforts in this vulnerable, chronically stressed population. By doing so, farmers' stress may be fruitfully addressed.

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