

The development of the Agricultural Producer Barriers to Care Scale (APBCS)

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Abstract

Purpose: The purpose of this study was to identify and test the factor structure of the Agricultural Producer Barriers to Care Scale (APBCS), which assesses barriers to engaging with health care in rural US farmers.

Methods: Respondents ($n = 1045$) completed an online survey that was distributed digitally and in-person by researchers and community partners at farming events and via farm-related social media. Exploratory and Confirmatory Factor Analysis were used to assess the underlying factor structure of the APBCS, and McDonald's omega coefficients were calculated to test the reliability of each factor and the instrument as a whole. Data analysis was conducted in SPSS 28.0 and MPlus Version 7.4.

Findings: The exploratory factor analysis ($n = 689$) indicated a four-factor structure for the APBCS with domains of (i) formal health care challenges, (ii) cultural barriers to help-seeking, (iii) stigma, and (iv) resilience, which explained 38.408% of the overall variance. The confirmatory factor analysis ($n = 231$) found that a three-factor structure, where questions from "cultural barriers to help seeking" were applied to factors for stigma and resilience, was a better fit for the model than the four-factor model hypothesized by the EFA. The final APBCS showed reliability within each domain, and across the full three-factor scale.

Conclusion: The APBCS is a promising tool that shows high internal consistency and could inform researchers and practitioners about the structural and cultural barriers to engaging with health care in agricultural producers living in the United States.

KEYWORDS

barriers to care, farming community, health care access, instrument development, mental health

INTRODUCTION

Due to the nature of their work, farmers often live in rural areas and have greater physical distance from health care resources, fewer health care providers per capita, and decreased insurance coverage compared to urban residents.¹⁻³ Formal health care challenges are

well-documented by farmers and include long travel times to access services, lack of specialty care in rural areas, and the inability to take time away from work to access services.⁴⁻⁶ Farmers are less likely to receive benefits from Medicare or Medicaid, and to receive health insurance through their employer, placing them at greater risk of health-related financial concerns.⁷ Roughly 60% of rural adults live

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in areas experiencing a deficit of mental health care providers.⁸ Lack of access to health care resources in rural areas leads to reliance on primary care providers as a sole touchpoint with the health care system, despite the fact that PCP's are often poorly equipped to deliver behavioral or specialty health care.⁹ Farmers also report a lack of competence by providers in understanding their occupation and lifestyle, leading to avoidance of help-seeking behavior and lack of disclosure regarding health concerns.^{4,10,11}

Even when health care resources are available to farmers, a combination of factors contribute to underutilization of services including poor perceived quality of care, stigmatization of engaging with services, and farmers' adherence to principles of self-reliance and other conventional masculine ideals.^{11,12} For those within the agricultural community, farming is closely related to one's personal identity due to its extensive demands and common generational ties.^{11,13} Furthermore, many farmers live on or in close proximity to their farm, amplifying the personal aspects of farming and decreasing overall work-life balance.¹⁴ This relationship between farming and identity gives rise to the internalization of common values associated with farming culture, including self-reliance, pride, and masculinity.^{4,11,13} Farmers typically reside in rural areas with close community ties, leading to infrequent help-seeking behaviors due to their fear of negative sentiment from community members.^{11,14} Barriers to help-seeking are even more pronounced for mental health and substance use issues. Farmers report that engaging with services for mental health may lead to individuals being viewed as weak, or unable to cope with the stressors of farm work in the same way as their peers.^{4,11,12} While farmers have been found to speak about their problems amongst themselves, they are unlikely to seek help from those outside the farming community due to pride being a frequent barrier that causes help-seeking to be viewed as a sign of weakness.^{11,15} Because farming is a time consuming occupation that often requires work outside typical hours, farmers are more likely to minimize their well-being and health care needs, thereby reinforcing self-reliance. Farmers also report a reluctance to seek care for mental health issues because of fear of job loss and others in the community perceiving them to be unfit to work, both of which are important concerns when farmer's identities and self-worth are closely tied to what they produce.^{11,15}

Existing measures of barriers to care

There is not an existing instrument that assesses the multitude of barriers to engaging with health care faced by agricultural producers. While some of the scales included in Table S1 share domains with the proposed instrument and others have been successfully utilized in rural populations, there are limitations to their relevance in assessing barriers to care within the farming community. For instance, several of these instruments were developed in the context of specific subpopulations, including college students and veterans, limiting their ability to be applied in an agricultural context.¹⁶⁻¹⁸ Other instruments focus solely on barriers to care for mental health services, and fail to capture barriers to engaging with resources for physical health care that

have been expressed in the farming community.¹⁹⁻²³ One instrument, the MBMC, shares several domains with the proposed instrument but was developed specifically to assess barriers to engaging in screening for colorectal cancer and includes questions about medical mistrust and fear of being perceived as homosexual, two themes that were not identified in formative qualitative research.²⁴ To our knowledge, no psychometrically validated instruments have been developed to measure barriers to care in rural farming populations living in the United States, and the purpose of this study was to fill this gap in the literature.

