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Cognitive theory of stress and farmers’ responses to the COVID 19 shock; a model to assess coping behaviors with stress among farmers in southern Iran

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ABSTRACT

Better understanding the capacity of farmers to react to the COVID-19 pandemic shock requires analyzing their coping mechanisms. This study investigates the relationship between coping style and coping behaviors with COVID-19, identifying the psychological factors affecting them based on the cognitive theory of stress. Perceived government support is added to the original model as a predictor for coping style and behavior. Cross sectional survey data was collected among farmers living in Dashtestan county of Bushehr province in southern Iran (N = 377). To determine the strength of the model, structural equation modeling (SEM) was performed. We find that demand appraisal and perceived collective efficacy have a positive, direct, and significant effect on coping style and an indirect effect on behaviors. Coping style and perceived government support are significantly related to behavior. The research model predicts 63% and 31% of variance changes in coping style and behavior, respectively. The results of this study provide empirical evidence on how people cope with the COVID-19 shock as well as useful information for designing and implementing health and social programs and policies in the agricultural communities.

1. Introduction

Rural households are often exposed to severe shocks of various natures. Shocks are defined as events beyond the control of an individual that typically arise in the occurring case of unexpected responses [1]. These are a constant threat for farmers, especially in developing countries [2]. Shocks can originate from external triggers, including diseases, pests, climate change, input price fluctuations, wars, and political shocks that reduce the well-being of farmers and their families [3]. Furthermore, shocks in nature environments can be classified into (i) idiosyncratic shocks that related only to individuals or households without any relation to neighboring households (i.e., family-centered shocks such as death, illness, injury, or unemployment of family members) and (ii) covariate shocks with multiple impacts to all households in a geographic area, like entire communities (Pradhan et al., 2017; [4,5]. COVID-19, the 2020 pandemic, is a major covariate shock affecting all communities directly, especially rural communities [6–8]. The disease, first observed in Wuhan, China, spread rapidly around the world [9]. Causing major disruptions, the virus poses numerous threats to people and societies globally, affecting physical, psychological, economic, social, and cognitive aspects [10]. It has also led to significant changes in health care, economics, transportation, education, and agricultural systems around the world [10]. The disease is having significant effects on the agricultural sector and, in addition to threatening people’s health, is profoundly affecting the livelihoods of poor rural farmers who depend on agriculture [11]. Such shocks include direct

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In response to the negative effects arising from the COVID-19 shock, there is the question of how governments respond with adequate and efficient measures, managing the risks confronting rural households, as well as launching programs that reduce the negative impacts and poverty in these areas. These measures can be achieved through mass enlightenment about the need to participate in various livelihood activities, like participation in non-farm and off-farm activities, which should be done through financial assistance in the form of loans [15]. For shocks like the COVID-19 pandemic, governments can try to adapt existing social protection schemes or design new programs to meet the specific needs of rural communities, especially for those working in agriculture, fisheries, and forestry [13]. Providing adequate support to those who are, or will be, vulnerable is critical for ensuring compliance with movement restrictions that dramatically change daily lives and impact agricultural livelihoods as well as preventing increasing levels and depth of poverty due to COVID-19. Social protection measures that protect lives and livelihoods can include securing income; securing access to safe, adequate, and nutritious food; providing childcare support through vouchers cash, or other allowance; insuring against sickness and risk of death; and facilitating access to health care [13]. Especially in poorer countries, efficient monetary measures are key for success, since the governments of developing countries often lack financial means for rural areas.

Medical care during the COVID-19 outbreak is also part of the government’s efforts to reduce harm to people living in rural areas. The medical care in rural areas of Iran includes screening and identification of suspects, providing necessary training to potential patients and their families, implementation of thermometry and distribution of health items, isolation, follow-up, home quarantine, as well as ensuring that suspects stay at home and use prescribed medications. This is implemented by rural community-based health workers known as Behvarz and rural doctors in health houses and rural comprehensive health centers [16].

Gaining a deeper understanding of farmers’ capacity to react to different shock types, specifically COVID-19, requires stress assessment and mechanisms for dealing with shocks. In particular, to design appropriate social protection measures for the effects of COVID-19, it is critical to generate knowledge on the perceptions and resulting behavioral responses of individuals and their current situation. Individuals usually make a cognitive assessment of the shock as they start coping with and responding to a shock.

