THE EFFECT OF RELATIONSHIP-BUILDING PROGRAMS ON THE RESILIENCE OF WOMEN IN AGRICULTURE

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ABSTRACT

The purpose of this 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. Women have demonstrated a unique ability to connect farms and ranches with social resources, drive change and adaptation in agriculture, facilitate farm and ranch succession, and build community after a disaster. The capacity of agriculture and rural communities to adapt in the face of significant adversity depends on those unique abilities. Improving the resilience of women in agriculture is critical to the overall resilience of rural America. Unfortunately, most resilience interventions focus on internal psychology and do not address external, social-ecological factors for resilience. The results of this study show participation in certain relationship-building programs is associated with a significant increase in the level of external resilience factors among women in agriculture in the U.S.

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DEDICATION

This work is dedicated to my life partner and best friend, Hilary, and to her grandmother and kick-ass woman in agriculture, Eleanor.

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CHAPTER 1: INTRODUCTION

Farmers, ranchers, and others who work in agriculture face significant stressors, many of which they can't control (Welke, 2004). They are regularly confronted by drastic economic, policy, technological, and social changes (Darnhofer, 2010). The future of farms and ranches, as well as the rural communities that depend on them, are also being threatened by climate change (Hanna et al., 2011; Havstad et al., 2018; Ko et al., 2012). For example, an extended drought in Utah, 1999-2004, had extremely negative effects on animal and crop production, resulting in an estimated $133 million loss to the state's economy (Coppock, 2011). In 2019, extreme flooding in the heavily agricultural north central region of the United States took millions of acres of farm land out of production and caused $10.8 billion in damages (Smith, 2020).

The impacts of climate-related events are not only economic. Bourque and Cunsolo Willox (2014) suggest the effects of climate change are a factor in psychological distress, depression, and anxiety, especially among Indigenous, rural, and farming communities. In a study of family farmers, Ellis and Albrecht (2017) found that weather and climate-related disasters can disrupt farmers' "sense of place." They concluded that people with "close cultural, personal, and working relationships with the land" (p. 162) can become depressed, anxious, fearful, angry, or sad as a result of changes in the environment caused by climate-related events, ultimately impacting their physical health. Given the extreme uncertainty and threats farmers, ranchers, and others who work in agriculture face, they must find a way to be resilient if farms, ranches, and rural communities are going to survive.

Resilience

Broadly defined, resilience is the capacity to adapt and/or maintain balance when faced with significant change or adversity (Windle et al., 2011). The concept of resilience has been

applied in many contexts. While it is most prevalent in the fields of ecology and psychology, resilience can be found in the literature of many disciplines including community development, education, emergency management, medicine, organizational management, and social work. Resilience is often viewed from one of three lenses: individual resilience, ecological resilience, or community resilience (Kulig et al., 2013).

Individual Resilience

In less than 50 years, the concept of individual resilience has evolved from the unexplained invulnerability observed by Anthony (1974) and Pines (1975) to the varying, multidimensional process most researchers acknowledge today. 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). These factors are not constant, they vary depending on context and operate as part of a dynamic resilience process (Luthar et al., 2000; Ungar, 2011). Because protective factors inside and outside an individual are part of the same system, Ungar (2011) has suggested a social-ecological approach to individual resilience, which places less emphasis on an individual's characteristics and more on their environment.

Ecological Resilience

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 since it has been applied to

other complex systems, including farms, ranches, and the natural environments they exist within. Consideration of how these systems are directly impacted by humans has given rise to research into how individuals, organizations and society contribute and respond to ecological change (Gallopín, 2006; Marshall, 2010).

Community Resilience

Community resilience is closely related to the concept of social resilience. Sometimes social resilience is presented as an element of community resilience, and other times the two terms are used interchangeably. Adger (2000) defines social resilience as, "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change" (p. 347). A focus on the capacity of groups and communities are common in definitions of both social resilience and community resilience. For example, McConnell and colleagues' (2018) definition focuses on the capacity of communities to empower individuals, "Community resilience refers to a community's capacity to empower marginalized members, such as through the provision of both tangible and intangible resources that facilitate successful coping with stress" (p.3). This study uses the term "community resilience" as interchangeable with the term "social resilience."

Intersection of Individual, Ecological, and Community Resilience

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 the ecological resources (Bourque & Cunsolo Willox, 2014; Buikstra et al., 2010). In turn, ecological resilience is impacted by the actions of individuals and communities (Holling, 1996). 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, and the people who live and work on them. People who work in agriculture impact ecological resilience individually through their farming and ranching practices, and collectively through the institutions that set agriculture policy (Darnhofer et al., 2010). Swinton (2008) suggests agriculture is itself an ecosystem that is "frequently disrupted to favor desired products" (p.28). The individual resilience of farmers and ranchers depends on ecological resilience. Stressing the agricultural ecosystem beyond its capacity to absorb change would result in the loss of financial resources and cultural identity as protective factors that contribute to their resilience. Farmers and ranchers contribute to community resilience by producing food and fiber that impact the physical and economic health of communities, and by joining with others in farm groups and rural communities to collectively cope with change. Because people working in agriculture exist at the intersection of individual, ecological and community resilience, 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.

Improving Individual Resilience

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. The results of their meta-analysis suggest that resilience trainings may be able to enhance resilience. However, both

Joyce and associates and Macedo and associates (2014) cite a lack of research and the extreme heterogeneity of the research that has been done as barriers to determining whether resilience interventions are effective overall.

According to studies that have assessed them, most resilience trainings and interventions have focused on improving internal protective factors as a means of building resilience. Joyce and colleagues (2018) categorized the interventions they analyzed based on the psychological approach of the intervention: cognitive behavioral therapy (CBT)-based interventions, mindfulness-based interventions, or mixed interventions, those combining CBT and mindfulness training. CBT focuses on how people frame a situation as positive or negative, encouraging a more flexible, optimistic way of thinking about adversity (Hutnik et al., 2016). Mindfulness training focuses on stabilizing and focusing one's attention on the experience of the present moment (Jha et al., 2017). Neither of these training methods addresses external protective factors, like social support, that could improve individual resilience. 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.

Women in Agriculture

According to the 2017 Census of Agriculture, there were 1.23 million female farm producers in the U.S., comprising about 36% of total producers. However, only 78% of female producers indicated they were involved in day-to-day decision making on their operation, compared to 92% of male producers. Female producers reported being most involved in decisions regarding record keeping and/or financial management (74%). Only 55% of female producers were involved in livestock decisions, and only 58% were involved in land use and/or crop decisions, compared to 65% and 83% of male producers respectively. While the number of

female producers increased by 26.6% between 2012 and 2017, the influence of female producers on day-to-day decisions still lags significantly behind male producers (USDA NASS, 2017).

It is not only female agricultural producers who lack decision-making power. Women involved in agricultural education and industry are underrepresented in leadership roles. However, the number of women studying agricultural sciences has been growing. In 2016, women made up 52.3% of graduate students studying agricultural sciences in the U.S. (*Survey of Graduate Students and Postdoctorates in Science and Engineering*, 2016). A 2014 study of representation in agricultural leadership found only 18% of department chairs and deans in colleges of agriculture and 23% of agricultural sciences faculty at land-grant institutions, which traditionally focus on teaching practical agriculture, science, and engineering, were women. The study also looked at industry, finding only 11% of executive board members of agricultural companies were women (Cho et al., 2017).

Despite these inequities, women have made and continue to make critical contributions to agriculture. 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). They drive change and adaptation on farms and ranches (Seuneke & Bock, 2015; Trauger, 2004), and they 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. The

authors recommend institutions acknowledge that disasters exacerbate social inequities, recognize women's ability to cope after a disaster, and empower women to use their skills and leadership through meaningful participation in the recovery process.

Women play a unique and critical role in the capacity of farms, ranches and rural communities to adapt to and survive the significant stressors they face, including climate change. The ability of women to connect with social resources, drive change and adaptation, facilitate farm and ranch succession, and build community is critical to addressing climate change. Djoudi & 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 inhibited the ability of women to utilize their adaptive capacity.

If farms, ranches, and rural communities are going to be able to cope with the extreme weather events, natural disasters, and long-term effects of climate change, 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. The capacity of agriculture and rural communities to adapt in the face of the 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.

Programs and Social Groups for Women in Agriculture

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 individual resilience factor of personal competence, and gains in participants' feelings of connectedness, which contribute to the individual resilience factor of social support. For example, Heins, Beaulieu, and Altman (2010) found Annie's Project, a farm risk management program for women, increased knowledge of marketing planning, record keeping, and estate planning among Illinois farm women. 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 of these 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.

Some women in agriculture participate in online social groups, which may also influence their feeling of connectedness and provide social support. There are many Facebook groups for women in agriculture. 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 in order 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 ultimately improve individual resilience.

Theoretical Framework

Theoretical support for this study comes from the work of the International Resilience Project, which outlined three types of protective factors for individual resilience: personal competence, family support, and social and community inclusion. The Resilience Research Centre (RRC) designed both the Child and Youth Resilience Measure and the Adult Resilience Measure based on these three types of protective factors, as well as 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" (*CYRM and ARM user manual*, 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. This study focuses specifically on how relationship-building programs and online social groups could influence two of the factor types: personal competence and social and community inclusion.

Statement of the Problem

Farms, ranches, and the people who live and work on them have significant stress from economic, political, and meteorological disturbances. According to Berardi and associates (2011), these disturbances, "global climate change, volatile energy markets, localized natural hazards such as flooding, and effects of regulations on technology use and labor supply" are becoming larger and more frequent "raising questions about the sustainability of U.S. agriculture" (p. 121). Threats to the sustainability of agriculture also threaten rural communities that rely on the financial, human, and cultural capital provided by farms and ranches, and all people who rely on agriculture for food and fiber.

Women play a critical role in individual, ecological, and community resilience in agriculture and in rural communities. They connect farms and ranches to social support, drive change in farm and ranch systems, and connect people with each other after community disasters (Drolet et al., 2015; Liebenberg & Moore, 2018; Wilmer & Fernández-Giménez, 2016). Women also face significant resilience challenges. Gender inequity in agriculture, in terms of ownership of capital and decision making, (Seuneke & Bock, 2015) compromises the capacity of women to navigate to and negotiate for resources, which is the definition of resilience.

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.

Purpose of the Study

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.

Research Objectives

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 the 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.

Need for the Study

The sustainability of agriculture and rural communities depends on women. The unique role women play in individual, ecological, and community resilience is more important than ever as farms, ranches, and rural communities face the challenges of climate change, volatile markets, natural disasters, rapid technological advancement, and a fluctuating labor supply. Improving the resilience of women can have a significant impact on individual, ecological and community resilience in agricultural systems. However, 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.

This study describes the relationship between participation in relationship-building programs and online social groups, and the individual resilience of women in agriculture. Research on relationship-building programs for women in agriculture is scarce. This study is a significant addition to the existing data about these programs, which is mostly evaluative. Describing the relationship between participation in these programs and the resilience of women in agriculture could open up new avenues of research into how these programs contribute to resilience, whether similar programs aimed at different audiences also contribute to resilience, and how existing programs can be changed to enhance their resilience-building effect.

Limitations

This study has limitations, including but not limited to:

1. The subjects selected for study represent a convenience sample. As a result, the findings are not generalizable beyond the respondents.
2. The distribution of the survey through electronic mail lists and social media introduced the possibility of selection bias.
3. The instrument was administered and collected at one point in time. Respondents' change in resilience over time was not measured.
4. The instrument was not contextualized for cultural groups beyond women in agriculture in the U.S.
5. Confounding variables were not controlled for in the study. Past experiences, current stress level and other factors that may influence resilience were not controlled for.

Definitions

Resilience: The process of adapting to a positive trajectory of functioning during and/or after a disturbance (Norris et al., 2008).

