

Building Relationships and Resilience: The Effect of Extension Programs on Women in Agriculture

Bob Bertsch¹
Adam A. Marx²

Abstract

Improving the resilience of women is critical to the resilience of agriculture and rural communities. Women have demonstrated a unique ability to drive change and adaptation in agriculture. They play a leading role in introducing new practices, connecting farms and ranches with social resources, and facilitating farm and ranch succession. Women make unique contributions to the recovery of rural communities after a disaster, including bringing people together and building on a community's strengths. However, there is little research on the resilience of women in agriculture in the United States. This study describes the relationship between participation in relationship-building programs facilitated by Cooperative Extension and the individual resilience of women in agriculture in the United States. The results show an association between participation in certain relationship-building programs and increases in the level of external resilience factors among women in agriculture in the U.S. Given this association, program designers should consider enhancements to the resilience-building potential of their programs and funding agencies should broaden their perspective on the types of programs that could positively impact agriculture and rural communities.

Introduction

Research has shown women play a pivotal role in helping farms, ranches, and rural communities survive and grow when faced with significant adversity (Drolet et al., 2015; Wells & Tanner, 1994). Women connect farms and ranches to critical social resources (Wilmer & Fernández-Giménez, 2016), and they drive change and adaptation on farms and ranches (Seuneke & Bock, 2015; Trauger, 2004). Further, women often lead succession planning, which is necessary for the long-term survival of family-run agriculture operations (Kaplan et al., 2009). In case studies of disaster recovery in the United States and Pakistan, Drolet and associates (2015) found that women withstand the effects of disaster while making unique contributions, individually and collectively, to the recovery of their communities by organizing community activities, bringing groups together, and focusing on community strengths. Djoudi and Brockhaus (2011) found that women's differentiated views on environmental and social change, skills for adaptation, and preferences for social organization contribute to a unique capacity for climate adaptation. However, a lack of decision-making power in households and communities has inhibited the ability of women to utilize their adaptive capacity. Improving the individual resilience of women in agriculture will improve the resilience of farms, ranches, and rural communities. As women become more resilient individually, they better maintain their capacity to contribute to ecological and community resilience through connecting with social resources, driving change and adaptation, facilitating farm and ranch succession, and building community. There is little research on the resilience of women in agriculture in the United States, and even less research on trainings and interventions that may help women in agriculture become more resilient

¹ Bob Bertsch is a Program Coordinator in NDSU Extension Leadership and Civic Engagement at North Dakota State University, Morrill Hall 307, PO Box 6050, Fargo, ND 58108. robert.bertsch@ndsu.edu. ORCID# 0000-0003-2694-6091

² Adam A. Marx is an Associate Professor of Agricultural Education in the Department of Agricultural and Family Education at North Dakota State University, FLC Hall 216D, PO Box 6050, Fargo, North Dakota 58108. adam.marx@ndsu.edu. ORCID# 0000-0001-7200-0876

Broadly defined, resilience is the capacity to adapt and/or maintain balance when faced with significant change or adversity (Windle et al., 2011). Resilience is often viewed from one of three lenses: individual resilience, ecological resilience, or community resilience (Kulig et al., 2013). Individual resilience is marked by the capacity for positive adaptation despite significant adversity. Research into the factors that contribute to individual resilience has shown that there are internal factors such as, an individual's skills, knowledge, and level of self-esteem; and external factors such as, financial resources, family connection, and social support, which aid in positive adaptation (Connor & Davidson, 2003; Masten, 2001; Ungar et al., 2008). Ecological resilience was introduced by Holling (1973), who defined it as the "measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (p.14). Initially this definition was viewed in the context of natural ecosystems, but it has been applied to other complex systems, including farms, ranches, and the natural environments they exist within (Darnhofer et al., 2010; King, 2008). Community resilience focuses on the capacity of groups and communities to successfully cope with the stress of social, political, and environmental change (Adger, 2000; McConnell et al., 2018).

There is considerable overlap in the concepts of individual, ecological, and community resilience. Individual and community resilience are impacted by environmental changes and the availability of ecological resources (Bourque & Cunsolo Willox, 2014; Buikstra et al., 2010). In turn, ecological resilience is impacted by the actions of individuals and communities (Ruiz-Mallén & Corbera, 2013). Individual resilience is impacted not only by the availability of ecological resources, but also by the availability of resources provided through social connections and community infrastructure (Ledogar & Fleming, 2008). Community resilience is dependent on both the ecology and the capacity of individuals in a community to engage in collective action (Berkes & Ross, 2013).

The interdependence of individual, ecological, and community resilience is particularly evident in studies of farms and ranches, as well as the people who live and work on them. Because people working in agriculture exist at the intersection of individual, ecological, and community resilience (Pauley et al., 2019), improving their individual resilience could have a profound effect on the resilience of rural communities, and the ecological resilience of farms, ranches, and the broader ecosystems they exist within. This interdependent view of resilience is embedded in the concept of rural resilience, which considers rural areas as systems that include humans, their communities, and the ecology (Kim et al., 2020).

Farms, ranches, and rural communities need to be able to cope with the challenges of economic instability, workforce development, natural disasters and the immediate and long-term effects of climate change. Therefore, agricultural institutions and industry should begin to redress gender inequities in agriculture, recognize the contributions women are making to the survival of agriculture, and expand roles and opportunities for women, especially in leadership and decision making (Wells & Tanner, 1994; Farmar-Bowers, 2010). The capacity of agriculture and rural communities to adapt in the face of significant adversity, whatever that may be, depends on the adaptive capacity of women. While improving the individual resilience of all people working in agriculture is important to the resilience of farms, ranches, and rural communities, improving the individual resilience of women in agriculture is even more critical given the unique role they play in recovery and adaptation (Drolet et al., 2015).