METHODS

Identification of domains through formative research

This development of this instrument was driven by a prior research project titled FARMS (Finding Appropriate measurements for Rural Mental health and Substance use), which provided the authors with a better understanding of sources of stress, barriers to care, and coping strategies that exist within the farming community in the state of Georgia. Participants were recruited using a snowball sampling method, and ultimately 15 farmers participated in structured interviews ranging from 35 min to 1 h. Researchers used inductive coding to isolate prominent themes related to sources of stress, barriers to care, coping strategies, and mental health outcomes in transcribed interviews. Saturation was achieved over the course of the 15 interviews, and prominent themes of inaccessibility of care, low prioritization of health, adherence to traditional masculine ideals such as self-reliance and resilience, and the stigmatization of individuals who sought help for mental health challenges were identified.^{11,14}

Research findings mirrored themes that were identified in other research projects concerned with farmers' health and well-being. Qualitative research conducted by Hagen et al. among Canadian farmers found that care for mental health support was often inaccessible in rural farming communities, and those who publicly engaged in help-seeking behavior for mental health challenges would be stigmatized by other members of the community, mirroring statements made by participants in formative research.¹⁵ Another consistent theme was farmers often felt disconnected from their care providers due to a misunderstanding of the realities of working in agriculture.¹⁵ The influence of accessibility of care and provider disconnect on help-seeking behavior was not only identified in Canadian farmers, but in groups of Australian farmers as well. Research conducted by Vayro et al. found that farmers felt that providers should have a deeper understanding of their lifestyle to serve their communities more effectively, and that accessibility of services was a significant barrier to initiating help-seeking behavior in a timely manner.⁶ A separate longitudinal cohort study among Australian farmers mirrored findings from formative qualitative research, showing that many farmers preferred to manage health needs themselves or by relying on personal support networks of peers, friends, and family as opposed to visiting a health care provider.²⁵ Additional research in the Australian farming community further supports findings of low prioritization of health issues and

an emphasis on self-reliance as barriers to engaging in help-seeking behavior.¹⁰

Initial instrument development

Following the identification of qualitative themes and verifying consistency within the broader literature about health care engagement in the farming community, nine instruments with common developmental aims or factors related to a specific barrier to health care engagement present among the farming community were identified by a thorough literature review of existing instruments for assessing barriers to care. These instruments, represented in Table S1, assessed conventional barriers to engaging with health care in rural areas, the influence of masculinity on help-seeking and health care utilization, and the impact of resilience and stigmatization on a respondents' intentions to engage in either help-seeking behavior or resource utilization. After an instrument was identified, the research team conducted a specific search to identify the developmental context, factor structure, and any evidence of psychometric testing for each instrument. After the nine instruments were identified, the full set of 172 items were examined for redundancies, with duplicate questions removed from the pool. After redundant items were removed, remaining questions were grouped into four themes: resilience, stigma, formal health care challenges, and cultural barriers to help-seeking. Once the questions were grouped thematically the research team used a combination of their own experience conducting formative qualitative research and familiarity with existing literature related to farmers' experiences engaging with health care to assess the relevance of each item, and to amend the language of items to be more appropriate for use in the target population. Ultimately, 44 items were organized across the four hypothesized domains.

Pilot testing

Once researchers had identified the final pool of items for inclusion in the proposed instrument, the questionnaire was pretested prior to survey administration. Boateng et al. describe pretesting as a critical aspect of scale development, allowing researchers to identify potentially troubling questions, ensure that response options are appropriate, and understand the underlying thought process of respondents all of which allow minimization of measurement error during data collection.²⁶ To refine the structure of the questionnaire, the research team shared the proposed instrument with one farmer who participated in formative qualitative research, two researchers with a background in farmer health and well-being, and two community partners who had a relationship with the University and the farming community. All participants in the pretesting process were invited to provide unstructured, open-ended feedback on all aspects of the instrument from duration to complete the survey to specific item wording. The research team held in-person meetings with the farmer who participated in formative research and the two other members of

the farming community and corresponded with other researchers via email. After all comments were collected, the research team amended the proposed instrument to reflect the commentary from participants.

Recruitment and data collection

The survey was distributed from November of 2022 to February of 2023, and respondents were recruited using a combination of flyers, social media posts, and snowball sampling. Recruitment materials were shared in-person at farm related conferences and events, including the Georgia and National Farm Bureau Conferences, by community partners from the farming community, and online using farm-related social media sites. Respondents were also encouraged to share the link to the survey across state lines with other farmers who worked in similar commodities or geographic regions. This study was approved by the institutional review board, and all participants provided informed consent before completing the digital questionnaire.