Individual resilience: The capacity of individuals to navigate to and negotiate for the resources that sustain their well-being when faced with significant adversity (Ungar et al., 2008).

Ecological resilience: 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" (Holling, 1973, p. 14).

Community resilience: "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change" (Adger, 2000, p. 347).

Internal protective factors: personal skills or resources that help people positively adapt and develop despite significant adversity.

External protective factors: social-ecological resources that help people positively adapt and develop despite significant adversity.

Relationship-building programs: programs aimed at women in agriculture that increase participants' feelings of connectedness, contributing to the individual resilience factor of social support.

Assumptions

The following assumptions guided this study:

1. The respondents accurately reported their gender and involvement in agriculture.
2. The respondents honestly reported their personal demographic information.

3. The respondents honestly and accurately completed the Adult Resilience Measure.
4. The respondents followed the instructions for completing the Adult Resilience Measure.

CHAPTER 2: REVIEW OF LITERATURE

A significant component of this study was a review of existing research on resilience, women in agriculture, relationship-building programs for women in agriculture, and online social groups designed for women. The review of resilience literature is organized into sections for individual, ecological, and community resilience. Each section includes a short review of the research history, a review of literature defining the concept, and a review of studies addressing measurement of the concept. Recent research of women in agriculture has primarily focused on the developing world. Because this study focused on women in agriculture in the United States, the review of literature addressing women in agriculture primarily focuses on research done in the United States. The review concludes with a discussion of programs and online social groups designed for women in agriculture.

Individual Resilience

In the 1970s, researchers began to study why some patients diagnosed with psychological disorders experienced less severe effects than other patients. They found that a history of personal competence, stable relationships, and the ability to fulfill responsibility were related to a less severe course of illness (Luthar et al., 2000). These discoveries led to research of children who demonstrated more positive adaptation despite experiencing significant adversity. Initially, these children were seen as invulnerable, immune to adversity (Anthony, 1974; Pines, 1975). The quest to find what individual traits made some children invulnerable led to studies of specific populations of resilient children and adolescents (Rutter, 1987; Werner & Smith, 1982). These studies found resilient children benefitted not only from their own individual traits but from protective interactional processes, for example financial resources, family stability, and social support (Ungar, 2011).

More recent research has acknowledged that there are internal and external factors that influence individual resilience, that positive adaptation can be cultural and contextual, and that an individual's capacity for resilience can vary over time (Masten, 2001; Rutter, 1987; Ungar, 2011; Werner & Smith, 1982). Ungar (2011) sees future research into individual resilience moving in three major directions: the study of neuro-physical and genetic factors that may contribute to positive adaptation despite adversity, the examination of internal and external resources and the role they play in resilience, and research into how cultural and broader ecosystem variation may affect development.

Definitions

While definitions of individual resilience have evolved over time, they remain complicated. Definitions can emphasize the traits of individuals, characteristics of the individual's environment, social resources available to the individual, or the process of positive adaptation (Ungar, 2011). Nearly all recent definitions, however, include two crucial elements, the presence of significant adversity and the achievement of positive adaptation.

Researchers continue to explore what "positive adaptation" means. Traditionally it has included social and instrumental competence, and "avoidance of serious emotional or behavioral problems" (Conger & Conger, 2002). When longitudinal studies of child development found that children who displayed positive adaptation in the face of adversity did not always retain that capacity over time (Werner & Smith, 1982), researchers began to adjust their view of positive adaptation and the factors that contribute to resilience.

Many authors now define resilience as a process that can change over time, often with changes in an individual's social support and physical environment. The connections between individual, ecological and community resilience are being highlighted more frequently in the

literature (Adger, 2000; Darnhofer et al., 2010; Ledogar & Fleming, 2008; Ungar, 2011). Ungar and associates' (2008) definition of individual resilience as "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) draws heavily on that connection.

Measurement

Research on individual resilience has relied on many, varied measurement scales. Kulig, and associates (2013) noted the challenges in measuring individual, ecological, and community resilience. The primary challenge is that resilience, as noted above, is a process that changes over time, so levels of resilience need to be determined by studying response to adversity over time, but few studies have taken a longitudinal approach. Even longitudinal studies may have difficulty attributing changes in resilience to particular factors, since conceptually resilience is a multidimensional process.

Despite these challenges, Friborg and colleagues (2005) assert that measuring individual resilience is critical because it provides evidence that can be used in a clinical setting to help patients maintain or regain their health, and it may help predict the capacity to tolerate stress in selecting candidates for high stress jobs. Several resilience measures have been developed to meet these and other needs. In their review of resilience measurement scales, Windle and associates (2011) identified 17 different scales that had been referenced in peer-reviewed publications and found 15 of them suitable for review. However, the scales used a wide variety of approaches, raising questions about what exactly each scale was measuring. Some scales focused on psychological hardiness or ability to cope with stress, while others considered both

internal and external protective factors. Liebenberg and Moore (2018) found that, although there is widespread agreement that resilience is influenced by social-ecological factors, "most tools designed to measure resilience overemphasize individual characteristics without adequately addressing the quality of physical and relational resources located in the social ecology that support resilience processes" (p. 2).

Of the 15 studies reviewed by Windle and associates (2011), only six took both internal and external protective factors into account in measuring resilience. Of those six, only two were designed specifically for adults, the Connor-Davidson Resilience Scale (Connor & Davidson, 2003), which includes only secure relationships as an external protective factor, and the Resilience Scale for Adults (Friborg et al., 2005). The Resilience Research Centre's Adult Resilience Measure (RRC-ARM) was developed after the review mentioned above. The RRC-ARM was adapted from the Resilience Research Centre's Child and Youth Resilience Measure (CYRM), a self-reported measure of social-ecological resilience. Windle and associates (2011) highlighted the CYRM as one of only five measures they reviewed that examined resilience across multiple levels. At the time of this study, the RRC-ARM and the Resilience Scale for Adults were the only two measures that were developed for adults, examined resilience across multiple levels, and had several citations in the literature.

Ecological Resilience

Ecological resilience was introduced by Holling (1973) as a way to understand how ecosystems were able to maintain a state when subject to disturbance or change. Holling's original definition suggests resilient ecosystems are static or persistence, meaning they are able to return to an original state after a disruption. Holling (1996) later revised his definition of ecological resilience. He created the concept, engineering resilience, to describe how quickly

ecosystems return to equilibrium after they are disrupted, and re-conceptualized ecological resilience to describe how ecosystems move between multiple possible states within a stability landscape. Under this widely accepted, revised definition, systems can transform to new states, remaining resilient as long as disturbances do not lead to a change to an undesirable state which includes a loss of key functions (Perz et al., 2013).

The study of ecological resilience has expanded beyond ecosystems to be applied to all complex systems, including social-ecological systems. Recognizing that natural ecosystems existed in relationship with humans, more researchers began to view ecological resilience from a social-ecological perspective (Berkes et al., 2000). From this perspective, people and nature are interdependent systems. Farms, ranches, and communities can be viewed as social-ecological systems that are part of a larger, interdependent system that includes their surrounding ecosystems (Berardi et al., 2011; Darnhofer et al., 2010). Recent research on ecological resilience focuses largely on adaptation and transformation of social-ecological systems when threated by profound change (Gunderson, 2000; Walker et al., 2004)

Definitions

Since Holling redefined ecological resilience in 1996, most definitions have taken a social-ecological perspective and presented resilience in terms of adaptation and/or transformation. Walker and colleagues (2004) define resilience as the "capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks." The idea that adaption can occur while a system is still experiencing disruption has been influential in individual, ecological, and community resilience.

Other definitions have stressed the human perspective in describing resilience. Adger and associates' (2005) definition of resilience as "the degree to which a complex adaptive system is capable of self-organization and the degree to which the system can build capacity for learning and adaptation" (p. 1036), includes humans' social capacities to organize and learn as key elements of social-ecological resilience. As more attention was given to the social aspects of resilience, researchers began to focus on the social capital of communities, and the study of community resilience began to emerge (Kulig et al., 2013).

Measurement

The need to measure ecological resilience has been growing as people try to improve ecosystem management and conservation, and as researchers try to assess and predict the risks posed by climate change (Angeler et al., 2018). Measuring the engineering resilience of a system is relatively straightforward, since, by definition, it is the time a system takes to recover from a disturbance (Holling, 1996). Unfortunately, this measurement does not account for the complexities of ecological and social-ecological systems.

Researchers have tried to account for these complexities in a number of models and metrics. Peterson and associates (1998) built on the idea that ecosystem resilience is tied to the diversity of species and the relationships between those species to develop the cross-scale model. The model ties ecosystem resilience not just to the diversity of species, but also the ecosystem function of the species and scale at which the species performs that function. They hypothesized that if species who perform a particular function within the ecosystem do so at different scales it builds resilience for that function and for the entire ecosystem.

Kotzee and Reyers (2016) developed a composite metric, the flood resilience index, to measure the resilience of social-ecological systems prone to flooding. The index uses existing

data on education, employment, land use, wetland diversity, and other characteristics as measures of social, economic, infrastructural, ecological, and institutional resilience. The authors stressed the need for a multidimensional approach to measuring resilience that accounts for the "complex array of variables linked to resilience in a repeatable and replicable manner" (p. 52).

Community Resilience

As resilience researchers began to recognize the importance of social systems to individual resilience and acknowledge the role of people and communities in the ecosystems being studied in ecological resilience, the closely related concepts of community resilience and social resilience began to emerge (Kulig et al., 2013). Community resilience is evident in the ecological approach to individual resilience, described by Khanlou and Wray (2014) as a perspective of individual resilience where "relationships between risk and protective factors are considered, with emphasis on interdependency between individuals and social systems" (p. 68). It's also evident in the social-ecological view of ecological resilience through the influence societies have on ecosystems and the dependence of communities on ecosystems (Adger, 2000).

There has been research into the connection between individual and community resilience (Brown & Kulig, 1996) and the ties between ecological and community resilience (Adger, 2000; Adger et al., 2005). However, Berkes and Ross (2013) have called for an integrated approach that brings together the resilience research on social-ecological systems and on the mental health of individuals. They argue that, although ecological resilience may be relevant to communities that are more dependent on natural resources, individual resilience is more applicable to communities less connected to the natural environment. Their integrated approach to community resilience focuses on the influence that community characteristics like

connections to place, values, knowledge, skills, a diverse economy, community infrastructure, and leadership have on individuals' agency and their ability to self-organize for collective action.

Definitions

Definitions of community resilience often align with one of the two perspectives, ecological or individual, mentioned above. Adger (2000) takes the ecological resilience perspective in defining social resilience as "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change" (p. 347). McConnell and colleagues' (2018) definition comes from the individual resilience perspective, "*Community resilience* refers to a community's capacity to empower marginalized members, such as through the provision of both tangible and intangible resources that facilitate successful coping with stress."

Definitions of community resilience are further complicated by the multiple meanings of the term "community" (Norris et al., 2008). In most community resilience research, communities have geographical boundaries and shared interests. Tying community resilience only to communities of place, ignores communities of practice, online communities, and the influence they might have in ecological and individual resilience. The influence of these different types of communities is apparent in agriculture where communities of practice influence how ag producers interact with the ecosystem (Dolinska & d'Aquino, 2016), and in farmers who, sometimes geographically isolated, find social support in social networking groups (Stain et al., 2008).

Measurement

There are a variety of tools available for measuring community resilience. Like definitions of community resilience, these tools vary in perspective, ecological or individual, and

in context, whether they are measuring resilience in the context of disaster preparedness, climate adaptation, or some other context.

Saja and associates (2018) reviewed existing frameworks to create their "5S" framework for social resilience to disasters, which emphasizes social structure; social capital; social mechanisms, competence, and values; social equity and diversity; and social beliefs, culture and faith. The 5S framework emphasizes social assets and processes over natural resources and community infrastructure. In contrast, Cutter's (2016) review of disaster resilience indicators, found several measurements that included infrastructure, housing and environment as resilience indicators.