However, there are relatively few studies of the effectiveness of interventions or trainings intended to improve resilience. In a review of 533 citations, Joyce and associates (2018) found only 17 articles that met their inclusion criteria for valid assessments of resilience. According to the review, most resilience trainings and interventions have focused on improving internal protective factors as a means of building resilience. Very few interventions addressed external protective factors, like social support, that could improve individual resilience. Ferreira and colleagues (2021) found 38 studies of individual resilience interventions, and most showed statistically significant results, yet they were limited by sample size and

methodological quality. More research into interventions and trainings that address external protective factors is needed to find ways to improve the resilience of people working in agriculture, especially women.

There are programs aimed at women in agriculture that may have a positive effect on both internal and external protective factors for resilience. However, these programs are not primarily focused on resilience. Evaluations of some farm management, leadership, and succession planning programs aimed at women have shown increases in participants' knowledge, which contribute to the internal resilience factor of personal competence, and gains in participants' feelings of connectedness, which contribute to the external resilience factor of social support. For example, Brumfield and their co-authors (2023) found Urban Annie's Project, a farm risk management program designed to empower urban women farmers, increased knowledge of in five areas of farm risk and provided participants the opportunity to network with their peers. According to Harris and Leberman (2012), the New Zealand Women in Leadership program led to increased confidence and more developed support networks among participants. Both programs bring women together for multiple events over the course of days or weeks. They intentionally connect participants to external resources, build the social relationships between participants, and work to empower women.

Annie's Project and similar relationship-building programs include only female participants, creating a "safe harbor" not only for questions and answers, but also for important exchanges between participants. Ely and associates (2011) highlighted the importance of creating a safe space for learning and experimentation in their work on leadership programs for women. According to Trauger and associates (2008), a learning environment in which women can communicate with each other about farming and ranching "extends agency and empowerment to women for a variety of reasons" (p. 436).

Some women in agriculture participate in online social groups, such as the many Facebook groups for women in agriculture, which may also influence their feeling of connectedness and provide social support. Some of these are private, meaning that only members can see posts made in the group, and permission from an administrator or member is required to join. In a study of private Facebook groups for women, Pruchniewska (2019) found the groups provided a "space for discussion and the sharing of personal experiences" (p. 1372) and a place where women could find professional support and opportunities to build relationships. Private Facebook groups for women in agriculture may provide similar benefits, which may improve individual resilience.

Theoretical Framework

Current understanding of individual resilience draws on the work of the International Resilience Project, a collaborative, mixed-methods study of resilience across cultures in 14 communities in 11 countries. The Project led to an understanding of resilience as the qualities of both the individual and their environment, outlining three types of protective factors for individual resilience: personal competence (individual skills and attitudes), family support (access to support and caregiving from family or friends), and social and community inclusion (access to community resources and sense of community belonging) (Liebenberg et al., 2012; Ungar & Liebenberg, 2011).

The Resilience Research Centre (RRC) designed both the Child and Youth Resilience Measure and the Adult Resilience Measure based on the work of the International Resilience Project, the three types of protective factors, and a social-ecological and culturally sensitive view of resilience. This view of resilience draws on RRC director and founder Dr. Michael Ungar and his colleagues' (2008) definition of individual resilience:

In the context of exposure to significant adversity, resilience is both the capacity of individuals to navigate their way to the psychological, social, cultural, and physical resources that sustain their well-being, and their capacity individually and collectively to negotiate for these resources to be provided and experienced in culturally meaningful ways (p. 225).

Ungar and associates state that, within a social-ecological frame, “resilience requires individuals to have the capacity to find resources that bolster well-being” (Resilience Research Centre, 2018, p. 4). Although individual resilience is a complex and dynamic process, actions that bolster the personal competence, family support, and/or social and community inclusion of women in agriculture will support their capacity for navigating to and negotiating for the resources they need, ultimately improving their overall resilience. There is a need for more research specifically on how relationship-building programs and online social groups could influence two of the factor types: personal competence and relational support.

Purpose and Objectives

The purpose of this descriptive relational study was to describe the relationship between participation in relationship-building programs and online social groups and the individual resilience of women in agriculture in the United States. This study was undertaken to address the following objectives:

1. Describe the characteristics of women in agriculture surveyed in this study.
2. Describe the relationship between demographic factors of age, education, and primary occupation and the personal, relational, and overall resilience of women in agriculture.
3. Describe the relationship between participation in relationship-building programs and the personal, relational, and overall resilience of women in agriculture.
4. Describe the relationship between participation in online social groups and the personal, relational, and overall resilience of women in agriculture.

Methods

The target population for this study was women in agriculture who were 18 years old or older and resided in the United States at the time of the study. A convenience sample was selected to ensure representation of women who were likely to have participated in a relationship-building program. This sample consisted of people on the electronic mailing lists of two university Extension’s Women in Agriculture programs and a university Extension’s Annie’s Project program. These lists were presumed to reach adult women involved in agriculture who may have participated in relationship-building programs, including but not limited to: Annie’s Project, conferences for women in agriculture, leadership programs for women, learning circles for women in agriculture, and succession planning workshops. A survey invitation was sent to this sample on June 19, 2019. A survey reminder was sent on July 12, 2019.