1.1. Background

Based on cognitive assessments, peoples select the appropriate coping style and behaviors to the shock. Hence, when a person is faced with a shock, resulting in a stressful situation, they do not immediately adopt a specific coping style or strategy, but undergo a cognitive assessment of the situation first [17,18]. According to various studies [19,20], coping style affects behavior. Farming households in high-risk environments have developed complex risk coping behaviors; including the use of savings, reducing food intake, selling properties and assets, obtaining credit and loans from formal and informal sources, receiving gifts in cash or non-cash kinds, as well as labor supply based strategies with increasing work and reducing consumption [12,21] to reduce income fluctuations [5].

A review of various studies (Yilma, 2014 [20,22]; Dhanaraj, 2015 [23,24]; shows that decision-making on coping with various shocks at the farm level is complex and dependent on different factors such as psychological, economic, and social factors. These studies have examined various shocks at the farm level, but in particular, in the case of COVID-19, previous studies have paid less attention to psychological factors. As such, to fill this gap in the literature, it is logical to carry out a study that focuses specifically on the psychological factors affecting decision-making on coping with the COVID-19 shock.

In particular, psychological factors play a key role in the way people cope with the threat of epidemics and their consequences. In addition, psychological factors are important for identifying and managing broader pandemic social problems, such as those involved in the over-expansion of fears that may arise for public health, family security, finances, and employment [25]. Psychological factors are also important for identifying and managing disruptive or maladaptive defensive reactions [26]. In the context of COVID-19, understanding how the general public can be better supported in dealing with the epidemic requires synthesizing existing information on the psychological effects and coping strategies used during previous outbreaks of infectious diseases [25]. The perceptions of key decision-makers (farmers) are one of the most important factors, playing an important role in the process of coping with shocks [22,27]. As programs or policies may not be successful if they do not take into account the stress of health shock and the factors affecting coping style and behavior [28,29], assessing stress and understanding the factors that affect farmers’ coping style and coping behaviors is crucial for formulating local coping policies and programs.

While various studies [19,20,30–33] evaluate stress and coping responses to shocks, no known study examines the psychosocial ability of farmers to cope with health shocks like COVID-19. Thus, an empirical study of farmers’ responses and strategies to deal with the shock of COVID-19 is particularly important for the design and implementation of health and social policies. Therefore, this study seeks to fill the gap by studying the capacity of farmers to deal with the COVID-19 epidemic and the factors affecting it, as well as farmers’ response to this health shock. To achieve this goal, the improved model of cognitive theory of stress model is used to evaluate stress and coping responses to COVID-19. In this study, we address the question, how does the psychological stress of COVID-19 directly and indirectly influence coping styles and behaviors of farmers in southern Iran?