Measures of community resilience in the context of climate adaptation vary not only in which resilience factors they measure, but also in the scale at which they are measured. Clare and associates (2017) found tools that measured resilience at the community scale using participatory methods to discover protective and adaptive factors specific to a community, and other tools that measured resilience at the individual scale where people responded individually in regards to their own resilience and the resilience of their community.

The variance in perspective, context, and scale of community resilience measures makes comparative analysis of the measures a challenge (Kulig et al., 2013). Likewise, the variance in which protective factors are measured makes it challenging for communities to compare their level of resilience to the levels of other communities. Still, in the face of escalating climatic, political, social, technological and economic change, measuring community resilience, can help communities conceptualize their collective ability to adapt.

Intersection of Individual, Ecological, and Community Resilience

Research into individual, ecological, and community resilience has pointed to the interdependence of all three constructs (Buikstra et al., 2010; Kulig et al., 2013; Obrist et al., 2010; Ungar, 2011). In a study of individual and community resilience in a rural Australian community that had responded positively after a long drought, Buikstra and colleagues (2010) identified 11 major themes that were intertwined in both individual and community resilience: social networks and support, positive outlook, learning, early experience, environment and lifestyle, infrastructure and support services, sense of purpose, diverse and innovative economy, embracing differences, beliefs, and leadership. Many of these themes related to both individual and community resilience. For example, social networks and support not only provided social support for individual resilience, but also enhanced the community's capacity for collective action. While self-belief was an important factor in individual resilience in the study, beliefs also related to community resilience through the shared beliefs and practices that tied the community together. Buikstra and their colleagues also found the natural environment was a protective factor in both individual and community resilience, providing feelings of well-being for individuals, and a shared sense of place for the community.

As King (2008) writes, "…people cannot be separated from nature, but are part of nature" (p. 114-115). In her review of alternative approaches to food production, she identified how different agricultural systems contribute to ecological and community resilience, and highlighted the role communities have in developing agricultural systems that positively contribute to ecological resilience. Humans have long managed ecosystems to provide, and sometimes protect, the food, water, and energy individuals and communities need (DeFries & Nagendra, 2017). These ecosystem management activities have brought about habitat loss, the introduction of

invasive species, climate change, and other threats (Crook et al., 2015). Farmers and ranchers manage ecosystems often by disrupting them to produce the products humans need and desire, but many do so with an understanding that they need to maintain the balance of the ecosystems to ensure their own survival (Swinton, 2008).

Maintaining the balance of ecosystems while producing the food and fiber people need is key to agricultural sustainability (Ehrlich, 2008). Darnhofer and associates (2010) suggest a systems approach to sustainable agriculture with a focus on the interdependence of social and ecological systems. They argue the resilience of the agricultural system is achieved through adaptability and change, emerging when "farmers hone the capacity to transform the farm, when farm production is attuned to the local ecological carrying capacity, and when learning and innovation are targeted outcomes" (p.186). An individual's capacity for adaptation is dependent on the condition of their environment, the quality of their life, and other factors associated with individual resilience (Gallopín, 2006).

Improving Individual Resilience

Research into interventions designed to improve individual resilience is limited. In their systematic review and meta-analysis of controlled trials that assessed the efficacy of resilience interventions for adults, Joyce and associates (2018) found only 17 articles that met their inclusion criteria. Those 17 articles were categorized based on the psychological approach of the intervention that was being assessed. Six of the articles assessed interventions that used a cognitive behavioral therapy (CBT) approach, which focuses on how people frame a situation as positive or negative, encouraging a more flexible, optimistic way of thinking about adversity (Hutnik et al., 2016). Five of the articles assessed mindfulness-based interventions, which focuses on stabilizing and focusing one's attention on the experience of the present moment (Jha

et al., 2017). The remaining six articles assessed interventions which included elements of both CBT and mindfulness.

One of the trials of a CBT-based intervention assessed the efficacy of telephone calls and webinars designed to support the spouses of deployed military members (Nichols et al., 2015). The calls and webinars were intended to help spouses recognize and change negative thoughts by practicing assertiveness, relaxation, and coping strategies. Nichols and their colleagues found that, although the intervention improved spouses depression, anxiety, personal/family coping, and family problem-solving communication, there was no statistically significant improvement in resilience.

In the mindfulness category, Joyce and associates included an assessment of a workplace intervention studied by Aikens and associates (2014). The intervention consisted of a 7-week program of virtual, synchronous classes and online, asynchronous, applied training. The classes and trainings focused on mindfulness practices like breathing exercises, focusing exercises, and meditation. Aikens and associates found significant post-intervention improvements in vigor, mindfulness, and resilience.

One study Joyce and associates included in the mixed CBT/mindfulness category assessed a multidimensional intervention intended to affect the mental health and wellness of veterans of the Global War on Terror and their significant relationship partners. Kahn and their colleagues (2016) studied the effectiveness of the self-directed intervention which included information on mindfulness, massage therapy, positive emotions, and caregiver education. They found intervention participants reported improved depression, sleep quality, perceived stress, self-compassion, pain, and resilience.

Women in Agriculture

The relationship between women and agriculture goes back thousands of years. According to many anthropologists, women were the first to domesticate corn about five thousand years ago (Jensen, 1981). Unfortunately, the numerous contributions women have made to agriculture have gone largely unrecognized (Hunter et al., 2013). Traditional images of women on the farm (Rathge, 1989) and gender roles in which "women's work was socially defined to be everything but that which contributed to the main production of commodities" (Eells, 2008, p. 33) are partly to blame, but the structural transformation of agriculture into a mechanized and modernized endeavor has contributed significantly to the lack of recognition and opportunity for women in agriculture. Most of the research into the marginalization of women in agriculture focuses on women living and/or working on farms and ranches, but women who work in agricultural business, education, research, and government face some of the same barriers.

As agriculture has become more mechanized women have been further removed from farm work. Early mechanical advances, like the plow, required more physical strength and lessened the need for women and children to pull weeds, leading to farm work becoming the work of men (Alesina et al., 2011). As farming became more mechanized, it also became more closely associated with masculinity (Seuneke & Bock, 2015).The male body became a symbol of the difficult, dirty, physical work of farming that persists today. A study of the perceptions of young women in agricultural training found they associated the male body with agricultural work, even work that did not require physical strength (Bryant, 1999). While it seems that machinery would reduce the need for physical strength in agricultural work and allow women to participate more fully, farm machinery and the technical knowledge to operate it has become an

extension of masculinity (Brandth, 2006; Trauger et al., 2008). According to Trauger and colleagues (2008), women in agriculture report significant gaps in their agricultural education, including in technical areas like equipment maintenance, and these gaps are used to further entrench male control of agriculture.

Especially after World War II, modernization pushed women out of farm work and into housework, resulting in the "gradual subordination of farm women through the closure of female labour domains, resulting in the de-skilling of female farm labour" (Seuneke & Bock, 2015, p. 42). Beginning in the early twentieth century, university agricultural research programs and the extension programs that brought information to farmers focused on the adoptions of new technologies (Hassanein, 1999). However, education on new technologies did not extend to women. Instead programs aimed at farm women emphasized food preservation, nutrition, bookkeeping and farm safety (Babbitt, 1993; Trauger et al., 2008), further entrenching them into traditional gender roles.

The institutional barriers constructed by agricultural education, along with structural economic obstacles that benefit men keep agriculture male dominated. As Pilgeram (2007) writes, "This dominance is maintained through structural systems such as laws and customs that privilege men as farmers, which is tied to the perceptions of farming as masculine" (p. 576). Despite these structural barriers, women continue to make valuable contributions to agriculture.

Women have taken the lead in introducing new practices onto farms, driving changes in farm entrepreneurship, sustainable agriculture, and land conservation (Eells, 2008; Seuneke & Bock, 2015; Trauger, 2004). Many other women contribute to agriculture through their roles as industry professionals, educators, and researchers. Women also connect farms to new knowledge networks and initiate family conversations about succession.

Wilmer and Fernández-Giménez (2016) provide several examples of how women's cultural practices build resilience when traditional discourse in ranching systems is confronted by change. When increased regulation and conflict over the use of public lands threaten the ranching system discourse that ranchers are independent and self-sufficient, women bridge ranching and non-ranching worlds bringing people together and advocating for ranching. When social and ecological uncertainties that make it difficult for young people to go into ranching threaten the traditional ranching discourse that ranching is facing a succession crisis, women reproduce ranching knowledge and empower younger generations to choose to stay in ranching. These practices demonstrate the critical influence of women over the individual resilience of farmers, ranchers, and their family members, the ecological resilience of farms, ranches, and the environments they are a part of, and the community resilience of rural communities.

Programs and Social Groups for Women in Agriculture

In general, adult educational programs aimed at women in agriculture have reinforced traditional gender roles. Most programs have addressed topics associated with homemaking, such as food preservation, nutrition, and family finances. When programs have sought to deliver information on agricultural production to women, they have usually focused on farm financial management or succession planning, rather than topics more directly connected to the field, feedlot, or range (Brasier et al., 2014; Hancharick & Kiernan, 2008; Trauger et al., 2008). Few programs specifically for women in agriculture have focused on crop or livestock production topics traditionally associated with male roles, but some programs have been constructed in ways that challenge traditional gender roles and potentially contribute to individual resilience. While conferences, networks, and leadership programs for women in agriculture also have values and design elements that challenge traditional gender roles and potentially build resilience, the

Annie's Project program provides an example that demonstrates many of the concepts, contexts and characteristics of these kinds of programs.

Annie's Project, a national farm management course for women, focuses on managing production, marketing, and finances on farms and ranches (Hunter et al., 2013). The program empowers women, in part, by recognizing and reinforcing their multiple roles, which may include agricultural producer, business owner, financial manager, spouse, mother, or homemaker. Liepins and Schick (1998) contend agricultural education and training should approach individual identity "without presuming that categories of individuals are internally homogenous or that members consistently prioritize the same aspects of their identity (e.g., gender, race, class, professional position) across the various contexts of social action" (p. 288). This approach is particularly important in programs for women in agriculture because the alternative is to view identities "according to an inherited set of historically structured social and material relationships" (p.288), relying on a traditional view of women in agriculture as "helpmates whose labor is only indirectly related to agriculture" (Rathge, 1989, p. 36).

The core values and design of Annie's Project reflect much of what has been learned about connecting and empowering women in agriculture. The stated values of Annie's Project include a "safe harbor" for questions and discussion, "guided intelligence" that empowers participants to share their knowledge and not always defer to instructors, and "connection" between the women participating in the program (Schultz et al., 2015).

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). Annie's Project includes only female participants, creating the a "safe harbor" not only for questions and answers, but also for important exchanges between participants.

Annie's Project recognizes and builds women's agency, through the value of "guided intelligence" (*Annie's Project | University of Maryland Extension*, n.d.). Agency, participants' capacity to act on and engage with the program and the systems that the participants and programs are a part of, is a critical concept in effective agricultural education (Liepins & Schick, 1998). Social agency can emerge in online groups as well (Mayne, 2016).

In a study of a Facebook group for parents of children with Autism Spectrum Disorder, Mustafa and colleagues (2015) found that participants gained both informational and emotional support from the group. Their analysis of the messages posted to the group revealed that even posts that seemed focused on sharing a personal experience often included a request for social support. Oliver and associates (2015) discussed the importance of online groups for socially isolated people who cannot access face-to-face support, like those providing hospice care for a family member. For women, feelings of social isolation can arise from gender discrimination and lack of support in the workplace (Parker & Funk, 2017). Pruchniewska (2019) found private Facebook groups for women not only provided social support for dealing with gender discrimination, but also built community and inspired action. When that action becomes collective, as it did in the Pennsylvania Women in Agriculture Network, studied by Trauger (2009), participants can "at least partially resist the forces that marginalised them" (p. 126).