A second sample was selected to reach women involved in agriculture who were less likely to have participated in relationship-building programs. A snowball sample, in which a qualified participant is asked to share an invitation to respond with subjects who also fit the target population (Dusek et al., 2015), was generated using social media outlets. A list of Facebook groups and pages that had at least 1,000 members or followers and had been active in the six months prior to distribution was assembled from search results. Ten Facebook pages and seven Facebook groups with a total membership/following of 78,708 were identified and included in the sample. On September 25, 2019, a message was sent to the administrators of these pages and groups requesting they post a provided survey invitation and graphic on their respective page or group. Of the 17 administrators, 12 responded to the message indicating they would post the survey invitation. After a reminder message was sent on October 2, 2019, one additional administrator indicated they would post the invitation. The remaining four administrators did not respond to either message. Survey responses were submitted between September 25 and November 4, 2019.

This study employed two instruments, a demographic survey and the Resilience Research Centre's Adult Resilience Measure (RRC-ARM). The mode of instrumentation was two web-based questionnaires to accommodate distributions to two separate samples. Questionnaire 1 was distributed through electronic mailing lists in [three Midwestern states]. Questionnaire 2 was distributed through social media. The demographic survey included questions about the respondent's age, gender, state of residence, county of residence, level of education, and primary occupation. The demographic survey also included questions about respondents' participation in programs for women in agriculture and social media use. Questionnaire 1 included three additional questions about participation in learning circles specifically aimed at women in the states where the learning circles were conducted. These questions were not included in Questionnaire 2, but the learning circle program and "social media groups for women in agriculture" were added to the possible responses to the question, "Which, if any, of the following programs have you participated in?"

Both questionnaires included the English language version of the 17-item RRC-ARM. The RRC-ARM measures resilience from a multi-level, social-ecological perspective. In their study using the RRC-ARM to measure the resilience of institutional childhood abuse survivors in Ireland, Liebenberg and Moore (2018) found RRC-ARM items clustered around five themes related to individual resilience: social/community inclusion, family attachment and supports, spirituality; national and cultural identity, and personal skills and competencies. They also found the measure showed good content validity, demonstrated strong internal consistency, and had strong criterion validity with the Warwick-Edinburgh Mental Well-being Scale. Antora's (2008) study of Muslim American women with symptoms of anxiety and depression found the RRC-ARM was reliable (*Cronbach's alpha* = .95) and demonstrated predictive validity.

For this study, a five-point scale was used for each RRC-ARM measure ranging from 1 – "Not at all" to 5 – "A lot." The possible range of total resilience score was a minimum of 17 and a maximum of 85. Two sub-scales were also derived from the total resilience score, the personal resilience sub-score (based on seven items), and the relational resilience sub-score (based on 10 items). The RRC-ARM was evaluated for face and content validity to ensure it would accurately measure the resilience of women in agriculture. Leaders of women in agriculture programming ($n = 3$) evaluated the RRC-ARM and determined no changes were necessary for use with women in agriculture in the United States. A post-hoc reliability test showed the RRC-ARM was internally consistent in this study ($\alpha = .88$).

Before analysis began, 85 responses were cleared due to missing data ($N = 499$). Responses were removed if they lacked consent or were missing responses to two or more questions in the RRC-ARM. The first distribution of the survey had 229 total responses of which 18 responses were cleared ($n = 211$). The second distribution of the survey had 355 total responses from which 67 were cleared ($n = 288$). Responses missing data for two or fewer RRC-ARM questions were filled in using the median score for that question. In response to the question, "What is your primary occupation? (more than 50% of your work hours)," some respondents responded "Other," but entered occupations that were clearly farming or ranching occupations (e.g. "dairy farm operator") or ag-related occupations (e.g. "Extension educator"). These responses were included with their corresponding category, rather than with "Other."

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 26. Measures of central tendency, dispersion, and frequency were reported to describe the age, education, and primary occupation of respondents. Analysis of variance (ANOVA) was used to determine if personal, relational, and overall resilience scores as measured by the RRC-ARM differed based on age, education level, and primary occupation. ANOVA was also used to determine if personal, relational, and overall resilience scores differed based on participation in relationship-building programs and online social groups.

Findings

The following description of findings is organized by the objectives of this research.

Characteristics of Survey Respondents

All survey respondents identified as female. The mean age of respondents was 45 years old ($SD = 14.7$). Respondents ranged in age from 20 to 86 years old. For analysis, respondents were sorted into the following age groups 20-29 years old, 30-39 years old, 40-49 years old, 50-59 years old and 60 years old or older. The 30-39-year-old age group had the highest number of respondents (24.8%, $n = 124$). All respondents had completed at least a high school education. A majority of respondents had completed a post-secondary degree (77.8%, $n = 388$). Nearly half indicated bachelor's degree as the highest level of education they had completed (45.7%, $n = 228$). Most respondents indicated their primary occupation was in either farming and/or ranching (39.3%, $n = 196$), or in another ag-related field (28.3%, $n = 141$). While respondents resided in 35 different states, the majority (64.7%, $n = 323$) indicated they lived in one of the states that were the focus of the first survey distribution. When asked to estimate the population of the county they resided in, 43.1% ($n = 215$) of respondents indicated they lived in a county with a population between 2,500 and 19,999. The mean number of hours respondents spent on social media each week was 10.17 hours ($SD = 7.014$). Responses ranged from 0 to 40 hours per week. The highest number of respondents indicated they spent between 6 and 10 hours on social media per week (39.9%, $n = 199$). A slight majority of respondents (50.1%, $n = 250$) indicated social media has no effect on their ability to deal with stressful events.