Participants

A total of 1045 farm owners, managers, workers, and spouses of farmers completed the online survey. Respondents represented a wide array of commodities, with the most commonly reported commodities being fruit and vegetables (35.3%), beef cattle (26.6%), wheat (25.7%), corn (25.4%), and poultry/eggs (19.3%). The majority of respondents indicated they produced multiple commodities, with the most prevalent combinations being cattle/beef and fruit/vegetables (4.3%), wheat/corn (4.3%), and fruit/vegetables and poultry/eggs (1.9%). The majority of respondents were male (28.1% female), and were between the ages of 35–45 (49.3%) with an average age of 33.42 years old (SD = 6.9 years). The majority of farmers reported being either a second (32.6%) or third (33.8%) generation farmer, and being either a farm owner (45.7%) or farm manager (27.9%).

Data analysis

SPSS 28.0 was used for initial data analysis, including descriptive statistics, scale and subscale reliability, and exploratory factor analysis (EFA). Mplus version 7.4 was used for confirmatory factor analysis (CFA). Missing data was dealt with by using listwise deletion, leading to the sole inclusion of respondents who provided answers to the full set of scale items in data analysis. The sample size of this model ($n = 689$) was sufficient and generally acceptable to conduct an EFA.²⁷ The final EFA model was comprised of respondents who resided outside of the Southeastern United States, while the CFA model was tested on those respondents who lived in states in the Southeastern region of the United States (Florida, Georgia, Mississippi, Alabama, Louisiana, Tennessee, South Carolina, North Carolina, Kentucky, Virginia, and West Virginia). In addition to the requisite sample size, the Kaiser–Meyer–Oklin value of 0.922 and significant result of Bartlett's test of sphericity

($\chi^2[435] = 6440.869, p < 0.0001$) indicated that the correlation matrix was appropriate for factor analysis. The final EFA (principal axis factor analysis) was conducted on the 30-item barriers to care scale with Varimax rotation, using Kaiser normalization. The use of Varimax rotation, an orthogonal approach, for this final EFA analysis was selected as items that cross-loaded on multiple factors had been removed in prior analyses. The use of an orthogonal approach, where factors are treated as independent, for the final EFA was selected for ease of interpretation of the final factor structure after previous, unrotated EFAs were used to identify items with poor factor loadings or substantial cross-loading for removal.

Multiple criteria were used to determine the number of factors that were retained for the final model. Because the sole use of the Kaiser criterion, where all factors with an eigenvalue greater than one are retained, has been criticized for potential over factoring, the research team also relied on the scree plot to make decisions about factor retention.^{28,29} To address cross-loading, where items are loaded at $|0.40|$ or higher on one factor and $|0.32|$ or higher on another, researchers chose to retain items on the factor where they loaded greater than $|0.40|$ provided the item fit within a theoretical understanding of the nature of the factor.

In addition to the use of eigenvalues and the scree plot to determine factor retention, a confirmatory factor analysis (CFA) was used to assess the model fit from the results of the EFA analysis. Maximum Likelihood (ML) estimation was used to fit the CFA models, as all items were scored on a 5-point Likert scale and treated as continuous measures. The first test of model fit was the four-factor model hypothesized by the EFA analysis, after which a 3-factor model was tested. Several goodness-of-fit indices were used to assess model fit, including the Tucker-Lewis Index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Finally, McDonald's Omega coefficient was calculated for each factor, and for the instrument as a whole, as a measure of internal consistency both within factors and across the instrument.³⁰

RESULTS

An initial, unrotated EFA analysis was used to give researchers a better sense of the general factor structure of the model. This analysis produced ten eigenvalues greater than one, with the scree plot showing an "elbow" after the fourth factor. When exploring the factor loadings of this unrotated solution, all items loaded on the first four factors, with numerous instances of cross-loading. At this stage, all items with a factor loading less than $|0.40|$, and which correlated poorly with other items were excluded from subsequent EFA analyses, resulting in the removal of 8 items.

Following the removal of items from the item pool, a second EFA was conducted in the same dataset using varimax rotation, with all responses forced onto the four-factor solution indicated by the initial EFA. This analysis produced seven eigenvalues with a value greater than one, and a more pronounced "elbow" after the fourth factor. All

items loaded on four factors and based on the questions loaded on each factor, indicated three distinct factors relating to stigma, resilience, and formal health care challenges, with a fourth factor capturing questions related to self-reliance, masculinity, help-seeking behavior, and acceptance of help when in need. This analysis produced 5 instances of cross-loading but only one of the cross loaded questions loaded $<|0.40|$ on both factors and was omitted from future analyses. Three of remaining questions loaded $>|0.40|$ on one factor, and $<|0.40|$ on their second, weaker factor and were ascribed to the factor where they loaded more strongly. The fifth question loaded at .401 on one factor, and at .436 on another, and was related to self-reliance. This item was retained for future analyses due to its high loading on two distinct factors. This further reduced the pool of items to 30. The factor loadings for this EFA analysis can be seen in Table 1.