1.2. Cognitive theory of stress

The use of social cognition theories promises to provide an understanding of the factors affecting coping with stress and preventive behaviors [34]. The main base of this approach is that the COVID-19 shock can act as a stressor. Stressors are defined as environmental, social, and physical conditions that individuals understand as threatening, challenging, and harmful [35]. According to the cognitive theory of stress, stressors can activate a coping style through appraisal demand, self-efficacy, and collective effectiveness [36]. The model is applied widely (Goh et al, 2016; [18]), for example to investigate stress induced by outdoor recreation conflict incidents [37], stress during football matches [38], administrative stress in school principals [39], climate change [20,33], academic stress [31], job stress [32], as well as related to sexual abuse of children [39]. The cognitive theory of stress provides a psychological clarification for the hypothetical relationship between personal health and the external and internal happenings of life called...
stress. This theory is a cognitive theory because the physiological and psychological consequences are contingent on a cognitive assessment of the condition and personal ability to manage the situation. This theory also differs from other theories of stress in that it provides a formal system of systematic definitions. This theory depends on cognitive constructions in learning theory, it provides a pathophysiological framework for health and disease, and it is useable across cultures [40, 41]. The theoretical foundation of this study is taken from the stress, appraisal, and coping model of Lazarus and Folkman [17]. Stress is definite and operationalized by motivations (stressors)-individuals' mental reports of an experience-and a general nonspecific increase in arousal (activation and feedback to the brain from this response) [42]. Lazarus and Folkman [17] believe that stress is a special relationship between the person and the environment where pressure and excess in resources and capacities result in one's health and well-being becoming endangered. This view offers an interactive approach that emphasizes the interaction between the person and her/his environment in determining stress. It also emphasizes the importance of evaluating the nature of this interaction and considers stress only when it is threatening, challenging, or potentially harmful. In other words, in this context, stress is defined as a response to interactions between a person and an event in the environment that potentially exceeds the individual's resources, thus endangering the well-being of the individual [43]. Based on this framework, two main methods mediate the individual's connection with the environment: cognitive appraisal and coping [31]. Cognitive appraisal is defined as the assessment process that regulates the degree to which a specific transaction between a person and her/his environment is seen as stressful [17,44]. In general, the cognitive appraisal shows how a person can act within a condition and is classified into two forms: (i) primary, and (ii) secondary [17]. The (i) primary appraisal is to understand the meaning of the stressful event and its positives and negatives (assessment of threat, challenge, and harm) [45]. In other words, the person assesses whether something is at risk in this encounter. For example, is the health and well-being of a loved one in danger? As a result of the primary appraisal, stress occurs when a situation is judged as problematic. (ii) The secondary appraisal is the next step in the primary appraisal and occurs after perceiving the event as a threat or challenge, during which the individual examines his or her individual and social resources and capabilities for coping. This secondary appraisal determines what kind of coping resources are available, how they can be used effectively from such coping resources, how can explore the consequences of such resources, and finally assess the coping to the current situation [31]. A person's ability to cope with stress and to deal with problems arising from a stressful situation depends on the individual's assessment of the situation [43]. According to Chen [20]; cognitive appraisal includes demand appraisal and resource appraisal. Demand appraisal refers to a person's observing of events related to his or her well-being, which can be in the form of threat and harm assessments. According to this theory, people monitor their environment and then interpret the situation through the evaluation process [17]. Resource appraisal is also related to coping options - that is, whether an act can avoid harm, improve it, or cause harm or other benefits. Homberg et al. [46], specify that resource appraisal and self-efficacy [47] stimulate the motivation to cope with problem-focused coping. After the cognitive assessment, coping is initiated by individuals. Coping is a set of tactics that are executed for exact circumstances. It is not just a response to stress; rather, coping is determined by a person's cognitive evaluation of an event and, therefore, cognitive evaluation can affect emotional arousal. Therefore, when the condition is assessed, coping is stimulated accordingly [48]. Various coping options include changing the status, accepting it, seeking more information, or avoiding impulsive actions. Therefore, it can be said that no event or situation is stressful in itself, but if the event is particularly threatening, damaging, harmful, depriving, or taxing, it can be stressful [17].

The coping style includes strategies to manage behaviors, emotions, and cognition in people affected by stress [49]. Coping style is differentiated between (i) emotion-focused and (ii) problem-focused styles [50]. The (i) emotion-focused style is about inner feelings, rather than external stimuli that trigger an emotional reaction. This form is more likely to occur when a situation is perceived in a way that no action can change the underlying harmful, threatening, or challenging situation. Emotional-focused styles include trying to control feelings or anxieties related to irrepressible stressors by seeking emotional support and re-evaluating situations in a more positive perspective. (ii) Problem-focused styles are more appropriate for stressors that are considered changeable and controllable. Problem-focused styles include the active search for alternatives and the learning of new skills [48]. This study focuses on problem-oriented coping styles. Dimensions of the problem-focused coping style include problem solving, expressing emotions like grief and anger, as well as self-protection [46]. Problem-solving skills include the ability to seek information, analyze situations to identify a problem, as well as to select and implement an appropriate action plan [17]. Self-protection involves activities to protect oneself and one's health [19]. Studies confirm that the effect of coping style on the perception of risk can affect behavior [19,20,32,51]. [51] shows that the probability of illness and perceived severity of influenza's disease affect psychological responses (coping style), with these responses, in turn, affecting the performance of recommended behaviors.

The stress model is similar to the Protection Motivation Model [52], except that in the stress model, appraisal processes are considered a little far from behaviors [19]. Cognitive stress theory includes components of demand appraisal, resource appraisal, and coping style to predict the practical response to stress [20]. In the stress model, after the occurrence of stress, variables include the appraisal of, and coping with, factors that are important for predicting the output of stresses [33]. In this study, to fit the model with the subject and the community, the model is developed to overcome the limitations of the original theory. For this, collective efficacy and perceived government support is added to the model to predict the coping style and behavior variables.