Summary

While women in agriculture face unique challenges like inequality and gender discrimination that make them vulnerable to adversity, they also have unique skills and cultural practices that help farms, ranches, and rural communities deal with adversity and change.

Through those skills and practices, women in agriculture play an important role in individual, ecological, and community resilience in the rural and agricultural contexts. The literature on resilience points to a conceptualization of resilience as a complex, multidimensional process in which individual, ecological, and community resilience are interdependent. Recent measures of each type of resilience have been more likely to account for the other types of resilience, for example measures of individual resilience that have taken a social-ecological approach to the construct. Although there are a limited number of controlled trials, there are indications that interventions, like resilience training, can improve resilience. Given the role of social agency in agriculture, programs that include efforts to build trust and connect participants in networks and collectives may be able to have a positive effect on individual resilience.

CHAPTER 3: METHODS

This descriptive relational study was designed to describe the relationship between the individual resilience of women in agriculture and participation in relationship-building programs and online social groups in the United States. Women involved in agriculture completed an online survey that included the Resilience Research Centre's Adult Resilience Measure (RRC-ARM), a 17-item self-assessment designed to measure resilience based on both internal and external protective factors.

Research Objectives

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.

The independent variables for this study were gender, age, population of county of residence, education, primary occupation, social media use, participation in selected relationship-building programs, and participation in online social groups. The dependent variable was the respondent's resilience score, the sum of the responses to the 17 questions in the RRC-ARM.

Population and Sample

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 University of Missouri Extension's Women in Agriculture program, North Dakota State University Extension's Annie's Project program, and Nebraska Extension's Women in Agriculture 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 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.

Procedure

This study employed two instruments, a demographic survey and the 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 Missouri,

Nebraska, and North Dakota. Questionnaire 2 was distributed through social media. There were only minor differences between the surveys. Questionnaire 2 included an additional question in the pre-survey to determine if respondents had already responded to Questionnaire 1. Five of the 355 total respondents indicated they had already completed the survey. Other differences are described in the "Independent Variables" section below. The full version of both surveys including the RRC-ARM is included in Appendices B through H.

Demographics

The initial section of Questionnaire 1 included six demographic questions including age, gender, state of residence, county of residence, level of education, and primary occupation. Questionnaire 2 included all six of those questions as well as a question asking for the population of the respondent's county of residence. This additional question was not necessary in Questionnaire 1, because it was distributed primarily to people in three states. This allowed the survey to include a list of the counties in each of those states for respondents to select from. Questionnaire 2 was distributed across the United States. Rather than include county lists for every state, respondents to Questionnaire 2 who indicated their state of residence was Missouri, Nebraska, or North Dakota selected their county of residence from a list of counties, and respondents from other states received the county population question.

The initial section of both questionnaires 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 Missouri and Nebraska. 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?"

Resilience Research Centre - Adult Resilience Measure

The final section of both questionnaires included the English language version of the 17-item RRC-ARM. The RRC-ARM was adapted from the Child and Youth Resilience Measure (CYRM), a "screening tool to explore resources (individual, relational, communal, and cultural) available to youth aged 12 to 23 years old, that may bolster their resilience" (Liebenberg & Ungar, 2009, p. 2). The measure was created through a collaborative effort that included input from 35 researchers in 11 countries (Daigneault et al., 2013). Studies have confirmed the validity and reliability of the CYRM including on face validity (Daigneault et al., 2013; Ungar et al., 2008), predictive validity (Daigneault et al., 2013; Kaur, 2018), and Confirmatory Factor Analysis (van Rensburg et al., 2019).

Like the CYRM, 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 string 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. The 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 ($\alpha = .879$).

Data Collection

A web-based survey was first distributed through electronic mailing lists provided by University of Missouri Extension's Women in Agriculture program, Nebraska Extension's Women in Agriculture program, and North Dakota State University Extension's Annie's Project program. These lists were thought likely to reach the target population of the study, adult women involved in agriculture whom 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.

The North Dakota State University Institutional Review Board (IRB) reviewed and approved this study and the collection of data prior to the distribution of the instrument (see Appendix A). Participants were informed of their rights and benefits of participation in the study before responding to the survey (see Appendices C and F).

Preliminary results from the first distribution of the survey indicated about 98% of respondents had participated in at least one relationship-building program. Although the data collected from the first distribution could yield results pertaining to the effects that the number and/or type of programs a respondent participated in had on their total resilience score, the researchers decided a second distribution of the survey, targeted at women involved in

agriculture who were less likely to have participated in relationship-building programs, could yield important comparative data for the study.

For the second distribution, researchers used Facebook as the primary distribution channel. According to the Pew Research Center, 66% of U.S. adults living in a rural community use social media, as of February 7, 2019 (Perrin et al., 2019). Facebook's "groups" and "pages" features were used to specifically target potential respondents. A list of Facebook groups and pages related to women in agriculture was assembled from results of a queries of Facebook's internal search. In an effort to efficiently reach the target population, the list included only groups and pages that had at least 1,000 members or followers, and that had been active in the last 6 months. Ten Facebook pages and seven Facebook groups were identified (Table 1). The total members/followers of all identified groups and pages was 78,708. A single person can be a member of multiple groups and a follower of multiple pages, so the aforementioned total includes duplicates. However, the survey was designed to include questions that discouraged duplicate responses. The survey included the following information to describe the first distribution, "This survey was also distributed in June and July of 2019 to email lists provided by Nebraska Women in Agriculture's Jessica Groskopf, University of Missouri Extension's Annie's Project leader Karisha Devlin, and NDSU Extension Annie's Project leader Crystal Schaunaman." This information was followed by the yes/no question, "Did you already complete this survey?" Respondents who answered yes were taken directly to the end of the survey.

Table 3.1

Number of members/followers of Facebook groups/pages selected for survey distribution.

Group/Page	**Type**	**Members/Followers**
American Agri-women	Page	8,473
Association of Women in Agriculture ay UW-Madison	Page	1,979
Executive Women in Agriculture	Page	2,895
Missouri Women in Agriculture	Page	1.039
Nebraska Women in Agriculture Conference	Page	1,621
Purdue Women in Agriculture	Page	1,596
Science-based Women in Ag	Closed Group	2,345
Successful Farming: Women in Agriculture	Page	5,656
True Moms of Agriculture	Closed Group	4,740
True Women of Agriculture	Closed Group	17,161
Uncensored Women in Agriculture	Closed Group	2,177
Women Changing the Face of Agriculture	Page	4,968
Women in Sustainable Agriculture	Closed Group	2,020
Women of the Land	Closed Group	4,857
Women Promoting Agriculture	Public Group	1,562
Women Stepping Forward for Agriculture	Page	2,209
Women, Food and Agriculture Network	Page	14,449
TOTAL		78,709

An invitation, available in Appendix B, was designed as a Facebook post while being as consistent as possible with the invitation sent out in the first distribution. The researchers sent a request to post the invitation to members/followers of a group/page that were already connected to the researchers on social media. For groups/pages without a member/follower connected to the researchers, the researchers sent the request to the group/page creator or administrator.

Data Analysis

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 from 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 in describing the relationship of age, education level, and primary occupation to personal, relational, and overall resilience scores as measured by the RRC-ARM. ANOVA was also used to describe the relationship of participation in relationship-building programs and online social groups to personal, relational, and overall resilience scores.

CHAPTER 4: RESULTS

The purpose of this study was to determine the relationship between the individual resilience of women in agriculture and participation in relationship-building programs and online social groups in the United States through the description of the characteristics of the women surveyed in this study; the relationship between demographic factors and the personal, relational, and overall resilience of respondents; the relationship between participation in relationship-building programs and the personal, relational, and overall resilience of respondents; and the relationship between participation in online social groups and the personal, relational, and overall resilience of respondents. This chapter includes the results of data analysis relating to each of those descriptions.

Objective 1: Characteristics of Survey Respondents

The characteristics of survey respondents (N = 499) can be found in Table 4.1. All respondents identified as female. The mean age of respondents was 45.07 years old (SD = 14.67). Respondents ranged in age from 20 to 86 years old. The 30-39-year-old age group had the highest number of respondents (24.8%, n = 124). All respondents had at least completed high school. 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 either Missouri, Nebraska, or North Dakota, 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.

Table 4.1

Characteristics of survey respondents (N = 499)

Variable	***n***	**%**
Age		
20-29 years old	77	15.4
30-39 years old	124	24.8
40-49 years old	111	22.2
50-59 years old	92	18.4
60 years old or older	95	19.0
Missing	0	0.0
Highest level of education completed		
Less than H.S. degree	0	0.0
H.S. degree	111	22.2
Associate's degree	63	12.6
Bachelor's degree	228	45.7
Graduate degree	97	19.4
Missing	0	0.0
Primary occupation		
Farming and/or ranching	196	39.3
Ag-related field	141	28.3
Non-ag field, student, or retired	161	32.3
Missing	0	0.0

Table 4.1. *Characteristics of survey responses (continued)*

Variable		***n***	**%**
State			
	Missouri	81	16.2
	Nebraska	78	15.6
	North Dakota	169	32.9
	Other states (32)	176	35.3
	Outside U.S.	4	0.8
	Missing	0	0.0
County population			
	Less than 2,500	37	7.4
	2,500 – 19,999	215	43.1
	20,000 – 249,999	138	27.7
	250,000 or more	42	8.4
	Missing	67	13.4
Social media hours per week			
	0 – 5 hours per week	140	28.1
	6 – 10 hours per week	199	39.9
	11 – 15 hours per week	82	16.4
	16 or more hours per week	78	15.6
	Missing	0	0.0
Social media effect on dealing with stressful events			
	None at all	250	50.1
	A generally positive effect	158	31.7
	A generally negative effect	77	15.4
	Missing	14	2.8

Respondent's participation in the relationship-building programs included in the survey varied (see Table 4.2). Most survey respondents (31.5%, *n* = 157) indicated they had not participated in any of the 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 4.2

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

Program/Group	***n***	**%**
Annie's Project		
Yes	211	42.3
No	288	57.7
Missing	0	0.0
Conference for women in agriculture		
Yes	199	39.9
No	300	60.1
Missing	0	0.0
Leadership program for women		
Yes	88	17.6
No	411	82.4
Missing	0	0.0
Farm/ranch succession planning		
Yes	134	26.9
No	365	73.1
Missing	0	0.0

Table 4.2. *Respondent participation in relationship-building programs (continued)*

Program/Group	***n***	**%**
Building Resilience Together		
Yes	18	3.6
No	481	96.4
Missing	67	13.4
Number of programs participated in		
0	157	31.5
1	153	30.7
2	100	20.0
3	62	12.4
4	24	4.8
5	3	0.6
Missing	0	0.0
Social media group for women in agriculture (N = 288)		
Yes	181	62.8
No	107	37.2
Missing	0	0.0

Objective 2: Relationship Between Demographics and Resilience Scores

Post-hoc reliability tests showed the RRC-ARM was internally consistent in this study ($\alpha = .879$). 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 4.3. The lowest possible total resilience score is 17, and the highest is 85. The total resilience scores of survey respondents ranged from 33 to 85. The mean total resilience score for all respondents was 71.83 ($SD = 8.02$). Higher scores and sub-scores on the RRC-ARM indicate characteristics associated with resilience. 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 (*CYRM and ARM User Manual*, 2018). References to mean scores and sub-scores in this study are only provided for comparison between groups.