The final EFA analysis was conducted using the reduced 30-item pool in the full sample of responses from outside of the Southeastern United States ($n = 689$). As with the second EFA, this analysis was conducted using varimax rotation, and with all items forced on to four factors. This analysis produced five eigenvalues greater than one, with a pronounced leveling of the scree plot after the fourth factor. In this analysis there were three instances of cross-loading, with one item loading $<|0.40|$ on both factors, and two loading $<|0.40|$ on one factor and $>|0.40|$ on the second. The item that loaded $<|0.40|$ on two factors was dropped from subsequent analyses, and the two questions that had a loading $>|0.40|$ on one factor were attributed to that factor. Altogether, these four primary factors explained 38.408% of the variance in the model. Factor one had ten items, and aligned with researchers' understanding of the impact that stigma has on help-seeking behavior, consisting of items related to internal and external stigmas associated with seeking help for mental health and substance-use related challenges. One item on this factor was cross-loaded poorly on two factors ($<|0.40|$), and was not included in future analyses. This factor cumulatively explained 14.424% of the variance in this model. Factor two had nine items, all of which related to the concept of resilience as a barrier to help-seeking behavior as indicated by farmers in formative qualitative research. This factor cumulatively explained 25.079% of the variance in this model. Factor three had six items, which assessed common barriers to care in rural areas experienced by farmers including distance from resources, concerns about the cost of care, and a perceived misunderstanding of farmers' lifestyles by health care providers. One item on this factor loaded at 0.303 on factor one, but loaded at 0.454 on factor three. This factor cumulatively explained 31.966% of the variance in the model. The fourth factor had seven items, one of which was poorly loaded on two factors ($<|0.40|$), and one of which was loaded more strongly on factor one. This factor assessed cultural barriers to help-seeking behavior described by farmers in prior qualitative studies including masculinity and a preference for self-reliance, and cumulatively explained 38.408% of the variance in this model. The scree plot and factor loadings for this EFA Analysis can be seen in Figure 1 and Table 2.

Based on the factor structure indicated by the final EFA analysis, researchers conducted a CFA to test the hypothesized model within responses to the same questionnaire where respondents reported

TABLE 1 Factor structure matrix with Varimax rotation for a four-factor model.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	h^2	M	SD
Stigma_1	0.555	-0.412			0.466	3.02	1.149
Stigma_2	0.642				0.476	3.11	1.231
Stigma_3	0.586	-0.395			0.487	3.06	1.204
Stigma_4	0.623				0.459	3.08	1.146
Stigma_5	0.627	-0.398			0.529	3.07	1.234
Stigma_6	0.630	-0.368			0.512	3.09	1.228
Stigma_7	0.596	-0.406			0.514	3.06	1.248
Stigma_8	0.624				0.479	3.09	1.198
CulturalBarriers_8	0.391				0.273	3.08	1.125
CulturalBarriers_6	0.399		0.328		0.285	3.19	1.168
CulturalBarriers_7		0.392			0.271	3.34	1.024
CulturalBarriers_9	0.331	0.310			0.258	3.31	1.005
CulturalBarriers_10		0.447			0.281	3.41	1.061
CulturalBarriers_15	0.321	0.347			0.281	3.37	1.031
CulturalBarriers_16		0.511	0.319		0.377	3.49	1.036
BarriersToCare_2	0.467			-0.306	0.299	3.43	1.049
BarriersToCare_3	0.457				0.293	3.45	1.032
BarriersToCare_4	0.467				0.305	3.33	1.069
BarriersToCare_5	0.505			-0.319	0.335	3.49	1.043
BarriersToCare_6	0.404				0.234	3.45	1.032
BarriersToCare_7	0.504				0.333	3.59	1.036
BarriersToCare_11	0.359	0.313			0.238	3.55	1.002
BarriersToCare_12	0.389	0.392			0.302	3.61	0.998
Resilience_3	0.459				0.300	3.38	1.034
Resilience_5	0.458				0.302	3.44	1.026
Resilience_7	0.440	0.393			0.365	3.43	1.047
Resilience_8	0.461	0.320			0.351	3.48	1.037
Resilience_9	0.450	0.359			0.359	3.50	1.015
Resilience_10	0.457	0.326			0.371	3.48	1.086
Resilience_11	0.434	0.350			0.332	3.48	1.016
Explained variance	22.482%	9.544%	3.515%	2.867%	38.408% (total)		

residing the Southeastern United States ($n = 231$). The first analysis based on the four-factor model showed a poor model fit $\chi^2 (399) = 1181.849$ ($p < 0.001$), CFI = 0.791, TLI = 0.772, RMSEA = 0.092, SRMR = 0.108. When assessing ways to improve model fit, researchers explored a potential three-factor solution, where items from the factor previously defined as “cultural barriers to help seeking” were hypothesized to have a relationship with the factors of stigma and resilience based on their wording. This factor was dissolved because of the disparate nature of its items- researchers hypothesized that these “cultural barriers” were manifestations of farmers’ conceptualization of both resilience and stigma in their communities. While the model fit indices for the three-factor model were better than those of the four-factor model, overall model fit was still poor, even after researchers incorporated correlation between latent factors $\chi^2 (321) = 927.532$