Respondent's participation in the relationship-building programs included in the survey varied (see Table 1). Only 31.5% of the respondents have not participated in any programs. Slightly fewer respondents (30.7%, $n = 153$) had participated in just one of the programs. One-fifth of respondents ($n = 100$) participated in two of the programs, and 17.8% ($n = 89$) indicated they had participated in three or more of the programs. Annie's Project had the most participants (42.3%, $n = 211$), followed by conferences for women in agriculture (39.9%, $n = 199$), farm/ranch succession planning programs (26.9%, $n = 134$), leadership programs for women (17.6%, $n = 88$), and the Building Resilience Together program (3.6%, $n = 18$). In the second survey distribution, respondents were asked about their participation in social media groups for women in agriculture. Of the respondents to the second survey ($N = 288$), 62.8% ($n = 181$) indicated they belonged to at least one social media group for women in agriculture.

Table 1

Respondent participation in relationship-building programs (N = 499)

Program/Group	Yes	No
Annie's Project	42.3%	57.7%
Conference for women in agriculture	39.9%	60.1%
Leadership program for women	17.6%	82.4%
Farm/ranch succession planning	26.9%	73.1%
Building Resilience Together	3.6%	96.4%
Social media group for women in agriculture (N = 288)	62.8%	37.2%

Relationship Between Demographics and Resilience Scores

Based on their responses to the RRC-ARM instrument, a total resilience score, a personal resilience sub-score, and a relational resilience sub-score was calculated for each respondent. Descriptive statistics for each of these scores can be found in Table 2. The lowest possible total resilience score is 17, and the highest is 85. Higher scores and sub-scores on the RRC-ARM indicate characteristics associated with resilience (Resilience Research Centre, 2018). The total resilience scores of survey respondents ranged from 33 to 85. The mean total resilience score for all respondents was 71.83 (*SD* = 8.02). Because resilience varies with context, the authors of the RRC-ARM caution against characterizing a score as “good” or “normal.” Instead, they recommend contrasting high and low scores within a sample (Resilience Research Centre, 2018). References to mean scores and sub-scores in this study are only provided for comparison between groups.

Table 2

Descriptive statistics for RRC-ARM resilience scores (N = 499)

Resilience Score (possible range)	Mean	SD	Range	
			Min.	Max.
Total resilience (17 – 85)	71.83	8.02	33	85
Personal resilience (7 – 35)	30.23	3.96	10	35
Relational resilience (10 – 50)	41.59	5.10	23	50

A one-way independent ANOVA was conducted to identify differences in total resilience scores, personal resilience sub-scores, and relational resilience sub-scores by age, education, and occupation (see Table 3). The between group analysis of resilience scores by age group showed respondents in the 20-29 years old age group had the highest total scores (*M* = 73.12, *SD* = 6.35) and the highest personal resilience sub scores (*M* = 30.90, *SD* = 2.99). Respondents in the 60 years old or older age group had the highest relational resilience sub scores (*M* = 42.75, *SD* = 4.58). However, none of the between group differences were statistically significant (*p* > .05).

Table 3

One-way, independent, between group ANOVA of RRC-ARM resilience scores by age, education, and occupation (N = 499)

Resilience Score	SS	df	F	p
By Age Group				
Total resilience	396.33	4	12.55	0.16
Personal resilience	71.04	4	1.13	0.34
Relational resilience	241.53	4	2.35	0.05
By Education Group				
Total resilience	35.33	2	0.27	0.76
Personal resilience	0.50	2	0.02	0.98
Relational resilience	41.97	2	0.81	0.45
By Occupation Group (N = 498)				
Total resilience	167.97	2	1.30	0.27
Personal resilience	5.77	2	0.18	0.83
Relational resilience	112.19	2	2.17	0.12

Relationship Between Program Participation and Resilience Scores

In an effort to describe the relationship between participation in relationship-building programs and the total resilience scores, personal resilience sub-scores, and relational resilience sub-scores of respondents, a one-way independent ANOVA was conducted on the factors of participation in each program and the total number of programs a respondent participated in (see Table 4). The between group comparison of the resilience scores of respondents who had participated in Annie's Project ($n = 211$), conferences for women in agriculture ($n = 199$), Building Resilience Together (BRT) workshops or learning circles ($n = 18$) and respondents who had not participated in each of those programs showed no statistically significant difference ($p > .05$).

There was a statistically significant difference in relational sub-scores ($p < .05$) found in between group comparisons of respondents who had participated in a leadership program for women ($n = 88$) and respondents who had not ($n = 411$), see Table 4. Respondents who had participated in a leadership program for women had a mean relational resilience sub-score of 42.76 ($SD = 4.49$) compared to a mean relational resilience sub-score of 41.34 ($SD = 5.19$) among respondents who had not.

Similarly, respondents who had participated in a succession planning program ($n = 134$) had higher relational resilience sub-scores ($M = 42.63$, $SD = 4.37$) than those who had not ($n = 365$, $M = 41.21$, $SD = 5.29$), and that difference was found to be statistically significant ($p < .05$), see Table 4.