Table 4.3

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

			Range	
Resilience Score (possible range)	**Mean**	**SD**	**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 4.4). 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 ($p > .05$). The difference in relational sub-scores between age groups nearly met the statistical significance threshold (p = .053), so post hoc tests were run to determine if differences between specific age groups were significant or if differences in responses to statements used to calculate the relational resilience sub-score were significant. No significant difference was found in relational resilience sub-scores in specific age group comparisons. However, significant differences were found in the responses to specific statements between the 30-39 years old age group and the 60 years old and over age group, as well as between the 40-49 years old age group and the 60 years old or older age group.

Differences in resilience scores between education groups were not statistically significant ($p > .05$). Respondents with a graduate degree had the highest total resilience scores ($M = 72.36$, SD = 7.96). The highest personal resilience sub scores ($M = 30.26$, SD = 3.70) was among respondents with a 2-year or 4-year college. The highest mean relational resilience sub-score by education group was among respondents with a graduate degree ($M = 42.16$, SD = 5.03). Comparison of resilience scores by occupation group did not show a statistically significant difference between groups ($p > .05$). The highest total resilience scores ($M = 72.63$, SD = 7.73), personal resilience sub-scores ($M = 30.37$, SD = 3.82), and relational sub-scores ($M = 42.26$, SD = 4.92) were all among respondents whose primary occupation was not related to agriculture.

Table 4.4

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

Resilience Score		**SS**	***df***	**F**	***p***
By Age Group					
Total resilience	Between groups	396.33	4	12.55	0.16
	Within groups	31660.85	494		
	Total	32057.18	498		
Personal resilience	Between groups	71.04	4	1.13	0.34
	Within groups	7750.52	494		
	Total	7821.57	498		
Relational resilience	Between groups	241.53	4	2.35	0.05
	Within groups	12692.89	494		
	Total	12934.42	498		
By Education Group					
Total resilience	Between groups	35.33	2	0.27	0.76
	Within groups	32021.85	496		
	Total	32057.18	498		
Personal resilience	Between groups	0.50	2	0.02	0.98
	Within groups	7821.07	496		
	Total	7821.57	498		
Relational resilience	Between groups	41.97	2	0.81	0.45
	Within groups	12892.45	496		
	Total	12934.42	498		
By Occupation Group (N = 498)					
Total resilience	Between groups	167.97	2	1.30	0.27
	Within groups	31887.84	495		
	Total	32055.80	497		
Personal resilience	Between groups	5.77	2	0.18	0.83
	Within groups	7812.68	495		
	Total	7818.44	497		
Relational resilience	Between groups	112.19	2	2.17	0.12
	Within groups	12821.88	495		
	Total	12934.06	497		

Objective 3: 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. The between group comparison of the resilience scores of respondents who had participated in Annie's Project (n = 211) and respondents who had not (n = 288) showed no statistically significant difference ($p > .05$), see Table 4.5. Annie's Project participants had higher mean total resilience scores (72.38, SD = 7.65 cf. 71.42, SD = 8.28) and higher means for relational sub-scores (41.91, SD = 4.83 cf. 41.36, SD = 5.28) and personal sub-scores (30.47, SD = 3.78 cf. 30.06, SD = 4.09), but the differences were not statistically significant ($p > .05$).

The comparisons of the mean resilience scores of respondents who had participated in a conference for women in agriculture (n = 199) and respondents who had not (n = 300) did not show a statistically significant difference ($p > .05$), see Table 4.5. Respondents who had participated in a conference for women in agriculture had higher total resilience scores (M = 72.06, SD = 7.73) than those who had not participated (M = 71.68, SD = 8.22). They also had higher relational resilience sub-scores (M = 42.04, SD = 4.80) compared to relational resilience sub-scores (M = 41.30, SD = 5.27) for non-participants. However, conference participants had lower personal resilience sub-scores (M = 30.02, SD = 3.91) than those who had not participated (M = 30.38, SD = 4.00), though not drastically different.

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), but the comparison showed no

statistically significant difference ($p > .05$) in personal resilience sub-scores or total resilience scores, see Table 4.5. 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. Leadership program participants also had higher total resilience scores ($M = 73.09$, SD = 7.10) and personal resilience sub-scores ($M = 30.33$, SD = 3.39) than those who had not participated; total resilience scores ($M = 71.56$, SD = 8.19), personal resilience sub-scores ($M = 30.21$, SD = 4.08). Neither the difference in total resilience scores nor the difference in personal resilience sub-scores were statistically significant ($p > .05$).

Like those who had participated in a leadership program for women, 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 4.5. Succession planning program participants also had higher personal resilience sub-scores ($M = 30.30$, SD = 3.58) than those who had not participated ($M = 30.21$, SD = 4.10), and higher total resilience scores ($M = 72.93$, SD = 6.93) than non-participants ($M = 71.42$, SD = 8.36), although neither difference was statistically significant ($p > .05$).

The between group comparisons of respondents who had participated in Building Resilience Together (BRT) workshops or learning circles ($n = 18$) and those who had not ($n = 481$) showed no statistically significant differences ($p > .05$), see Table 4.5. BRT participants had lower total resilience scores ($M = 71.22$, SD = 6.03), personal resilience sub-scores ($M = 29.72$, SD = 2.65), and relational resilience sub-scores ($M = 41.50$, SD = 3.70) than non-participants;

total resilience scores (M = 71.85, SD = 8.09), personal resilience sub-scores (M = 30.25, SD = 4.00), and relational resilience sub-scores (M = 41.56, SD = 5.14).

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, see Table 4.5. 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 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).

Table 4.5

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

Resilience Score		**SS**	***df***	**F**	***p***
By Annie's Project participation					
Total resilience	Between groups	113.11	1	1.76	0.19
	Within groups	31944.07	497		
	Total	32057.18	498		
Personal resilience	Between groups	20.14	1	1.28	0.29
	Within groups	7801.43	497		
	Total	7821.57	498		
Relational resilience	Between groups	37.79	1	1.46	0.23
	Within groups	12896.63	497		
	Total	12934.42	498		
By conference for women in agriculture participation					
Total resilience	Between groups	17.15	1	0.27	0.61
	Within groups	32040.03	497		
	Total	32057.18	498		
Personal resilience	Between groups	15.93	1	1.01	0.31
	Within groups	7805.64	497		
	Total	7821.57	498		
Relational resilience	Between groups	66.14	1	2.56	0.11
	Within groups	12868.28	497		
	Total	12934.42	498		
By leadership program for women participation					
Total resilience	Between groups	170.50	1	2.66	0.10
	Within groups	31886.68	497		
	Total	32057.18	498		
Personal resilience	Between groups	0.97	1	0.06	0.80
	Within groups	7820.60	497		
	Total	7821.57	498		
Relational resilience	Between groups	145.80	1	5.67	0.02
	Within groups	12788.62	497		
	Total	12934.42	498		

Table 4.5. *One-way independent ANOVA of RRC-ARM resilience scores by program participation (continued)*

Resilience Score		**SS**	***df***	**F**	***p***
By succession planning program participation					
Total resilience	Between groups	223.76	1	3.49	0.06
	Within groups	31833.42	497		
	Total	32057.18	498		
Personal resilience	Between groups	0.75	1	0.05	0.83
	Within groups	7820.82	497		
	Total	7821.57	498		
Relational resilience	Between groups	198.58	1	7.75	0.01
	Within groups	12735.84	497		
	Total	12934.42	498		
By Building Resilience Together participation					
Total resilience	Between groups	6.85	1	0.11	0.75
	Within groups	32050.33	497		
	Total	32057.18	498		
Personal resilience	Between groups	4.90	1	0.31	0.58
	Within groups	7816.67	497		
	Total	7821.57	498		
Relational resilience	Between groups	0.16	1	0.01	0.94
	Within groups	12934.26	497		
	Total	12934.42	498		
By number of programs participated in					
Total resilience	Between groups	347.22	3	1.81	0.15
	Within groups	31709.96	495		
	Total	32057.18	498		
Personal resilience	Between groups	13.73	3	0.29	0.83
	Within groups	7807.79	495		
	Total	7821.57	498		
Relational resilience	Between groups	266.17	3	3.47	0.02
	Within groups	12668.24	495		
	Total	12934.42	498		

Objective 4: 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 ($p > .05$), see Table 4.6. The mean total resilience score for respondents who had participated in online groups for women in agriculture ($n = 181$) was 71.84 (SD = 8.23) compared to a mean of 70.81 (SD = 7.98) among those who had not participated in such a group ($n = 107$). Respondents who had participated in an online group also had higher personal resilience sub-scores ($M = 30.18$, SD = 4.10) and relational resilience sub-scores ($M = 41.66$, SD = 5.27) than those who had not; personal resilience sub-scores ($M = 30.12$, SD = 3.93), relational resilience sub-scores ($M = 40.69$, SD = 5.01). However, none of these differences were statistically significant.

In the analysis that included participation in relationship-building programs as a factor, respondents who had participated in a program as well as an online group for women in agriculture had higher total resilience scores ($M = 72.01$, SD = 7.44) and relational resilience sub-scores ($M = 41.86$, SD = 4.77) than respondents who had participated only in an online group (Total resilience scores, $M = 71.64$, SD = 9.10; Relational resilience sub-scores, $M = 41.43$, SD = 5.81) or respondents who had not participated in either an online group or

relationship-building program (Total resilience scores, *M* = 70.81, SD = 7.98; Relational resilience sub-scores, *M* = 40.69, SD = 5.01). Only slight differences were found in the mean personal resilience sub-scores. Respondents who had only participated in an online group had higher scores (*M* = 30.21, SD = 4.46) compared to respondents who had not participated in an online group (*M* = 30.12, SD = 3.93) and respondents who had participated in at least one program and an online group (*M* = 30.15, SD = 3.80).

Table 4.6

One-way independent ANOVA of RRC-ARM resilience scores by online group and program participation (N = 288)

Resilience Score		**SS**	***df***	**F**	***p***
By online group participation only					
Total resilience	Between groups	70.89	1	1.07	0.30
	Within groups	18934.62	286		
	Total	19005.50	287		
Personal resilience	Between groups	0.25	1	0.02	0.90
	Within groups	4666.40	286		
	Total	4666.65	287		
Relational resilience	Between groups	62.74	1	2.34	0.13
	Within groups	7659.59	286		
	Total	7722.32	287		
By online group and program participation					
Total resilience	Between groups	76.96	2	0.58	0.56
	Within groups	18928.54	285		
	Total	19005.50	287		
Personal resilience	Between groups	0.41	2	0.01	0.99
	Within groups	4666.24	285		
	Total	4666.65	287		
Relational resilience	Between groups	70.95	2	1.32	0.27
	Within groups	7651.37	285		
	Total	7722.32	287		

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS

Purpose of the Study

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.

Research Objectives

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.

Conclusions

Agriculture in the United States is under increasing threat from climate change, severe weather, and economic and social volatility (Hanna et al., 2011; Havstad et al., 2018; Ko et al., 2012). Women in agriculture play an important role in facing these threats due to their capacity for connecting farms and ranches to social support (Wilmer & Fernández-Giménez, 2016), driving change in farm and ranch systems (Seuneke & Bock, 2015; Trauger, 2004), and building community after disasters (Kaplan et al., 2009). To help women in agriculture continue to play

that role, a better understanding of women in agriculture, the factors that influence their resilience, and interventions that can support their resilience is needed.

A better understanding of women in agriculture relies not only on research into their capacity to support community and ecological resilience, but also into the gender inequity that inhibits that capacity and makes women more vulnerable to the impact of the complex issues threatening agriculture (Djoudi & Brockhaus, 2011). A better understanding of the resilience of women in agriculture depends on the view of resilience as a complex, multidimensional process in which individual, ecological, and community resilience are interdependent. Social-ecological approaches to resilience that go beyond an individual's personality and their immediate relational resources to include factors like systemic gender inequity acknowledge the complexity of resilience and could lead to new and better interventions to support all factors of individual resilience (Ungar, 2011). Although there are indications that interventions, like resilience training, can improve individual resilience, much more research is needed. Resilience interventions often focus on internal resources for resilience (Joyce et al., 2018). Programs that focus on immediate external resources or help address systemic factors could have a greater effect on individual resilience.