According to several studies [19,20], collective efficacy can also affect a problem-oriented coping style. Bandura [47] points out that understanding collective efficacy can affect a group's goals, how resources are managed, and the type of strategic designs. Bandura [53] defines collective efficacy as judging the group's ability to make decisions, to enlist supporters and resources, design and implement appropriate strategies, as well as to withstand failures and reprisals. It seems that, in addition to the variables discussed, perceived government support can influence the responsive behaviors of individuals. In this regard, the social-cognitive model proposed by Lee and Lemyre [54] shows that perceived governmental preparedness can affect both affective and behavioral responses. Prati et al. [51]; using this theory in the context of the H1N1 Influenza outbreak, shows the positive effect of the level of preparedness of institutions on psychological responses.

![Fig. 1. Proposed research framework.](image-url)
Fig. 1 shows the proposed research framework. Based on the research framework, we propose the following eight hypotheses:

1) Demand appraisal has a direct effect on coping style.
2) Self-appraisal has a direct effect on coping style.
3) Collective efficacy has a direct effect on coping style.
4) Coping style has a direct effect on behavior.
5) Perceived government support has a direct effect on behavior.
6) Demand appraisal has an indirect effect on behavior.
7) Self-efficacy has an indirect effect on behavior.
8) Collective efficacy has an indirect effect on behavior.

2. Methodology

2.1. Survey

This study is based on a quantitative survey. Data were collected in March 2020 through face-to-face interviews as well as through an online platform; all data were collected in the Persian language. To measure the model variables, multiple items are used (Table 1), as based on a review of existing studies using the cognitive theory of stress. Researcher-devised items are used to measure perceived government support. Furthermore, in order to identify coping behavior, past studies on the coping of farmers with different stresses are used but modified to fit the research topic [21]; Dhanaraj et al., 2016; [4]. All items are measured using the 5-point Likert scale (strongly disagree 1 to strongly agree 5).

2.2. Participants

The population of this study are farmers in Dashtestan county of Bushehr province in southern Iran. Based on Krejcie and Morgan [55] and using random sampling, 377 farmers were selected as the study sample. The mean age of the farmers was 41.43 years (SD = 11.71). In terms of gender, 76.4% (288) were male and 23.6% (78) were female; 2.9% (11) of the respondents did not answer this question. The low number of women in the research sample is due to the low proportion of women in the farmer population as well as the convenient sampling method used (which did not seek to gather a sample representative of female farmers). Further, 5.2% of the respondents were illiterate; with respect to education, 61.3% had completed elementary school, 7.4% middle school, 20.4% a high school diploma, and 5.7% a university education. The average agricultural work experience of the respondents was 18.68 years (SD = 14.56).

2.3. Data analysis method

To investigate the validity of the model and research hypotheses, as well as to determine the strength of the model, this study uses structural equation modeling (SEM) with maximum likelihood algorithm using AMOS 21.0 program. SEM, a path analysis with latent variables, is a method that is generally used in the behavioral and social sciences; it shows dependency relationships in multivariate data [31]. Structural equation modeling is done in two stages. According to Anderson and Gerbing [56]; the confirmatory factor analysis stage is examined to test the fit of the measurement model before the structural equation modeling stage.

The relative chi-square value is used to evaluate the validity of the fit of the measurement model and the structural model. As chi-square values are sensitive to sample size and chi-square significance does not necessarily indicate model fit, in the present study, other indicators, including RMSEA (root mean square error of approximation), IPI (Incremental Fit Index), and CFI (comparative fit index) (Hu and Bentler, 1999), are used to evaluate the fit of the models. For RMSEA, values smaller than 0.06 are usually considered very good fit [57]; for CFI and IPI, values 0.9 or higher indicate model acceptability [58]. To determine the significance of the indirect effects, a bootstrap with 2000 samples