($p < 0.001$), CFI = 0.809, TLI = 0.792, RMSEA = 0.09, SRMR = 0.113, and researchers elected to continue improving upon the three-factor model.

The three-factor model was further evaluated for potential improvements in model fit. First, researchers dropped one question that cross-loaded on two factors in the final EFA analysis, but loaded more strongly on a factor where it did not fit with the rest of the items from a theoretical point of view. This change only marginally improved model fit (Model 1) $\chi^2 (296) = 836.971$ ($p < 0.001$), CFI = 0.812, TLI = 0.793, RMSEA = 0.089, SRMR = 0.101. Following the omission of this question, researchers explored modification indices to identify other sources of misfit within the model. Among modification suggestions, items that address the same topic can have covariances between their error variances, and this relationship was observed between two dif-

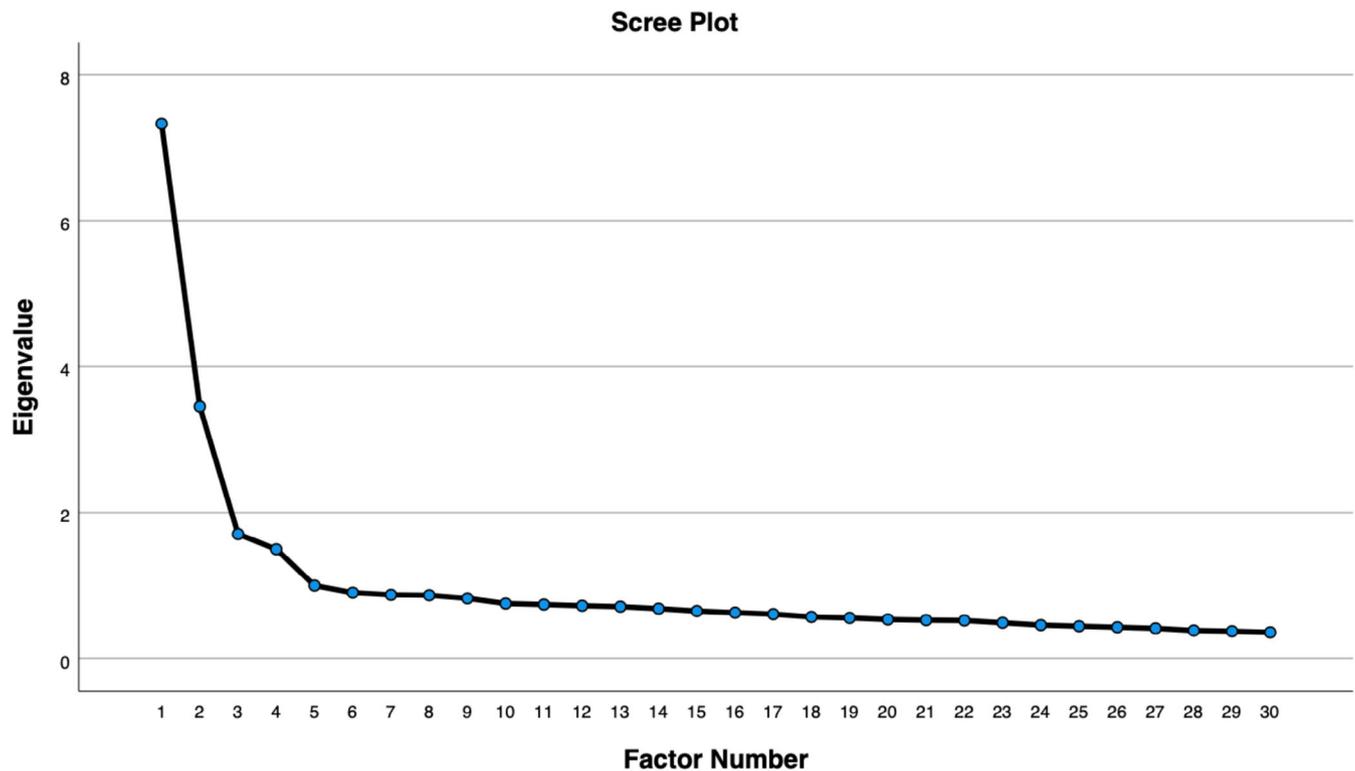


FIGURE 1 Scree Plot final EFA analysis.

ferent item-latent construct pairs. The first instance was a covariance between Stg_1 and the latent construct of resilience in this model, and the second instance was a covariance between Res_11 and the latent construct of stigma. To be perceived as unreliable by community members and other farmers may undermine a farmer's self-perception of resilience, and in prior qualitative work in the farming community, farmers reported a complex relationship between resilience and mental health stigma, indicating that being seen engaging with mental health care support would lead to them being perceived as poorly equipped to handle the stress of farming and ultimately unfit for the occupation.^{11,14} Adding these suggested covariances to the model improved model fit.