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. 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. Overall, a comparison of groups based on participation in relationship-building programs and online social groups found practical 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. 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.

Objective 1: Characteristics of Survey Respondents

The data in this study were gathered from two survey distributions. The first survey distribution utilized electronic mailing lists provided by programs for women in agriculture in Missouri, Nebraska, and North Dakota. The second survey distribution utilized social media, including sharing the survey invitation within several private online social groups for women in

agriculture. Because this study is based on a convenience sample, the characteristics of respondents do not represent women in agriculture in the U.S. in general.

The average age of respondents (M= 45.07, SD = 14.67) is considerably lower than the average age of female agriculture producers of 57.1 years found in the 2017 Census of Agriculture (USDA NASS, 2017). The lower average age of our respondents is of interest because research has suggested an association between age and resilience. In a study of more than 3,000 people in the Netherlands, Portzky and associates (2010) found a positive association between age and scores on the Dutch Resilience Scale RS-n. In the aforementioned study, resilience scores steadily increased for each age group before flattening out between the 55 to 65 years old and the 65 years or older age groups. The association between age and resilience presents some challenges and opportunities for the women in agriculture. In our study, the mean age of respondents working primarily in an ag-related field was 38.96 years (SD = 11.82). This group includes Extension educators and Women in Ag network leaders who often lead the relationship-building programs included in this study. Women in this comparatively younger group have the opportunity to positively influence the resilience of women working primarily in farming or ranching, a group with a mean age of 46.63 years (SD = 13.84) in this study. However, research associating age and resilience suggests those who lead relationship-building programs may have a lower level of resilience than those women whose resilience they are working to improve. This is a potential challenge because program leaders could be prone to burnout. Research has shown that long hours and stress have led to burnout and retention issues among Extension agents (Benge et al., 2015). Extension agents often lead relationship-building programs for women in agriculture. Maintaining and improving relationship-building programs as resilience interventions relies, in part, on building the resilience of the program leaders, who

may have lower resilience than those, often older, women they are trying to help. The age and resilience differences between those who lead relationship-building programs and those who participate in them also presents a potential opportunity for a more collaborative approach. Including program participants in the design and delivery of these programs could reduce stress on program leaders and give them time and space to participate in and benefit from the program themselves.

Survey respondents had a higher than average level of educational attainment. The 2019 American Community Survey found 44.81% of women in the United States had attained post-secondary degrees (US Census Bureau, n.d.). In comparison, 78.1% of our respondents had attained a post-secondary degree and 64.2% had attained at least a Bachelor's degree. Among respondents working primarily in farming and/or ranching, 64.8% had attained at least a Bachelor's degree. Lower levels of education have been associated with diminished resilience (Campbell-Sills et al., 2009). The women in agriculture in this study are highly educated in comparison with the women in the U.S. in general, so it is reasonable to expect them to be more resilient than groups of women with lower levels of education. It is of some concern that none of the respondents in this study indicated a level of education below high school graduate. Slightly less than ten percent (9.47%) of women 25 years old and over in the U.S. have an educational level less than high school graduate (US Census Bureau, n.d.). Because this study does not include any of those women, we cannot draw conclusions about the influence of educational attainment on their resilience. Further, we cannot know what, if any, influence relationship-building programs or online social groups may have had on the resilience of women without at least a high school education. While the survey distribution methods used in this study may have influenced the data, the educational attainment found among respondents still provides a

counterpoint to traditional views of women in agriculture which define them only in relation to their farming and ranching husbands, fathers, or sons.

According to 2019 population estimates from the U.S. Census Bureau, 42.04% of U.S. counties have a population of 20,000 persons or fewer. Slightly more than half (50.5%) of our respondents indicated they lived in one of those counties. People living in more sparsely populated counties might find it more difficult to find other people to connect with in their community and may rely more on social media for social connection. Respondents living in counties with a population less than 2,500 and those living in counties with a population greater than 250,000 reported more use of social media. Respondents in counties with less than 2,500 people spent an average of 12.88 hours per week on social media (SD = 8.32). Those living in counties with more than 250,000 people spent an average of 10.62 hours on social media (SD = 7.88). In a one-way independent ANOVA test, the difference between the mean hours of social media use per week among respondents in counties with less than 2,500 people and those in counties with between 20,000 and 249,999 people (M = 9.56, SD = 6.49) was statistically significant (p = .05). One possible explanation for that difference is that respondents in sparsely populated counties feel socially isolated and spend more time on social media seeking the social connection they do not get in their communities. That hypothesis is further supported by the responses to the survey question, “What effect, if any, does social media have on your ability to deal with stressful events?” Although the differences were not statistically significant, 37.8% of respondents from counties with a population less than 2,500 indicated social media has a generally positive effect on their ability to deal with stressful events. In comparison, 29.3% of respondents from counties with a population between 2,500 and 19,999, 33.3% of respondents from counties with a population between 20,000 and 249,999, and 33.3% of respondents from

counties with a population of 250,000 or more, responded in the same way. This suggests that social media helps some women, possibly more women in counties with smaller populations, deal with adversity. It is unclear which social media activities (e.g. connecting with family, posting about one's own feelings and experiences, connecting with new people who share one's interests) are helping these respondents deal with adversity. In this study, differences in the resilience scores of respondents who had participated in online social groups and those who had not were not statistically significant. However, the relatively higher use of social media among respondents in the smallest counties, cited above, and other research showing the ability of online social groups to build supportive relationships (Pruchniewska, 2019), suggest more investigation of the effects of online social groups on resilience is needed.

Objective 2: Relationship Between Demographics and Resilience Scores

There were no statistically significant differences in total resilience scores, personal resilience sub-scores, or relational resilience sub-scores between age groups, education groups or county population groups in this study. This lack of significant difference is consistent with a social-ecological view or resilience, which puts more emphasis on an individual's environment than on their personal characteristics. The lack of difference also points to the relative homogeneity of women in agriculture. Results of the 2017 Census of Agriculture show 95% of female producers are white (USDA NASS, 2017). This study did not consider race as a factor in resilience because a lack of racial diversity in the sample was assumed. In retrospect, race and ethnicity should have been included as factors in the study. Although there has been research into the resilience of varying racial and ethnic groups, studies that include race and ethnicity as potential resilience factors within diverse groups is scarce. Even a small amount of resilience data from women of color in agriculture could have added to the base of knowledge.

Among the demographic factors that were included in this study, age group showed the most influence on total resilience scores, personal resilience sub-scores, and relational resilience sub-scores, although there were no statistically significant differences. The difference in relational resilience sub-scores between respondents in the 60 years old or older group (M = 42.75, SD = 4.58), which were the highest across the age groups, and those in the 30 to 39 years old age group (M = 40.91, SD = 5.10), which were the lowest, was notable. In post-hoc tests of the responses to the ten questions that are factored into the relational resilience sub-score, the mean response, on the scale of 1 – "Not at all" to 5 – "A lot," to the statement, "I feel that I belong in my community," showed a statistically significant difference ($p < .05$) between respondents in the 30 to 39 years old group (M = 3.56, SD = 1.030) and respondents in the 60 years old or older group (M = 4.02, SD = .945). There was also a statistically significant difference ($p < .05$) between the mean response of respondents in the 40 to 49 years old group (M = 3.59, SD = 1.031) and respondents in the 60 years old or older group (M = 4.02, SD = .945). Respondents in the 30 to 39 years old group also had a statistically significant difference ($p < .05$) in their mean response (M = 3.96, SD = .859) to the statement, "I am treated fairly in my community" when compared to the mean response of those in the 60 years old or older group (M = 4.29, SD = .810). Based on their responses to the two statements above, respondents in the 30 to 39 years old age group do not feel as strong of a sense of community belonging or fairness as respondents in other age groups. One possible explanation for this difference is the multiple social roles women fulfill in their 30's and 40's. Multiple roles can have positive effects (Hoffnung & Williams, 2013), but balancing the social roles of caregiver, employee, mother, and spouse can also produce role-related stress (Stewart et al., 2018). Balancing these multiple roles may also leave little time for engaging with one's community. In this study, participation in

succession planning and leadership programs showed a positive relationship with responses to the community belonging statement mentioned above. Participation in a succession planning program also showed a positive relationship with responses to the community fairness statement mentioned above. Many leadership programs include activities that get participants more involved in their communities, which may lead to a greater feeling of community belonging. The connection between succession planning programs and feelings of community belonging and fairness is not as obvious, and further investigation is needed. In the meantime, programs for women in agriculture should explore ways to get participants, especially those in their 30s and 40s, more involved in their communities and specifically address the issues of community isolation and unfairness that are impacting the resilience of some women in agriculture.

Objective 3: Relationship Between Program Participation and Resilience Scores

There is a clear and positive relationship between respondents' participation in relationship-building programs and their total resilience score, including their personal resilience and relational resilience sub-scores. In four of the five programs included in the study, mean resilience scores were higher among respondents who had participated in the program than the resilience scores of those who had not. The one program in which mean resilience scores were lower among its participants was Building Resilience Together, a program that had been offered for less than a year before data collection was completed. Only 18 respondents indicated they had participated in that program.

The mean relational resilience sub-score of respondents who had participated in a leadership program for women ($M = 42.7614$, $SD = 4.48752$) was significantly higher ($p < .05$) than the mean score of those who had not ($M = 41.3431$, $SD = 5.18831$). Similarly, the difference between the mean relational resilience sub-score of respondents who had participated

in a succession planning program (M = 42.6343, SD = 4.37103) and those who had not (M = 41.2110, SD = 5.29222) was statistically significant ($p < .05$). Post hoc analysis of the responses to the statements associated with the relational resilience sub-score indicated that both leadership program and succession planning participation were associated with a greater feeling of community belonging and ability to adapt to social situations. Succession planning participation was also associated with a greater cooperation skill and a sense of being treated fairly in the community. The responses of those who had participated in a leadership program for women indicated participants placed more importance on getting and improving skills and had more opportunities to apply their skills.

While both succession planning and leadership programs are related to higher levels of relational resilience, they relate to different parts of the relational resilience construct. This suggests that different relationship-building programs could be associated with different parts of resilience. That suggestion is further supported by the relationship between the number of programs a respondent participated in and their relational resilience sub-score. The mean relational resilience sub-score of respondents who had participated in three or more programs (M = 43.0787, SD = 4.30176) was significantly higher ($p < .05$) than the mean relational resilience sub-score of both respondents who had participated in only one program (M = 41.06, SD = 4.94) and respondents who had not participated in any programs (M = 41.06, SD = 5.69). Based on that data, it appears that participation in multiple relationship-building programs is associated with increasing resilience benefits, due, at least in part, to the unique strengths of each program and their relationship to specific factors of resilience. Increases in relational resilience associated with the number of programs a respondent has participated in may also be due to the accumulation of social support participants are able to build through multiple programs. If the

programs women are participating in are truly relationship-building, then women will accumulate more relationships with each additional program they participate in. It is not clear if sheer number of relationships is associated with higher levels of resilience. However, increased opportunity to build relationships can invite additional diversity into an individual's social support system. According to Norberg and associates (2008, p. 46), "there is a growing recognition that diversity is a key requirement for long-term (sustainable) functioning of systems – biological and social." Having a more diverse social support system builds resilience by increasing an individual's capacity for navigating to resources. By utilizing diverse social connections, individuals have easier access to a wider set of resources. Encouraging women in agriculture to participate in multiple relationship-building programs is one way to build diverse social support systems. One alternative to encouraging participation in multiple programs is to help program participants build a personal practice for establishing and maintaining diverse relationships that will continue to serve them beyond the temporal limits of any individual program. One way to support that personal practice outside of the limits of a program is to encourage participants to join online social groups.