Table 4

One-way, independent, between group ANOVA of RRC-ARM resilience scores by program participation (N = 499)

Resilience Score	SS	df	F	p
Annie's Project participation				
Total resilience	113.11	1	1.76	0.19
Personal resilience	20.14	1	1.28	0.29
Relational resilience	37.79	1	1.46	0.23
Women in Ag Conference participation				
Total resilience	17.15	1	0.27	0.61
Personal resilience	15.93	1	1.01	0.31
Relational resilience	66.14	1	2.56	0.11
Leadership program for women participation				
Total resilience	170.50	1	2.66	0.10
Personal resilience	0.97	1	0.06	0.80
Relational resilience	145.80	1	5.67	0.02
Succession planning program participation				
Total resilience	223.76	1	3.49	0.06
Personal resilience	0.75	1	0.05	0.83
Relational resilience	198.58	1	7.75	0.01
Building Resilience Together participation				
Total resilience	6.85	1	0.11	0.75
Personal resilience	4.90	1	0.31	0.58
Relational resilience	0.16	1	0.01	0.94

Resilience Score	SS	df	F	p
Total program participation				
Total resilience	347.22	3	1.81	0.15
Personal resilience	13.73	3	0.29	0.83
Relational resilience	266.17	3	3.47	0.02

The comparison of resilience scores based on the number of programs a respondent had participated in showed a statistically significant difference ($p < .05$) in the relational resilience sub-score. Respondents who participated in three or more programs ($n = 89$) had the highest total resilience scores ($M = 73.60$, $SD = 6.94$), personal resilience sub-scores ($M = 30.52$, $SD = 3.28$), and relational resilience sub-scores ($M = 43.08$, $SD = 4.30$). Respondents who had not participated in any program ($n = 157$) had the lowest total resilience scores ($M = 71.32$, $SD = 8.84$) and relational resilience sub-scores ($M = 41.06$, $SD = 5.69$) among the groups, although their mean scores were still in line with the mean scores of the sample. Both total resilience scores and relational resilience sub-scores increased with the number of programs respondents had participated in.

Total resilience scores for respondents who had participated in one program ($n = 153$) were slightly higher ($M = 71.41$, $SD = 8.03$) than scores for respondents who had not participated in any programs, as were relational resilience sub-scores ($M = 41.20$, $SD = 4.94$). Total resilience scores for those who participated in two programs ($n = 100$) were slightly higher ($M = 71.69$, $SD = 7.44$) than those for respondents who had participated in one program. The relational resilience sub-scores increased in a similar way ($M = 41.71$, $SD = 4.78$). However, the same increases were not found in personal resilience sub-scores. Respondents who had participated in two programs had the lowest personal resilience sub-scores ($M = 29.98$, $SD = 3.88$). Only the differences in relational resilience sub-scores were statistically significant, specifically, the relational resilience sub-score differences between respondents who had participated in three programs and those who had participated in one or no programs ($p = .01$).

Relationship Between Online Group Participation and Resilience Scores

Only data from the second survey distribution ($N = 288$) included information on online social group participation. Two one-way independent ANOVAs were conducted to describe the relationship between participation in relationship-building programs and the total resilience scores, personal resilience sub-scores, and relational resilience sub-scores of respondents. One ANOVA was conducted on the factor of participation in an online group for women in agriculture. Another was conducted on a factor that included online group participation and participation in any of the relationship-building programs. The between group differences in total resilience scores, personal resilience sub-scores, and relational resilience sub-scores were not statistically significant in either analysis ($p > .05$).

Conclusions and Recommendations

This data was collected in 2019. We realize that women in agriculture, like all of us, currently exist in a much different world due to the impacts of the COVID-19 pandemic and other wide-reaching events. More recent evidence shows relational factors are still critical to resilience. In a study of 2,030 students enrolled in a College of Agriculture across six land-grant universities conducted in July and August of 2020 during the first phase of the pandemic, Ehmke and associates (2023) found feelings of isolation from their community increased the likelihood of depression and anxiety among all students surveyed. Although, social media platforms have changed significantly since the data for this study was gathered, studies conducted during and after the pandemic have shown that women still see social media as a place to find community support (Dubbelman et al., 2024, Wellman et al., 2023). Many programs for women in agriculture were delivered virtually during the COVID-19 pandemic, and some have remained partially or entirely online. Brumfield and their colleagues (2023) found that women farmers participating in a virtual

delivery of the Annie's Project program reported beneficial outcomes in maintaining and growing their farm businesses.

It is possible that women with higher resilience may be more inclined to participate in relationship-building programs, influencing the relationship between program participation and resilience scores. The design of recruitment, the lack of a true directed treatment to facilitate a purposeful change, and self-reported participation in programs that align with the theoretical foundation of the study should also be considered when interpreting these findings.

This study utilized a social-ecological approach to resilience to describe the relationship between programs and online social groups that may support external resilience resources and the levels of resilience as measured by the RRC-ARM, which includes external relational factors. Our findings support the theory that overall resilience is supported by the intersection of personal competence, family support, and social and community inclusion (Liebenberg et al., 2012; Ungar & Liebenberg, 2011). Although the programs and groups included in this study were not designed as resilience interventions, they include activities that could be supportive of external relational resilience. These programs and groups connect participants with each other. Many of the programs create opportunities for participants to network with people with agricultural experience outside the program.