The third model incorporated another covariance between CBar_15 "When my job gets stressful, I am comfortable asking others for help" and CBar_16 "I am willing to accept assistance when it is offered during a time of need," which both address farmers' receptivity to aid in challenging times. The incorporation of this third covariance into the model further improved the model fit indices, although the model was ultimately still not a great fit for the data collected from farmers living in the Southeastern United States. Model fit indices for the three CFA models can be found in Table 3, and the final path diagram for the APBCS can be found in Figure 2.

After the final model was specified, reliability analysis was conducted on each of the three factors and the overall instrument itself. The factor of stigma had a reliability estimate of 0.938 (coefficient omega), and the factors of resilience and formal health care challenges had reliability estimates of 0.85 and 0.76 respectively, indicating

acceptable internal consistency of these factors. The overall instrument had a reliability estimate of 0.93 (coefficient omega), indicating that, as a whole, the proposed instrument is internally consistent.

DISCUSSION

The purpose of this study was to develop an instrument for assessing barriers to care in the rural farming population. The challenges faced by farmers when trying to engage with conventional resources for health care access are well-documented, but the majority of this previous work has been qualitative in nature, which is limited in generalizability.^{5,11,13,15} While these studies have been conducted in a number of countries with different systems of health care delivery, barriers related to inaccessibility of resources due to distance, cost, and time constraints of farming, as well as cultural barriers like stigma, masculinity, and a perceived disconnect between farmers and health care providers have been consistently identified, regardless of participants' country of residence.

The study results show evidence for internal consistency reliability and construct validity, indicating promise for the usefulness of the APBCS. The blend of sociocultural and structural barriers faced by farmers is nuanced, and assessing these challenges in a quantitative manner will allow researchers to better understand the impact of these barriers. A major strength of the APBCS is the inclusion of social and cultural factors that impact help-seeking and the measurement of formal health care challenges in rural areas, which will

TABLE 2 Factor structure matrix rotated to the Varimax criterion for the final model.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	h^2
Stem: If I were to seek treatment for mental health or a substance abuse issue...					
Stigma_1: Community members would think that I am unreliable	0.654				0.494
Stigma_2: Community members would treat me differently.	0.588	0.301			0.494
Stigma_3: Community members would look down on me.	0.692				0.516
Stigma_4: Community members would discuss it behind my back.	0.595				0.453
Stigma_5: I would feel weaker than others.	0.732				0.575
Stigma_6: I would feel ashamed.	0.704				0.549
Stigma_7: I would think less of myself.	0.751				0.578
Stigma_8: I would think people take me less seriously.	0.650				0.491
Stem: Select the level to which you agree with the following statements					
CulturalBarriers_8: A problem with my health will go away on its own.	0.411			0.310	0.288
CulturalBarriers_6: I wait until I am sure a problem with my health is serious.	0.330			0.327	0.282
CulturalBarriers_7: I take action immediately when I have a health problem.				0.482	0.287
CulturalBarriers_9: It is important to talk to others about my feelings.				0.476	0.285
CulturalBarriers_10: I believe in remaining strong at all times.				0.511	0.336
CulturalBarriers_15: When my job gets stressful, I am comfortable asking others for help.				0.533	0.330
CulturalBarriers_16: I am willing to accept assistance when it is offered in a time of need.				0.620	0.460
Stem: Rank your agreement with the following statements about challenges you have faced when accessing care					
BarriersToCare_2: I don't know what services are available in my area for mental health.			0.515		0.336
BarriersToCare_3: I don't know what services are available in my area for substance abuse treatment.			0.520		0.347
BarriersToCare_4: I feel as though my doctor does not understand the demands of my work.	0.303		0.454		0.309
BarriersToCare_5: Financial difficulties would be an obstacle for me getting help.			0.562		0.399
BarriersToCare_6: A lack of insurance would prevent me from engaging with care.			0.467		0.266
BarriersToCare_7: I am concerned with paying out of pocket for specialty care.			0.509		0.372
BarriersToCare_11: I trust the health care staff in my area to provide me with adequate care.		0.457			0.252
BarriersToCare_12: When I get sick, I know I can turn to the health care institutions in my areas to have the care necessary.		0.460			0.308
Stem: I feel that...					
Resilience_3: It does not take me a long time to recover from a stressful event.		0.502			0.307
Resilience_5: I usually come through difficult times with little trouble.		0.525			0.326
Resilience_7: In the event of an extreme situation, I know that I can count on my community to face the event and move forward.		0.605			0.404
Resilience_8: When I go through hard times, there are people in my community that I can talk with.		0.520			0.358