| Table 1 | Items, Factor Loading and Sources of items. |
|---------|-------------------------------------------|
| Constructs | Factor loading | Sources |
| **Threat** (Mean = 3.68; SD = 0.98) | | |
| I am concerned about the prevalence of COVID-19 and its consequences for agriculture. | 0.87 | [20,33] |
| I feel my agricultural activities are threatened due to the COVID-19 outbreak. | 0.72 | [20,33] |
| Thinking about COVID-19 makes me sad. | 0.81 | [20,33] |
| I feel my agricultural activities are threatened due to the COVID-19 outbreak. | 0.83 | [20,33] |
| **Harm** (Mean = 3.32; SD = 1.02) | | |
| Due to the prevalence of COVID-19, my agricultural situation worsened. | 0.86 | [20,33] |
| My usual income from agriculture is lower due to the COVID-19 outbreak. | 0.82 | [20,33] |
| During COVID-19, sales of my agricultural products have decreased. | 0.87 | [20,33] |
| During COVID-19, the prices of my agricultural products have decreased. | 0.81 | [20,33] |
| **Self-efficacy** (Mean = 2.70; SD = 0.87) | | |
| I know how to deal with all kinds of COVID-19 effects on agriculture. | 0.69 | [20,33] |
| I believe I can control the problems caused by COVID-19. | 0.82 | [20,33] |
| Whatever happens to my farm because of the COVID-19, I can adapt to it. | 0.74 | [20,33] |
| It is very easy for me to control the effects of COVID-19 on our agriculture. | 0.82 | [20,33] |
| I am sure I will find ways to cope with COVID-19. | 0.78 | [20,33] |
| **Collective efficacy** (Mean = 3.38; SD = 0.92) | | |
| I am sure that we can reduce the effects of the COVID-19 on agriculture, if all farmers work hard. | 0.80 | [20,33] |
| I am sure that, together, we farmers can find a way to fight the COVID-19 on the farms. | 0.81 | [20,33] |
| We can do a lot to help control the COVID-19. | 0.74 | [20,33] |
| Farmers can motivate each other to do better behavior to solve the COVID-19 problem in their agriculture. | 0.80 | [20,33] |
| **Perceived Government support** (Mean = 3.21; SD = 1.16) | | |
| To what extent do you perceived that the implementation of the following actions by government during the COVID-19 outbreak were successful? | 0.88 | [20,33] |
| Provide food subsidies to rural communities. | 0.81 | Self-developed |
| Economic support. | 0.86 | [20,33] |
| Increase in grace period for farmers. | 0.88 | [20,33] |
| Strict control of entry and exit of villages. | 0.71 | [20,33] |
| Strict quarantine and close high-risk jobs. | 0.66 | [20,33] |
| Provide targeted subsidy support. | 0.88 | [20,33] |
| **Problem solving** (Mean = 3.66; SD = 0.87) | | |
| I will try to get complete information about COVID-19. | 0.79 | [20,33] |
| I try to find the best solutions for COVID-19. | 0.77 | [20,33] |
| I will try to learn more new ways and methods about COVID-19 compatibility and its effects. | 0.89 | [20,33] |
| It is important for me to talk to others about the COVID-19 and to look for a solution to it in agriculture. | 0.76 | [20,33] |

(continued on next page)
Table 1 (continued)

| Constructs                                      | Factor loading | Sources                              |
|-------------------------------------------------|----------------|--------------------------------------|
| I try to read about how to reduce the effects of COVID-19. | 0.77            | [20,33] Homburg and Stolberg; 2006 [46]; |
| Expression of emotion (Mean = 3.41; SD = 0.98) |                |                                      |
| I feel depressed when I realize how much COVID-19 affects my agriculture. | 0.77            |                                      |
| It is very upsetting to me when I talk to others about COVID-19 problems. | 0.76            |                                      |
| I get sad when I think about the problems of COVID-19 on my farm. | 0.89            |                                      |
| I get sad when I see how much COVID-19 problems affect my income. | 0.85            |                                      |
| Self-protection (Mean = 3.63; SD = 0.77)       | 0.72            | [20]; Homburg and Stolberg; 2006 [46]; |
| Due to COVID-19 problems, I try to do more to protect myself against COVID-19. | 0.72            |                                      |
| Due to COVID-19 problems, I try to do more to make agriculture compatible with COVID-19. | 0.81            |                                      |
| I am worried that not implementing adaptive behaviors will hurt me. | 0.63            |                                      |
| I try to be more responsible in dealing with the COVID-19 and prevent it from harming agriculture. | 0.80            |                                      |
| I am worried that doing agricultural work will lead to the transfer of COVID-19. | 0.52            |                                      |
| behavior (Mean = 3.94; SD = 1.05)               |                | [21]; Dhandhar et al., 2016 [1]; Pradhan et al., 2017 |
| Collaborate and share information and equipment with other farmers. | 0.74            |                                      |
| Phone sales of pesticides and fertilizers and providing agricultural inputs door to door. | 0.76            |                                      |
| Maintain good relations with the government and cooperate with them in preventing the further spread of the COVID-19. | 0.70            |                                      |
| Save the product if there is no marketing.     | 0.54            |                                      |
| Diversification to income/capital/asset flexibility. | 0.73            |                                      |
| Get loan.                                       | 0.56            |                                      |
| Gather and track information on the quality and quantity assurance of agricultural products during the COVID-19. | 0.68            |                                      |
| Observance of safety and health principles in the workplace | 0.68            |                                      |