Overall, a comparison of groups based on participation in relationship-building programs and online social groups found practical, though not significant, increases in total resilience scores, personal resilience sub-scores, and relational resilience sub-scores among respondents who had participated in the programs and/or online groups. However, differences between these groups were statistically significant in the following three comparisons. The relational resilience sub-scores of respondents who had participated in leadership training for women was significantly higher than those who had not participated in the program. The relational resilience sub-scores of respondents who had participated in succession planning programs were significantly higher than those who had not participated. The relational resilience sub-scores of respondents who had participated in three or more relationship-building programs were significantly higher than those who had participated in only one program or had not participated in any of the programs. These results clearly show that relationship-building programs can positively influence the individual resilience of women in agriculture and improve external relational factors that other resilience interventions often do not address. The finding that these programs can act as resilience interventions gives women in agriculture new reasons to consider participating in them, gives program funders new and compelling reasons to support them, and gives program designers the impetus to change their programs to increase the resilience-building effects. A significant increase in the number of women participating in these programs coupled with a new focus on resilience among those who design and deliver these programs, could have wide-reaching impacts on the resilience of women in agriculture and, in turn, the resilience of farms, ranches, and rural communities.

Given the relationship between relationship-building programs and RRC-ARM resilience scores described in this study, organizations that fund relationship-building programs for women in agriculture, like the U.S. Department of Agriculture does through Cooperative Extension, should give these programs the same status as other programs in their portfolio. Relationship-building programs could play a critical role in improving the individual resilience of women in agriculture and, in doing so, have a positive influence on ecological and community resilience. Considering the complex issues challenging agriculture and the unique role women play in recovery and adaptation, these relationship-building programs may be critical to the future of agriculture. Opportunities for women in agriculture to participate in these programs need to be increased. Further, directed resources to enhance these programs as resilience interventions need to be made available.

Adult educators and others who design and deliver these kinds of programs should do so with the program's resilience-building potential in mind. Both of the programs associated with statistically significant increases in respondents' relational resilience sub-scores, succession planning and leadership programs, closely align with specific resilience factors and/or practices. Succession planning programs align with a gendered cultural practice described by Wilmer and Fernández-Giménez (2016), which empowers younger generations to choose to stay in agriculture. Leadership programs for women in agriculture address the resilience factors of community belonging and creation of opportunities to apply new abilities. Leadership programs also align with the resilience of rural communities by preparing women, who are critical to sustaining rural communities (Wells & Tanner, 1994), for community leadership. Tapping into resilience-related aspects of a program, especially those that highlight the connections between individual, ecological, and community resilience, could improve the program's capacity for building resilience.

Program designers should also seek to address the relatively weaker feelings of community belonging and fairness among women in their 30's, which emerged from this study. Succession planning and leadership programs showed potential to strengthen those feelings among participants. Intentionally providing opportunities for women in their 30's to participate in these programs are important but should be approached with sensitivity to the demands of the multiple social roles many of the women in this age group fulfill. Liepins and Schick (1998) contend agricultural education and training for women should acknowledge all aspects of participants identities and directly address the multiple roles they fulfill. All relationship-building programs should be sensitive to the role-related stress women in agriculture face. The design, scheduling, and delivery of programs should reflect the demands multiple roles place on women's time and include support for women seeking self-improvement while meeting the demands of their personal and professional roles.

Those who fund, design, and deliver relationship-building programs should consider the relationship between the number of programs participated in and respondents' relational resilience sub score described in this study. Respondents who had participated in three or more programs had significantly higher relational resilience sub-scores than those who had participated in one program or no programs at all. This suggests the resilience-building influence of individual programs is additive or interconnected. With that in mind, those who fund programs should consider a more holistic, interconnected approach to funding that avoids pitting one program against another, as the current grant funding process oftentimes does. Resilience is a complex, dynamic process that operates within and is influenced by complex systems. As Stroh (2009) points out, the interrelationships among the elements of these systems can undermine the impact of even our most well-designed efforts. Stroh suggests funders need to think systematically, not linearly; reduce the desire for quick fixes; and develop a vision for achieving sustainable solutions. Funding for relationship-building programs for women in agriculture should be made as part of a broader, systems-based strategy for building resilience for farms, ranches, rural communities, and the people that operate and populate them.

Those who design programs should also take a systems-based approach by positioning programs within a long-term, resilience-building practice for women in agriculture and addressing the systemic issues that prevent women from thriving. Highlighting the connections between the content of each program could help women see each program as part of their continuing development and encourage them to participate in multiple programs. Explicitly addressing gender dynamics and inequity in relationship-building programs could help women advance into leadership roles (Ely et al., 2011) and empower them to take action (Pruchniewska, 2019).

Finally, women in agriculture need to be aware of the social-ecological factors that influence their resilience. There has been too much emphasis on the personal factors of resilience in the past, implying that individuals were completely to blame for any failure to deal with adversity and leading to undue feelings

of guilt. Recognizing the role social support, from other people and from communities, plays in resilience can empower women in agriculture to develop both personal skills and social support for resilience, and to embrace the role they play in the social support of the resilience of others. Those who design and develop programs for women in agriculture are key to developing this awareness.