Objective 4: Relationship Between Online Group Participation and Resilience Scores

Differences in the total resilience scores, personal resilience sub-scores, and relational resilience sub-scores between respondents who had participated online social group for women in agriculture and those who had not were not statistically significant ($p > .05$). However, online social group participation as a positive influence on resilience should not be completely dismissed. Total resilience scores, personal resilience sub-scores, and relational resilience sub-scores were all higher among respondents who had participated in an online social group. In

situations where women in agriculture cannot access relationship-building programs due to geographic isolation or lack or time, online social groups may be an alternative.

There is some evidence suggesting online social groups may have more influence on resilience when participants have also participated in one or more relationship-building programs. Total resilience scores (M = 72.0103, SD = 7.43513) and relational resilience sub-scores (M = 41.8557, SD = 4.77186) among respondents who had participated in at least one relationship-building program and in an online social group were higher than the same scores among respondents who had participated only in an online group (Total resilience scores, M = 71.6429, SD = 9.09871; Relational resilience sub-scores, M = 41.4286, SD = 5.80877) or respondents who had not participated in an online group or program (Total resilience scores, M = 70.8131, SD = 7.98008; Relational resilience sub-scores, M = 40.6916, SD = 5.01396), although these differences were not statistically significant ($p > .05$). Intentionally combining a relationship-building program with an associated online social group may have resilience-building potential not addressed in this study. As mentioned above, online social groups could be used to support a personal practice that would extend the relationship-building benefits beyond the limits of a program. In a study of women-only, private Facebook groups, Pruchniewska (2019) described how those groups became consciousness-raising by providing "(1) spaces separate from men with (2) nonhierarchical membership where (3) women can discuss everyday experiences and build communities that (4) lead to agency to take actions that challenge that patriarchy" (p. 1368). Combining participation in relationship-building programs with participation in online social groups, like those described above, have potential to increase resilience-building effects by helping women collectively address the gender inequity in

agriculture (Seuneke & Bock, 2015) that compromises women's capacity to navigate to and negotiate for resources.

Implications for Research

This study is the first to describe the relationship between relationship-building programs and online social groups and social-ecological factors of individual resilience. More research will be necessary to elaborate on the findings.

The data collected from this research describe a positive relationship between participation in relationship-building programs and resilience as measured by the RRC-ARM. The results were significant in regards to participation in succession planning and leadership programs and relational resilience sub-scores, and in participation in three or more programs and relational resilience sub-scores. However, these findings are applicable only to the sample used in this study. Further research, employing a more generalizable sampling technique should be conducted into the capacity of relationship-building programs, online social groups, and other resilience interventions to address social-ecological factors that contribute to the resilience of women in agriculture.

The differences in the relational resilience sub-scores between age groups described in this study, especially the relatively low scores of women in their 30's, merit further investigation. Although longitudinal studies do not perfectly align with the conceptualization of resilience as a complex, dynamic process, such studies could reveal whether this phenomenon is limited to this study or whether it is associated with that particular time in the lives of women in agriculture. As previously noted, this study did not include race or ethnicity as a factor of resilience. Further research that includes that factor within a diverse sample is needed. This study also described a statistically significant difference in amount of social media use among respondents living in

counties with less than 2,500 people. This raises important questions about social isolation of women in agriculture in sparsely populated areas. Additional research into that potential social isolation and the use of social media as a practice for dealing with that isolation is needed.

In describing the relationship between both relationship-building programs and online social groups, and factors of resilience, this study treated all implementations of programs and groups as equal. It was assumed that participation in a succession planning program, for example, would have the same effect on resilience regardless of the quality of the program, the curriculum, or the delivery method. More research is needed to describe which aspects of particular programs contribute to improvements in resilience among women in agriculture. A qualitative study of women who had participated in relationship-building programs could determine which program characteristics and activities were important in generating resilience-building effects. Research could focus on a variety of important questions, including whether women-only cohorts, program duration, or program frequency were a factor in producing improvements in resilience. Program curriculum is another possible research focus. A qualitative study could examine the relationship between particular program activities and personal and relational factors for resilience.

Implications for Practice

The description of the relationship between relationship-building programs and social-ecological factors of individual resilience in this study has important implications for practice among those who fund, design and deliver these programs.

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. Improving the resilience of women in agriculture has wide-reaching positive effects for farms and ranches, the families who own and operate them, and the rural communities that rely on them. 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 threatening 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, and more resources for the development and enhancement of these programs as resilience interventions needs 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 one of the gendered cultural practices described by Wilmer and Fernández-Giménez (2016), empowering younger generations to choose to stay in agriculture. Leadership programs for women in agriculture address the resilience factors of community belonging and having opportunities to apply their 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 were evident in this study. Both 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 multiple roles.

Finally, those who fund, design, and deliver relationship-building programs should consider the relationship between 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 doesn't pit one program against another, as the current grant funding process 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 systems that keep 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.

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APPENDIX A: IRB APPROVAL LETTER

NDSU NORTH DAKOTA STATE UNIVERSITY

May 23, 2019

Dr. Adam Marx
School of Education

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #HE19248, "The Effect of Relationship-building Programs on the Resilience of Women in Agriculture"

Co-investigator(s) and research team: Bob Bertsch, Lynette Flage, Claudette Peterson
Date of Exempt Determination: 5/23/2019 Expiration Date: 5/22/2022
Study site(s): online
Sponsor: n/a

The above referenced human subjects research project has been determined exempt (category #2(i)) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on the revised protocol submission (received 5/16/2019).

Please also note the following:
• If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
• The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
• Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
• Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.
Sincerely,

Kristy Shirley

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult http://www.ndsu.edu/research/integrity_compliance/irb/. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb
Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

APPENDIX B: QUESTIONNAIRE 1: INVITATION

Hi, I'm Bob Bertsch, a graduate student at North Dakota State University in the School of Education. I am working with Karisha Devlin from University of Missouri Extension to conduct **research on the resilience of women in agriculture in Missouri**. I am inviting you to participate in this study because of your connection to agriculture.

If you have already responded to my survey, THANK YOU! There's no need to respond again.

If you haven't responded yet, **your response would really help** with my research.

Participation in this research includes taking a survey about your participation in programs aimed at women in agriculture and factors that might contribute to your resilience. **The survey will take approximately 15 minutes.**

Your responses will be anonymous and confidential. **Your participation could benefit women in agriculture by determining whether certain types of programs contribute to their resilience.**

Take the Survey Now

If you have any questions, please contact me at 701-231-7381 or robert.bertsch@ndsu.edu.

Thanks in advance for your help!

Bob Bertsch
North Dakota State University

APPENDIX C: QUESTIONNAIRE 1: CONSENT

School of Education
Fargo, ND 58108-6050
701-231-7439

The Effect of Relationship-building Programs on the Resilience of Women in Agriculture

This study is being conducted by: *Bob Bertsch:*
Email: robert.bertsch@ndsu.edu
Phone: 701-231-7381
Dr. Adam A. Marx, Ph D.:
Email: adam.marx@ndsu.edu
Phone: 701-231-7439

Key Information about this study:
This consent form is designed to inform you about the study you are being asked to participate in. Here you will find a brief summary about the study; however, you can find detailed information later on in the form.

Why am I being asked to take part in this study?
You are being asked to take part in this study because you are a woman connected to agriculture in either Missouri, Nebraska or North Dakota. This study focuses on the resilience of women in agriculture in those states.

What will I be asked to do?
You will be asked to take a survey and answer questions regarding your participation in programs aimed at women in agriculture and factors that might contribute to your resilience.

Where is the study going to take place, and how long will it take?
This study will take place anywhere that you have access to the internet and a desktop or laptop computer. The survey will take you approximately 10-15 minutes to complete.

What are the risks and discomforts?
The risks of participating in this study are minimal. Your responses will be anonymous and confidential. Thinking about the factors that contribute to your resilience might cause you some discomfort.

What are the expected benefits of this research?
This study could benefit women in agriculture by determining whether certain types of programs contribute to their resilience. It could also benefit Women in Agriculture, Annie's Project and other programs by providing information that could be used to improve those programs.

Do I have to take part in this study?
Your participation in this research is your choice. If you decide to participate in the study, you may change your mind and stop participating at any time without penalty or loss of benefits to which you are already entitled. Your responses are completely anonymous.

Who will have access to my information?
Only those conducting the study, Dr. Adam A. Marx, Ph D. and Mr. Bob Bertsch, will have access to any information you wish to provide.

How will my information be used?
No identifiable information will be obtained. Your responses will be anonymous. Your answers will be used to provide feedback to stakeholders to help women in agriculture build their resilience.

Will I receive any compensation for participating in the study?

There is no compensation for this study.

What if I have questions?

If you have any questions, you can contact Dr. Adam A. Marx, Ph D. at adam.marx@ndsu.edu or Mr. Bob Bertsch at robert.bertsch@ndsu.edu

What are my rights as a research participant?

You have rights as a research participant. A committee called the Institutional Review Board (IRB), which works to protect your rights and welfare, reviews all research with human participants. If you have questions about your rights, an unresolved question, a concern or complaint about this research you may contact the IRB office at 701.231.8995, toll-free at 855-800-6717 or via email (ndsu.irb@ndsu.edu). Please reference Protocol #HE19248.

Do you agree to continue?
(Answering "Yes" means you have read and understand the information above; had any questions answered; and decided to be a part of the study.)

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Do you agree to continue? (Answering "Yes" means you have read and understand the information abo... = No

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APPENDIX D: QUESTIONNAIRE 1: DEMOGRAPHIC SURVEY

How old are you in years? (Please enter numbers only) _____

Skip To: End of Survey If Condition: How old are you in years? (... Is Less Than 19. Skip To: End of Survey.

What best describes your gender?

- ○ Female (1)
- ○ Male (2)
- ○ Prefer not to say (3)
- ○ Prefer to self-describe (4) _____

In which state do you currently live?

▼ Alabama (1) ... I do not reside in the United States (53)

Display This Question:
If 50 States, D.C. and Puerto Rico = North Dakota

What county do you live in?

▼ Adams (1) ... Williams (52)

Display This Question:
If 50 States, D.C. and Puerto Rico = Nebraska

What county do you live in?

▼ Adams (1) ... York (93)

Display This Question:

If 50 States, D.C. and Puerto Rico = Missouri

What county do you live in?

▼ Adair (1) ... Wright (111)

What is the highest level of school you have completed?

- Less than high school degree (1)
- High school graduate (high school diploma or equivalent including GED) (2)
- Some college but no degree (3)
- Associate degree in college (2-year) (4)
- Bachelor's degree in college (4-year) (5)
- Master's degree (6)
- Doctoral degree (7)
- Professional degree (JD, MD) (8)

What is your primary occupation? (more than 50% of your work hours)

- ○ Farming and/or ranching (1)
- ○ Agriculture-related business (not farm/ranch) (2)
- ○ Non-agriculture job (3)
- ○ Retired (4)
- ○ Student (5)
- ○ Not employed (6)
- ○ Other (7) _____

Did you attend the Building Resilience Together workshop at the 2019 Nebraska Women in Agriculture Conference?

- ○ Yes (1)
- ○ No (2)

Have you participated in the Building Resilience Together Learning Circles with other women?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Have you participated in the Building Resilience Together Learning Circles with other women? = Yes

Approximately how many Learning Circle meetings did you attend? _____

Approximately, how many hours a week do you spend on social media?

_____

Display This Question:

If If Approximately, how many hours a week do you spend on social media? Text Response Is Greater Than 0

What effect, if any, does social media have on your ability to deal with stressful events?