and 95% confidence interval (Bias-corrected confidence interval) is performed.

To evaluate the convergent validity of the latent variables, after confirming the measurement model, we used three indicators: 1) Factor Loading, 2) Average Variance Extracted (AVE) value, and (3) Construct Reliability (CR). Convergent validity is usually confirmed when the factor load is 0.5 or more, AVE is 0.5 or more, and CR is 0.7 or more [58]. In addition, Cronbach’s alpha coefficients are used to evaluate the reliability of the constructs. To confirm discriminant validity, the square root of AVE of a particular variable should be higher than the correlation of it with other variables [58].

3. Results

3.1. Measurement model

The $\chi^2$ value of the measurement model is $\chi^2 (df) = 1870.468 (992)$, which is statistically significant at $p < .0001$. As mentioned earlier, $\chi^2$ is sensitive to sample size and, therefore, not a suitable indicator for evaluating model fit. The incremental indices CFI = 0.927 and IFI = 0.928 show the acceptable fit of the model. Additionally, the absolute fit index, RMSEA is equal to 0.049. These results show that the measurement model had a suitable fit.

According to the results, factor loading values for all items are higher than the acceptable threshold. For each indicator of the latent variables, the value of the CR is calculated, which has a good value (greater than 0.8). Additionally, the obtained AVE values for all variables, except the two variables of behavior and perceived government support, are higher than 0.5 (Table 2). In case the AVE is less than 0.5, but the CR is higher than 0.6, the convergent validity of the constructs are still adequate [59].

Thus, the measurement model has adequate convergent validity. Table 2 shows that the square roots of the AVE of each of the variables; the bolded elements are greater than the correlation of it with other variables. Therefore, model constructs have acceptable discriminant validity. This table also shows that the reliability of the research constructs are in the range of good to excellent (0.84–0.93).

3.2. Structural model

The $\chi^2$ value of the structural model is $\chi^2 (df) = 1982.198 (1012)$, which is statistically significant at $p < .0001$. However, other indices, including CFI = 0.920, IFI = 0.920, and RMSEA = 0.050, indicate that the structural model is suitably fit. The results of structural equation modeling show that the research model is able to predict 63% and 31% of variance changes in coping style and behavior, respectively.

Demand appraisal ($\beta = 0.45, p < .001$) and collective efficacy ($\beta = 0.59, p < .001$) have a positive, direct, and significant effect on coping style. Self-efficacy ($\beta = 0.01, p = .891$) does not have significant effect on coping style. Additionally, coping style ($\beta = 0.43, p < .001$) and perceived government support ($\beta = 0.31, p < .001$) have a direct and significant effect on behavior. Regarding the indirect effects, the results show that demand appraisal ($\beta = 0.19, p < .0001$) and collective efficacy ($\beta = 0.25, p < .001$) have a significant indirect effect on coping behavior via coping style (Table 3) (see Fig. 2).

4. Discussion

The purpose of this study is to investigate how psychological factors, specifically demand appraisal and self-efficacy affect coping style and behaviors based on the cognitive theory of stress (Lazarus and Folkman, 1984). For this study, perceived government support and collective efficacy, as additional constructs for predicting coping styles and behavior, are added to the cognitive theory of stress. The cognitive theory of stress assumes coping style is determined by demand appraisal and self-efficacy. The structural equation modeling results show that the extended model of the cognitive theory of stress significantly describes coping styles in southern Iran. The proposed model also has good explanatory power for self-reported behavior. Based on the research findings, the proposed research model is able to explain about 63% of the variance changes in coping styles and 31% of the variance changes in coping behavior.