References

- Adger, W. N. (2000). Social and ecological resilience: Are they related? *Progress in Human Geography*, 24(3), 347–364. <https://doi.org/10.1191/030913200701540465>
- Antora, S. (2008). *The influence of visibility on mental health amongst the Muslim female population in the United States* [City University of New York]. https://academicworks.cuny.edu/hc_sas_etds/291
- Berardi, G., Paci-Green, R., & Hammond, B. (2011). Stability, sustainability, and catastrophe: Applying resilience thinking to U.S. agriculture. *Human Ecology Review*, 18(2), 12.
- Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. *Society & Natural Resources*, 26(1), 5–20. <https://doi.org/10.1080/08941920.2012.736605>
- Bourque, F., & Cunsolo Willox, A. (2014). Climate change: The next challenge for public mental health? *International Review of Psychiatry*, 26(4), 415–422. <https://doi.org/10.3109/09540261.2014.925851>
- Brumfield, R. G., Greenwood, D., DiNardo, M. F., Both, A.-J., Heckman, J. R., Govindasamy, R., Polanin, N., Rouff, A. A., Rowe, A., VanVranken, R., & Arumugam, S. (2023). *A Risk Management Training Program Designed to Empower Urban Women Farmers*. <https://doi.org/10.21273/HORTSCI17305-23>
- Brumfield, R.G., Flahive Di Nardo, M., Both, A.J., Heckman, J., Rowe, A., VanVranken, R. and Bravo, M. (2023). Online workshop empowers women farmers to manage business risk during the pandemic. *Acta Hortic*. 1368, 315-322. DOI: 10.17660/ActaHortic.2023.1368.40 <https://doi.org/10.17660/ActaHortic.2023.1368.40>
- Buikstra, E., Ross, H., King, C. A., Baker, P. G., Hegney, D., McLachlan, K., & Rogers-Clark, C. (2010). The components of resilience—Perceptions of an Australian rural community. *Journal of Community Psychology*, 38(8), 975–991. <https://doi.org/10.1002/jcop.20409>
- Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 18(2), 76–82. <https://doi.org/10.1002/da.10113>
- Darnhofer, I., Fairweather, J., & Moller, H. (2010). Assessing a farm’s sustainability: Insights from resilience thinking. *International Journal of Agricultural Sustainability*, 8(3), 186–198. <https://doi.org/10.3763/ijas.2010.0480>
- Djoudi, H., & Brockhaus, M. (2011). Is adaptation to climate change gender neutral? Lessons from communities dependent on livestock and forests in northern Mali. *International Forestry Review*, 13(2), 123–135. <https://doi.org/10.1505/146554811797406606>

- Drolet, J., Dominelli, L., Alston, M., Ersing, R., Mathbor, G., & Wu, H. (2015). Women rebuilding lives post-disaster: Innovative community practices for building resilience and promoting sustainable development. *Gender & Development, 23*(3), 433–448. <https://doi.org/10.1080/13552074.2015.1096040>
- Dubbelman, J., Ooms, J., Havgry, L., & Simonse, L. (2024). Communal Load Sharing of Miscarriage Experiences: Thematic Analysis of Social Media Community Support. *Journal of Medical Internet Research, 26*(1), e56680. <https://doi.org/10.2196/56680>
- Dusek, G., Yurova, Y., & P. Ruppel, C. (2015). Using social media and targeted snowball sampling to survey a hard-to-reach population: A case study. *International Journal of Doctoral Studies, 10*, 279–299. <https://doi.org/10.28945/2296>
- Ehmke, M. D., Katare, B., Kiesel, K., Bergtold, J. S., Penn, J. M., & Boys, K. A. (2022). U.S. agricultural university students' mental well-being and resilience during the first wave of COVID-19: Discordant expectations and experiences across genders. *Applied Economic Perspectives and Policy, 44*(1), 129–161. <https://doi.org/10.1002/aep.13233>
- Ely, R. J., Ibarra, H., & Kolb, D. M. (2011). Taking gender into account: Theory and design for women's leadership development programs. *Academy of Management Learning & Education, 10*(3), 474–493. <https://doi.org/10.5465/amle.2010.0046>
- Farmar-Bowers, Q. (2010). Understanding the strategic decisions women make in farming families. *Journal of Rural Studies, 26*(2), 141–151. <https://doi.org/10.1016/j.jrurstud.2009.09.008>
- Ferreira, M., Marques, A., & Gomes, P. V. (2021). Individual Resilience Interventions: A Systematic Review in Adult Population Samples over the Last Decade. *International Journal of Environmental Research and Public Health, 18*(14), Article 14. <https://doi.org/10.3390/ijerph18147564>
- Harris, C. A., & Leberman, S. I. (2012). Leadership development for women in New Zealand Universities: Learning from the New Zealand Women in Leadership Program. *Advances in Developing Human Resources, 14*(1), 28–44. <https://doi.org/10.1177/1523422311428747>
- Heins, L., Beaulieu, J., & Altman, I. (2010). The effectiveness of women's agricultural education programs: A survey from Annie's Project. *Journal of Agricultural Education, 51*(4), 1–9. <https://doi.org/10.5032/jae.2010.04001>
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics, 4*(1), 1–23. <https://doi.org/10.1146/annurev.es.04.110173.000245>
- Holling, C. S. (1996). Surprise for science, resilience for ecosystems, and incentives for people. *Ecological Applications, 6*(3), 733–735. <https://doi.org/10.2307/2269475>
- Joyce, S., Shand, F., Tighe, J., Laurent, S. J., Bryant, R. A., & Harvey, S. B. (2018). Road to resilience: A systematic review and meta-analysis of resilience training programmes and interventions. *BMJ Open, 8*(6), e017858. <https://doi.org/10.1136/bmjopen-2017-017858>
- Kaplan, M. S., Nussbaum, J. F., Becker, J. C., Fowler, C., & Pitts, M. J. (2009). Communication barriers to family farm succession planning. *Journal of Extension, 47*(5), 9.