- ○ None at all (1)
- ○ A generally positive effect (2)
- ○ A generally negative effect (3)

Which, if any, of the following programs have you participated in? (check all that apply)

- ☐ Annie's Project (1)
- ☐ A conference for women in agriculture (2)
- ☐ A leadership program for women (3)
- ☐ A succession planning workshop or program (4)

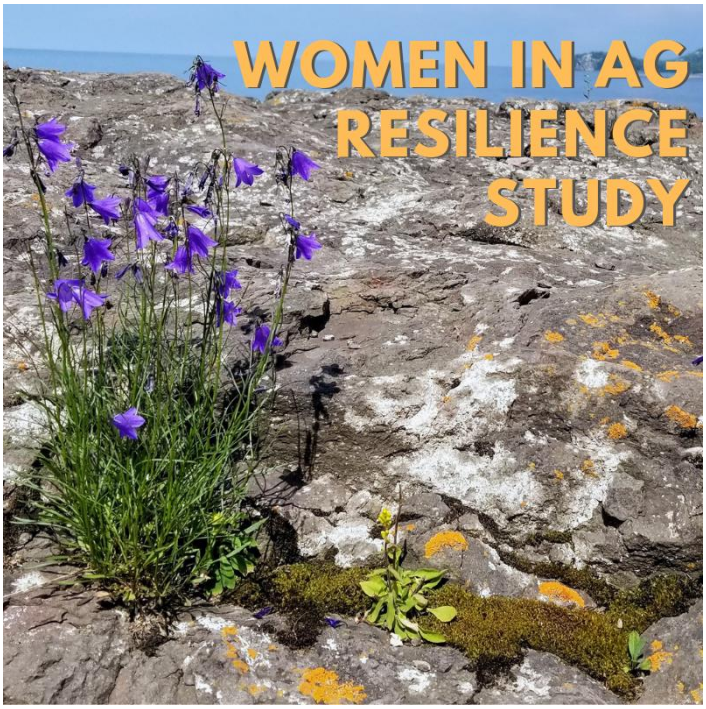
APPENDIX E: QUESTIONNAIRE 2: INVITATION

Women in Ag Resilience Study

Bob Bertsch, a graduate student at North Dakota State is studying the resilience of women in agriculture, and he needs your help. Your participation could benefit women in agriculture by determining whether certain types of programs contribute to their resilience.

Please take this anonymous and confidential survey, [insert URL], about factors that might contribute to your resilience. It will only take about 15 minutes.

If you have any questions, please contact me at 701-231-7381 or robert.bertsch@ndsu.edu.



APPENDIX F: QUESTIONNAIRE 2: CONSENT

The Effect of Relationship-building Programs on the Resilience of Women in Agriculture

This survey was also distributed in June and July of 2019 to email lists provided by Nebraska Women in Agriculture's Jessica Groskopf, University of Missouri Extension's Annie's Project leader Karisha Devlin, and NDSU Extension Annie's Project leader Crystal Schaunaman.

Did you already complete this survey?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Did you already complete this survey? = Yes

---

What best describes your gender?

- ○ Female (1)
- ○ Male (2)
- ○ Prefer not to say (3)
- ○ Prefer to self-describe (4) _____

Skip To: End of Survey If What best describes your gender? = Male

---

School of Education
Fargo, ND 58108-6050
701-231-7439
The Effect of Relationship-building Programs on the Resilience of Women in Agriculture
This study is being conducted by:

Bob Bertsch
Email: robert.bertsch@ndsu.edu
Phone: 701-231-7381
Dr. Adam A. Marx, Ph D.:
Email: adam.marx@ndsu.edu
Phone: 701-231-7439

Key Information about this study:
This consent form is designed to inform you about the study you are being asked to participate in. Here you will find a brief summary about the study; however, you can find detailed information later on in the form.

Why am I being asked to take part in this study?
You are being asked to take part in this study because you are a woman connected to agriculture. This study focuses on the resilience of women in agriculture.

What will I be asked to do?
You will be asked to take a survey and answer questions regarding your participation in programs aimed at women in agriculture and factors that might contribute to your resilience.

Where is the study going to take place, and how long will it take?
This study will take place anywhere that you have access to the internet and a desktop or laptop computer. The survey will take you approximately 10-15 minutes to complete.

What are the risks and discomforts?
The risks of participating in this study are minimal. Your responses will be anonymous and confidential. Thinking about the factors that contribute to your resilience might cause you some discomfort.

What are the expected benefits of this research?
This study could benefit women in agriculture by determining whether certain types of programs contribute to their resilience. It could also benefit Women in Agriculture, Annie's Project and other programs by providing information that could be used to improve those programs.

Do I have to take part in this study?
Your participation in this research is your choice. If you decide to participate in the study, you may change your mind and stop participating at any time without penalty or loss of benefits to which you are already entitled. Your responses are completely anonymous.

Who will have access to my information?
Only those conducting the study, Dr. Adam A. Marx, Ph D. and Mr. Bob Bertsch, will have access to any information you wish to provide.

How will my information be used?
No identifiable information will be obtained. Your responses will be anonymous. Your answers will be used to provide feedback to stakeholders to help women in agriculture build their resilience.

Will I receive any compensation for participating in the study? *There is no compensation for this study.*

What if I have questions?
If you have any questions, you can contact Dr. Adam A. Marx, Ph D. at adam.marx@ndsu.edu or Mr. Bob Bertsch at robert.bertsch@ndsu.edu

What are my rights as a research participant?
You have rights as a research participant. A committee called the Institutional Review Board (IRB), which works to protect your rights and welfare, reviews all research with human participants. If you have questions about your rights, an unresolved question, a concern or complaint about this research you may contact the IRB office at 701.231.8995, toll-free at 855-800-6717 or via email (ndsu.irb@ndsu.edu). Please reference Protocol #HE19248.

Do you agree to continue?
(Answering "Yes" means you have read and understand the information above; had any questions answered; and decided to be a part of the study.)

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Do you agree to continue? (Answering "Yes" means you have read and understand the information abo... = No

APPENDIX G: QUESTIONNAIRE 2: DEMOGRAPHIC SURVEY

How old are you in years? (Please enter numbers only)

_____

Skip To: End of Survey If Condition: How old are you in years? (... Is Less Than 19. Skip To: End of Survey.

In which state do you currently live?

▼ Alabama (1) ... I do not reside in the United States (53)

Display This Question:

If 50 States, D.C. and Puerto Rico = North Dakota

What county do you live in?

▼ Adams (1) ... Williams (52)

Display This Question:

If 50 States, D.C. and Puerto Rico = Nebraska

What county do you live in?

▼ Adams (1) ... York (93)

Display This Question:

If 50 States, D.C. and Puerto Rico = Missouri

What county do you live in?

▼ Adair (1) ... Wright (111)

Display This Question:

If 50 States, D.C. and Puerto Rico != Missouri

And 50 States, D.C. and Puerto Rico != Nebraska

And 50 States, D.C. and Puerto Rico != North Dakota

What is the population of the county you live in?

- ○ Less than 2,500 (1)
- ○ 2,500 to 19,999 (2)
- ○ 20,000 to 249,999 (3)
- ○ 250,000 or more (4)

What is the highest level of school you have completed?

- ○ Less than high school degree (1)
- ○ High school graduate (high school diploma or equivalent including GED) (2)
- ○ Some college but no degree (3)
- ○ Associate degree in college (2-year) (4)
- ○ Bachelor's degree in college (4-year) (5)
- ○ Master's degree (6)
- ○ Doctoral degree (7)
- ○ Professional degree (JD, MD) (8)

What is your primary occupation? (more than 50% of your work hours)

- ○ Farming and/or ranching (1)
- ○ Agriculture-related business (not farm/ranch) (2)
- ○ Non-agriculture job (3)
- ○ Retired (4)
- ○ Student (5)
- ○ Not employed (6)
- ○ Other (7) _____

Approximately, how many hours a week do you spend on social media?

_____

Display This Question:

If If Approximately, how many hours a week do you spend on social media? Text Response Is Greater Than 0

What effect, if any, does social media have on your ability to deal with stressful events?

- ○ None at all (1)
- ○ A generally positive effect (2)
- ○ A generally negative effect (3)

Which, if any, of the following programs have you participated in? (check all that apply)

- ☐ Annie's Project (1)
- ☐ A conference for women in agriculture (enter title below) (2)
- ☐ A leadership program for women (enter title below) (3)
- ☐ A farm/ranch succession planning workshop or program (enter title below) (4)
- ☐ Building Resilience Together workshop or learning circle (5)
- ☐ A social media group for women in agriculture (6)

Display This Question:

If Which, if any, of the following programs have you participated in? (check all that apply) = A conference for women in agriculture (enter title below)

Or Which, if any, of the following programs have you participated in? (check all that apply) = A leadership program for women (enter title below)

Or Which, if any, of the following programs have you participated in? (check all that apply) = A farm/ranch succession planning workshop or program (enter title below)

Please identify the title of the program(s) you participated in.

_____

APPENDIX H: QUESTIONNAIRES 1 & 2: RRC-ARM

The following 17 questions come from the Adult Resilience Measure, which is designed to measure a person's resilience. Please respond to the statements below. There are no right or wrong answers. Your answers are anonymous and confidential.

To what extent do the following statements apply to you?

I enjoy my family's/partner's cultural and family traditions

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

I have opportunities to apply my abilities in life (life skills, a job, caring for others)

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

I feel secure when I am with my family/partner

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

I have opportunities to show others that I can make good decisions

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

I am treated fairly in my community

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

My friends stand by me during difficult times

- Not at all (1)
- A little (2)
- Somewhat (3)
- Quite a bit (4)
- A lot (5)

To what extent do the following statements apply to you?

I feel that I belong in my community

- Not at all (1)
- A little (2)
- Somewhat (3)
- Quite a bit (4)
- A lot (5)

My family/partner stands by me during difficult times

- Not at all (1)
- A little (2)
- Somewhat (3)
- Quite a bit (4)
- A lot (5)

I feel supported by my friends

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

I talk to my family/partner about how I feel

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

People like to spend time with me

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

If I am hungry, I can get food to eat

- Not at all (1)
- A little (2)
- Somewhat (3)
- Quite a bit (4)
- A lot (5)

To what extent do the following statements apply to you?

My family knows a lot about me

- Not at all (1)
- A little (2)
- Somewhat (3)
- Quite a bit (4)
- A lot (5)

My family have usually supported me through life

- Not at all (1)
- A little (2)
- Somewhat (3)
- Quite a bit (4)
- A lot (5)

I know how to adapt to different social situations

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

Getting and improving qualifications or skills is important to me

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

I cooperate with people around me

- ○ Not at all (1)
- ○ A little (2)
- ○ Somewhat (3)
- ○ Quite a bit (4)
- ○ A lot (5)

APPENDIX I: RRC-ARM SCORING GUIDE

[Source: Resilience Research Centre. (2018). *CYRM and ARM user manual*. Halifax, NS: Resilience Research Centre, Dalhousie University. Retrieved from http://www.resilienceresearch.org/]

The items within the measures can be directly summed to gain a total score of an individual's resilience.

To derive personal resilience subscale scores, sum the following items:

4. My family have usually supported me through life
5. My family knows a lot about me
6. If I am hungry, I can get food to eat
8. I talk to my family/partner about how I feel
11. My family/partner stands by me during difficult times
15. I feel secure when I am with my family/partner
17. I enjoy my family's/partner's cultural and family traditions

To derive relational resilience scores, sum 10 items:

1. I cooperate with people around me
2. Getting and improving qualifications or skills is important to me
3. I know how to adapt to different social situations
7. People like to spend time with me
9. I feel supported by my friends
10. I feel that I belong in my community
12. My friends stand by me during difficult times
13. I am treated fairly in my community
14. I have opportunities to show others that I can make good decisions
16. I have opportunities to apply my abilities in life (life skills, a job, caring for others)