The results show that collective efficacy is the strongest predictor of coping style and coping behavior, a finding supported by existing studies (Homburg and Stolberg; 2006; [20]). Failure to use collective efficacy in the cognitive theory of stress model can reduce the explanatory power of problem-focused coping styles and behaviors. We hypothesize that, with respect to problems of epidemic diseases like COVID-19, as stressors, collective efficacy (believe in the coping abilities of a larger reference group) could explain coping style and behavior. As tackling COVID-19 is a social action that requires collective effort to control, collective efficacy is an essential factor in the study of coping with epidemics.

Demand appraisal is another determining factor in coping style, which, subsequently, leads to people’s participation in certain behaviors. Demand appraisal has a positive, direct, and significant impact on coping style. Demand appraisal includes two dimensions: perceived threat and perceived harm. This finding is supported by previous studies [20,60]; and [33] showing that people, after facing a threat to their...
Table 2
Discriminant and convergent validity.

| Variables                  | Threat | Harm | Self-efficacy | Collective efficacy | Perceived Government Support | Problem solving | Expression of emotion | Self-protection | Behavior | Alpha Cronbach | CR | AVE |
|----------------------------|--------|------|---------------|---------------------|-------------------------------|-----------------|-----------------------|-----------------|----------|----------------|-----|------|
| Threat                     | 0.77   |      |               |                     |                               |                 |                       |                 |          | 0.88           | 0.84 | 0.59 |
| Harm                       | 0.66** | 0.77 |               |                     |                               |                 |                       |                 |          | 0.93           | 0.90 | 0.60 |
| Self-efficacy              | -0.17**| -0.13**| 0.78         |                     |                               |                 |                       |                 |          | 0.88           | 0.88 | 0.61 |
| Collective efficacy        | 0.14** | 0.06  | 0.46**        | 0.81                |                               |                 |                       |                 |          | 0.86           | 0.88 | 0.66 |
| Perceived Government       | 0.07   | 0.03  | -0.01         | 0.07                | 0.66                          |                 |                       |                 |          | 0.92           | 0.84 | 0.44 |
| Government Support         |        |      |               |                     |                               |                 |                       |                 |          |                |      |      |
| Problem solving            | 0.23** | 0.14**| 0.26**        | 0.50**              | 0.11*                         | 0.77            |                       |                 |          | 0.90           | 0.87 | 0.59 |
| Expression of emotion      | 0.75** | 0.62**| -0.21**       | 0.10                | 0.00                          | 0.19**          | 0.78                  |                 |          | 0.89           | 0.87 | 0.62 |
| Self-protection            | 0.58** | 0.41**| 0.08          | 0.49**              | 0.04                          | 0.57**          | 0.57**                | 0.77            |          | 0.84           | 0.88 | 0.60 |
| Behavior                   | 0.18** | 0.12* | 0.22**        | 0.37**              | 0.27**                        | 0.32**          | 0.11*                 | 0.32**          | 0.66     | 0.87           | 0.86 | 0.44 |

Bolded elements indicate the square root of AVE.

Table 3
Estimates of total, direct, and indirect effects.

| Path                          | Direct effects | Indirect effects | Total effects |
|-------------------------------|----------------|------------------|---------------|
|                               | B   | β   | P   | B   | β   | P   | B   | β   | P   |
| Demand appraisal → Coping style | 0.316 | 0.445 | 0.001 | –   | –   | –   | 0.316 | 0.445 | 0.001 |
| Self-efficacy → Coping style   | 0.009 | 0.011 | 0.891 | –   | –   | –   | 0.009 | 0.011 | 0.891 |
| Collective efficacy → Coping style | 0.422 | 0.589 | 0.001 | –   | –   | –   | 0.422 | 0.589 | 0.001 |
| Coping style → behavior        | 0.687 | 0.431 | 0.001 | –   | –   | –   | 0.687 | 0.431 | 0.001 |
| Perceived Government support → behavior | 0.273 | 0.311 | 0.001 | –   | –   | –   | 0.273 | 0.311 | 0.001 |
| Demand appraisal → behavior    | –   | –   | –   | 0.217 | 0.192 | 0.0001 | 0.217 | 0.192 | 0.0001 |
| Self-efficacy → behavior       | –   | –   | –   | 0.006 | 0.005 | 0.871 | 0.006 | 0.005 | 0.871 |
| Collective efficacy → behavior | –   | –   | –   | 0.290 | 0.254 | 0.001 | 0.290 | 0.254 | 0.001 |

Fig. 2. Structural path model.
well-being, adopt various forms of problem-focused and emotion-focused coping styles to manage stressors. Prati et al. [51], show that perceived severity and disease likelihood influence coping styles.