(Continues)

TABLE 2 (Continued)

Variable	Factor 1	Factor 2	Factor 3	Factor 4	h^2
Resilience_9: The relationships that I maintain in my community help me cope with problems that happen to me, or may happen.		0.564			0.369
Resilience_10: One of my strengths in the face of adversity is knowing that I can count on one or many people from my community.		0.603			0.395
Resilience_11: The members of my community know they can count on me when problems arise.		0.549			0.352
Explained variance	14.424%	10.655%	6.887%	6.642%	38.408% (total)

TABLE 3 Model fit indices for different three-factor models.

Model	X^2	df	CFI	TLI	RMSEA [CI]	SRMR
1	836.971	296	0.812	0.793	0.089 [0.082–0.096]	0.101
2	748.610	294	0.842	0.825	0.082 [0.075–0.089]	0.088
3	722.444	293	0.851	0.834	0.080 [0.072–0.087]	0.087

be useful for researchers and practitioners working in public health, social work, health care, agriculture, and sociology. Interventions to improve farmer well-being must take an interdisciplinary approach and standardized measures that address the complex interactions may provide an opportunity to develop more robust interventions to break down barriers to care.³¹ Furthermore, farmers have stressed the importance of anonymity when discussing issues related to mental health and report time as a barrier for engaging with health care resources, illustrating the need for a discrete, and easily accessible, method of collecting data from this population.^{11,13,14,32} The proposed instrument can be widely distributed through digital means, and be completed from a personal electronic device, minimizing time demands and protecting future participants' identities.

While exploring potential model improvements, researchers noted there was covariance between an item related to resilience and the latent construct of stigma, and an item related to stigma and the latent construct of resilience. It may be that these questions are better assessments of the hypothesized latent constructs than their intended construct, or that the wording of these questions should be amended to better reflect researchers' intentions. The relationship between stigma and resilience is not well-documented in the farming population, but a recent publication highlighted the need for future research that considers resilience in farming populations not as a personal trait, but as a dynamic process that takes place within the agricultural community.³³ Prior research in the farming community has indicated that while farmers are willing to discuss their challenges and stressors with each other, publicly seeking formal care for mental health challenges is stigmatized within their communities.^{12–15} Studies have described how both "friendly competition" and the importance of pride in the farming community may be a barrier to serious discussions of mental health challenges, as farmers feel an urge to maintain an outward perception of resilience, even when discussing day-to-day

stressors.^{13,15} These findings speak to a complex relationship between stigma and resilience in these communities, and future research should explore how interpersonal interactions, stigmatizing or otherwise, may impact farmers' perceptions of their own resilience and their intentions to engage in help-seeking behavior.

Limitations

The development process of this instrument is not without limitations. First and foremost, the authors did not achieve conventional indices of good model fit used in structural equation modeling ($RMSEA > 0.05–0.07$, $CFI \geq 0.9$, $TLI \geq 0.9$, $SRMR \leq 0.05$).^{34,35} This may be attributable to a number of factors, including sample size. There are many recommendations about sufficient sample size for SEM approaches, ranging from general "rules of thumb" based on the ratio of variables to respondents to more specific considerations about how the number of factors impacts requisite sample size.³⁶ Beyond sample size, the authors may have mis-specified the model itself or failed to refine questions well enough to assess the hypothesized latent constructs included in this model. An additional limitation of this process was that data analysis was conducted in a single dataset that was split into two discrete groups, while best practices in scale development call for a validation study to be conducted in an entirely distinct sample population.²⁶ The use of responses collected solely from individuals from the Southeastern United States for the CFA may also have impacted model fit, as the initial EFA analyses were conducted in respondents from other regions of the United States and there may be regional differences in farmers' perception of the different barriers to care represented in the proposed instrument.