- Kim, G., Kang, W., & Lee, J. (2020). Knowledge Structures and Components of Rural Resilience in the 2010s: Conceptual Development and Implications. *Sustainability*, *12*(22), Article 22. <https://doi.org/10.3390/su12229769>
- King, C. A. (2008). Community resilience and contemporary agri-ecological systems: Reconnecting people and food, and people with people. *Systems Research and Behavioral Science*, *25*(1), 111–124. <https://doi.org/10.1002/sres.854>
- Kulig, J. C., Edge, D. S., Townshend, I., Lightfoot, N., & Reimer, W. (2013). Community resiliency: Emerging theoretical insights. *Journal of Community Psychology*, *41*(6), 758–775. <https://doi.org/10.1002/jcop.21569>
- Ledogar, R. J., & Fleming, J. (2008). Social capital and resilience: A review of concepts and selected literature relevant to Aboriginal youth resilience research. *Pimatisiwin*, *6*(2), 25–46.
- Liebenberg, L., & Moore, J. C. (2018). A social ecological measure of resilience for adults: The RRC-ARM. *Social Indicators Research*, *136*(1), 1–19. <https://doi.org/10.1007/s11205-016-1523-y>
- Liebenberg, L., Ungar, M., & Vijver, F. V. de. (2012). Validation of the Child and Youth Resilience Measure-28 (CYRM-28) Among Canadian Youth. *Research on Social Work Practice*, *22*(2), 219–226. <https://doi.org/10.1177/1049731511428619>
- Liepins, R., & Schick, R. (1998). Gender and education: Towards a framework for a critical analysis of agricultural training. *Sociologia Ruralis*, *38*(3), 285–302. <https://doi.org/10.1111/1467-9523.00079>
- Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist*, *56*(3), 227–238. <https://doi.org/10.1037/0003-066X.56.3.227>
- McConnell, E. A., Janulis, P., Phillips, G. I., Truong, R., & Birkett, M. (2018). Multiple minority stress and LGBT community resilience among sexual minority men. *Psychology of Sexual Orientation and Gender Diversity*, *5*(1), 1–12. <https://doi.org/10.1037/sgd0000265>
- Pauley, C., McKim, A., & Hodbod, J. (2019). A Social-Ecological Resilience Perspective for the Social Sciences of Agriculture, Food, and Natural Resources. *Journal of Agricultural Education*, *60*(4). <https://doi.org/10.5032/jae.2019.04132>
- Pruchniewska, U. (2019). “A group that’s just women for women”: Feminist affordances of private Facebook groups for professionals. *New Media & Society*, *21*(6), 1362–1379. <https://doi.org/10.1177/1461444818822490>
- Resilience Research Centre (2018). *CYRM and ARM user manual*. Dalhousie University, Halifax, NS. <http://www.resilienceresearch.org/>
- Ruiz-Mallen, I., & Corbera, E. (2013). Community-Based Conservation and Traditional Ecological Knowledge: Implications for Social-Ecological Resilience. *Ecology and Society*, *18*(4). <https://www.jstor.org/stable/26269393>
- Seuneke, P., & Bock, B. B. (2015). Exploring the roles of women in the development of multifunctional entrepreneurship on family farms: An entrepreneurial learning approach. *NJAS - Wageningen Journal of Life Sciences*, *74–75*, 41–50. <https://doi.org/10.1016/j.njas.2015.07.001>

- Stroh, D. P. (2009). Leveraging grantmaking: Understanding the dynamics of complex social systems. *The Foundation Review*, 1(3), 109–122. <https://doi.org/10.4087/FOUNDATIONREVIEW-D-09-00037>
- Trauger, A. (2004). ‘Because they can do the work’: Women farmers in sustainable agriculture in Pennsylvania, USA. *Gender, Place & Culture*, 11(2), 289–307. <https://doi.org/10.1080/0966369042000218491>
- Trauger, A., Sachs, C., Barbercheck, M., Kiernan, N. E., Brasier, K., & Findeis, J. (2008). Agricultural education: Gender identity and knowledge exchange. *Journal of Rural Studies*, 24(4), 432–439. <https://doi.org/10.1016/j.jrurstud.2008.03.007>
- Ungar, M., Brown, M., Liebenberg, L., Cheung, M., & Levine, K. (2008). Distinguishing differences in pathways to resilience among Canadian youth. *Canadian Journal of Community Mental Health*, 27(1), 1–13. <https://doi.org/10.7870/cjcmh-2008-0001>
- Ungar, M., & Liebenberg, L. (2011). Assessing Resilience Across Cultures Using Mixed Methods: Construction of the Child and Youth Resilience Measure. *Journal of Mixed Methods Research*, 5(2), 126–149. <https://doi.org/10.1177/1558689811400607>
- Wellman, M. L., Holton, A. E., & Kaphingst, K. A. (2023). Preivorship Posting: Why Breast Cancer Previvors Share Their Stories on Social Media. *Health Communication*, 38(11), 2441–2449. <https://doi.org/10.1080/10410236.2022.2074780>
- Wells, B. L., & Tanner, B. O. (1994). The organizational potential of women in agriculture to sustain rural communities. *Journal of the Community Development Society*, 25(2), 246–258. <https://doi.org/10.1080/15575339409489884>
- Wilmer, H., & Fernández-Giménez, M. E. (2016). Some years you live like a coyote: Gendered practices of cultural resilience in working rangeland landscapes. *Ambio*, 45(3), 363–372. <https://doi.org/10.1007/s13280-016-0835-0>
- Windle, G., Bennett, K. M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes*, 9, 8. <https://doi.org/10.1186/1477-7525-9-8>