Coping styles directly and significantly affect behavior. A problem-focused coping style is a positive strategy that involves some active methods, like finding several different ways to solve a problem or seeking advice from relatives or friends (Lazarus, 1999). We find that emphasizing positive cognition and learning more about the COVID-19 virus, as well as self-protection, leads to more coping behavior. Prati et al. [51], also show that psychological responses to the influenza pandemic can affect the performance of recommended behaviors. Studies also confirm the effect of coping style on different behaviors [19, 20, 32, 51].

Government support has a direct impact on the implementation of coping behaviors. Measures of targeted government support for farmers during the disease outbreak include providing food subsidies to rural communities, providing economic support, increasing grace periods for farmers, strictly controlling entry and exit of villages, strict quarantine, closure of high-risk jobs (or lockdown of dangerous jobs), and providing subsidized support. According to the results, the more that people perceive governmental support, the more likely they were to implement behavior that reduces their vulnerability.

Unlike Chang and Edwards [61] and Trouillet et al. [62]; we do not find that self-efficacy is significantly related with coping individual and farmer behaviors. Self-efficacy varies depending on how people think, feel, and act, relying on positive beliefs with respect to each individual regarding their ability to cope with many stressors. Persons with more self-efficacy prefer to take on more inspiring responsibilities, low levels of self-efficacy are related to depression, anxiety, and helplessness [63]. In this study, many farmers, possibly due to lack of education and awareness, still do not believe in their own ability to cope with COVID-19; However, self-efficacy does not significantly explain coping styles and farmer behaviors under COVID-19.

5. Conclusion

In general, according to the research, when farmers experience stresses like COVID-19, their appraisal, as well as collective efficacy, encourages them to use a problem-focused coping style. Perceived governmental support, along with their own coping style, leads individuals to engage in coping behaviors/strategies with respect to COVID-19 that meet pandemic demands. It is recommended that, in times of stress and tensions, like the outbreak of epidemics, sufficient information about the consequences of the outbreak of the disease, its negative effects, its prevalence, as well as other information regarding the threats and damage of this shock is provided in order to allow farmers to identify and implement appropriate coping measures. In this regard, agricultural extension can prepare and provide instructions to farmers that are designed to strengthen their knowledge and information-base with respect to the disease along with its dangers and threats. This should also encourage them to observe the principles of safety and health in the agricultural workplace. Another approach would be to send text messages that encouraging them to apply safety and health principles on their farm. Various media, including radio and television, can also help inform and educate farmers about health principles in agriculture.

Since tackling COVID-19 disease is a social action, requiring collective efforts to control it, non-governmental organizations can be used to increase the knowledge and awareness of farmers. Thus, providing the impetus to implement not just appropriate psychological responses but also practical coping behaviors. Further, given the positive impact of governmental support on the psychological and practical response to the COVID-19 shock, the government can provide temporary livelihood and cash assistance to farmers by, among others, purchasing their products, increasing grace periods, and providing COVID-19 shock relief facilities.

This study confirms that the expanded cognitive model of stress is an effective tool for improving the understanding of the process of coping with COVID-19 related stress among farmers.

5.1. Limitation and future studies

This study has several limitations that should be considered when generalizing the results of the study. The main limitation of this study is that the questionnaire relies on subjective reports of coping behavior and does not examine the actual behaviors of individuals. In addition, as this study is a cross-sectional study limited to specific temporal, geographic, and socio-cultural contexts, it does not allow for generalization of results. Our data were collected in March 2020, when the true nature and effects of the COVID-19 pandemic on various parts of the world, especially the agricultural sector, were not yet clear. Accounting for these limitations will provide clear insights for future studies. In addition, for future research, it is important to examine the psychosocial responses of different subgroups in the population affected by the disease, including those affected by specific disease control measures such as quarantine.

One limitation of this research is that it does not consider emotion-focused coping. Future studies applying the cognitive theory of stress in the context of COVID-19 should incorporate an emotion-focused style. Furthermore, we suggest that future researches investigate the economic, social, and even religious factors that play a key role in coping with the COVID-19 shock.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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