More generally, the data used for this analysis was self-reported data collected from a convenience sample of farmers who were willing to take this survey, which limits the generalizability of these findings outside the context of survey respondents. Additionally, while the research team did engage in cognitive testing of the instrument prior to survey administration and developed the final pool of items based on qualitative interviews and existing literature on barriers to care in the farming population, there may be other factors that prevent farmers from engaging with health care that were not identified through the interview and literature review process. The use of researcher

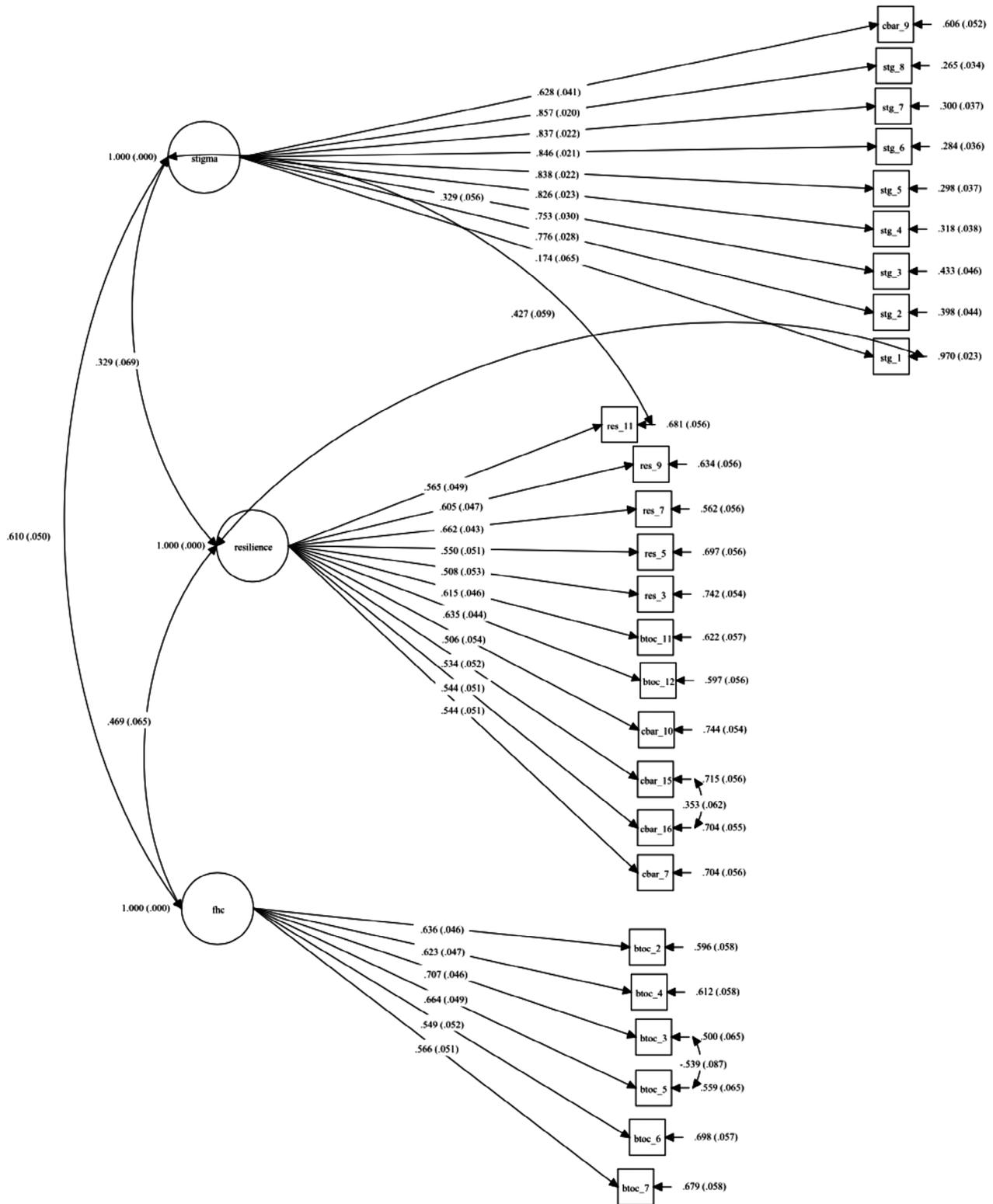


FIGURE 2 Final APBCS Path Diagram.

judgment, as opposed to an empirical approach, in the identification of items that were included and ultimately retained in the final model may also have introduced human error to the model specification process.

CONCLUSION

Future research is needed to improve the psychometric characteristics of the proposed instrument. While this dataset indicated good reli-

ability of both the individual factors and the instrument as a whole, the instrument should be administered in different populations to assess its test-retest reliability and further refine the proposed factor structure. Due to a deficit of comparable instruments in the existing literature, validity of the APBCS should be assessed by additional cognitive testing and consulting within the farming community, as well as administration alongside questions regarding patterns of utilization for both physical and mental health care to assess if greater endorsement of barriers to care relates to lower health care engagement.

In conclusion, while further research is needed to understand the relationship between the hypothesized constructs and improve the psychometric properties of this instrument, the proposed scale represents a promising tool for assessing barriers to care in rural farming populations, who are often disconnected from the conventional health care system due to a combination of rurality and cultural norms. Further refinement of this tool could lead to the development of culturally sensitive care options for rural farmers, and a better understanding of the relationship between different factors that prevent farmers from engaging with health care.

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CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest to disclose.

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