Research

Moderator:
Thomas R. Bender, M.D., M.P.H.

Secondary Analysis of Focus Group Data in Investigating Farm Stress

By *Pamela Kidd, Ph.D.*
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and

The Stress in Farm Family Research: Validation, Hypothesis Testing, and other Methodological Issues

By *Frederick E. Scharf, M.A.*
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DR. BENDER: And as was mentioned, Dr. Chapman drew us off this topic through his paper of the last part of the last session of stress-related disorders among agricultural workers. I am Tom Bender, the director of the Division of Safety Research for NIOSH. The last two papers will be presented in a conjoint manner. I am going to introduce both of the speakers to you now since they will be talking to you in rotation. The first speaker is Dr. Pamela Kidd, who is at the College of Nursing here at the University of Kentucky. And her role in this session is to tell us about secondary analysis of focus group data and investigating farm stress. The second speaker is Frederick E. Scharf, Ted Scharf, who is with the Division on Biomedical and Behavioral Sciences with NIOSH in Cincinnati. And his role will be to describe the stress farm family research validation hypothesis testing and other methodologic issues. So we have a half an hour for this and they have assured me that we are going to have time for a few questions. Let's start then with Dr. Pamela Kidd. Pam.

DR. KIDD: We are going to start collaboration early by sharing handouts. So I tried to make sure that everybody got a package of handouts or you are sitting next to someone that has them. We will be referring to those handouts throughout the presentation, but I'll try to get you oriented at the right place in time.

The way that we are going to break this session into components; it will be in three components. The first thing I am going to do is to talk a little bit about the original analysis and methodology that we used. Then I will

break and let Ted describe to you some of the methodological issues in stress modeling research. Then I will come back to you and show you how we have applied this model by using a secondary analysis or how the model was derived, from a secondary analysis of focus group data. And I just want to, also, thank my other colleague, Carol Koetke, who is in the audience, who was part of this analysis team as well.

Alright, let me introduce you a little bit to the original study. The original data was collected as part of the first year of the sur-

veillance of behavioral risk factors in older farmers project. This project is part of the Kentucky Farm Family Health and Hazard surveillance cooperative agreement between the University of Kentucky and NIOSH. And Dr. Robert McKnight is the Principle Investigator (PI) of the overall project.

These were the original research questions that we used in structuring our focus groups. These questions served as the initial interview guide. We used an exploratory research design with structured group interviews serving as the method of data collection. That slide just gives you a little bit more details about the methodology.

The initial interview guide did just consist of the research questions. But after each interview, the guide was expanded and refined based on ongoing analysis of our data. Subsequent questions were integrated within the framework of these original research questions. So with each focus group, the interview guide itself becomes a more structured research data collection tool.

A series of six focus groups were conducted that purposely sampled male farmers, age 55 years and older, that were engaged in full-time farming. We also engaged wives of those farmers in separate groups and couple groups, both the farmer and their wife. I hate to say it like that, because in actuality many of their wives could've been classified as full-time farmers, if you know what I mean. This slide is a little busy, but it is just to let you know we had a total sample size of 48.

Let me briefly discuss focus group methodology. Most of us are familiar with the tech-

nique since we are using it more frequently in surveillance. Traditionally, it hasn't been used for surveillance but it does offer some advantages. First off it gives you one topic of conversation. So participants can really discuss the complexity of that issue.

A second very positive factor has been an intimacy that's created between the researcher and the participant. You can go back to them and you can work with them as a team in trying to disseminate information or testing interventions. A lot of times you will get individuals in the group that represent agencies and their roles in life. From participating in a group they end up working together outside of the group. So the community infrastructure can be helpful as well.

And the last reason to use focus groups is they are relatively cheap and you get a lot of data very quickly.

In terms of why using focus groups with farmers, first off, farmers have a rich oral tradition. Their safety rules have been communicated verbally many times in the field, watch that shaft, or, turn off that tractor, I told you to do that - that type of safety rule. As well as, risk taking, hazard recognition, safety decision making are relatively salient issues. The process of how a person makes safety decisions is difficult to assess sometimes using pure survey, written survey techniques.

Safety decision making may not be a conscious process, so once the group discussion starts rolling it can serve as a stimulus for individual expression.

And the last very good reason to use them is

that farm families value fellowship. That is not on the slide, but group meetings provide a way of communicating, it's informal functional support, it's a legitimate cultural function of that community. And if you are dealing with older farmers it may be they participate in a group rather than deal with the respondent burden that might be associated with other data collection techniques.

What do you get from focus groups, or what can you get? Several different uses of the data. But the one that we are really focusing on is generating hypotheses for quantitative designs. I use them in my own research, really, as a sounding board for moving into the quantitative realm. This leads then to Ted, who is going to start out with that.

MR. SCHARF: Thank you, Pam. Thank you, Dr. Bender. Thank all of you for coming. My purpose is to discuss the methodological issues of stress process modeling.

Now the plan originally, at the time of submitting the abstracts, was simply to put up a general outline of where we might go with farm stress modeling. But then in looking at the results of Pam's transcripts from the Kentucky farmers we found that we had some information to fill in that model. And so I would just like to point out that Pam is a co-author on this presentation today. Also I would like to acknowledge Mark Veazie (DSR, NIOSH), who has been struggling valiantly to educate me in the research on injury and safety. He is in the Division of Safety Research. He has extended his best efforts and I'll just leave it at that. I don't know how successful he has been in my case.

We begin with what has become the NIOSH

stress model. See Figure 1. This is published in Hurrell and Murphy[1], and that is in the References in your handout. We use this as a basis for developing a model of stress in agriculture. My purpose is not to focus on the contents of these models but rather the main components.

So the first main component is job stresses. These are the physical, psychosocial and organizational features of the environment in which people work -- in which farmers work -- and in which all of us work.

The second main component I want to focus on is acute stress reactions. These are the immediate stressful consequences of those stressful features of the environment.

The third main component is down the line in terms of time -- illness or chronic strain. That doesn't happen right away. It develops later.

If we had time we would talk about nonwork factors, buffer factors, individual factors. We are not going to do that today. I am excluding them only because of the shortage of time. It is not to imply, in any way, that they are not important.

The most important thing I want to point out here though is that this is a process, it is a process over time. We are going to be coming back to that implicitly throughout this entire talk, even though we use models that look as though they are simple correlational single time designs. I want to emphasize that.

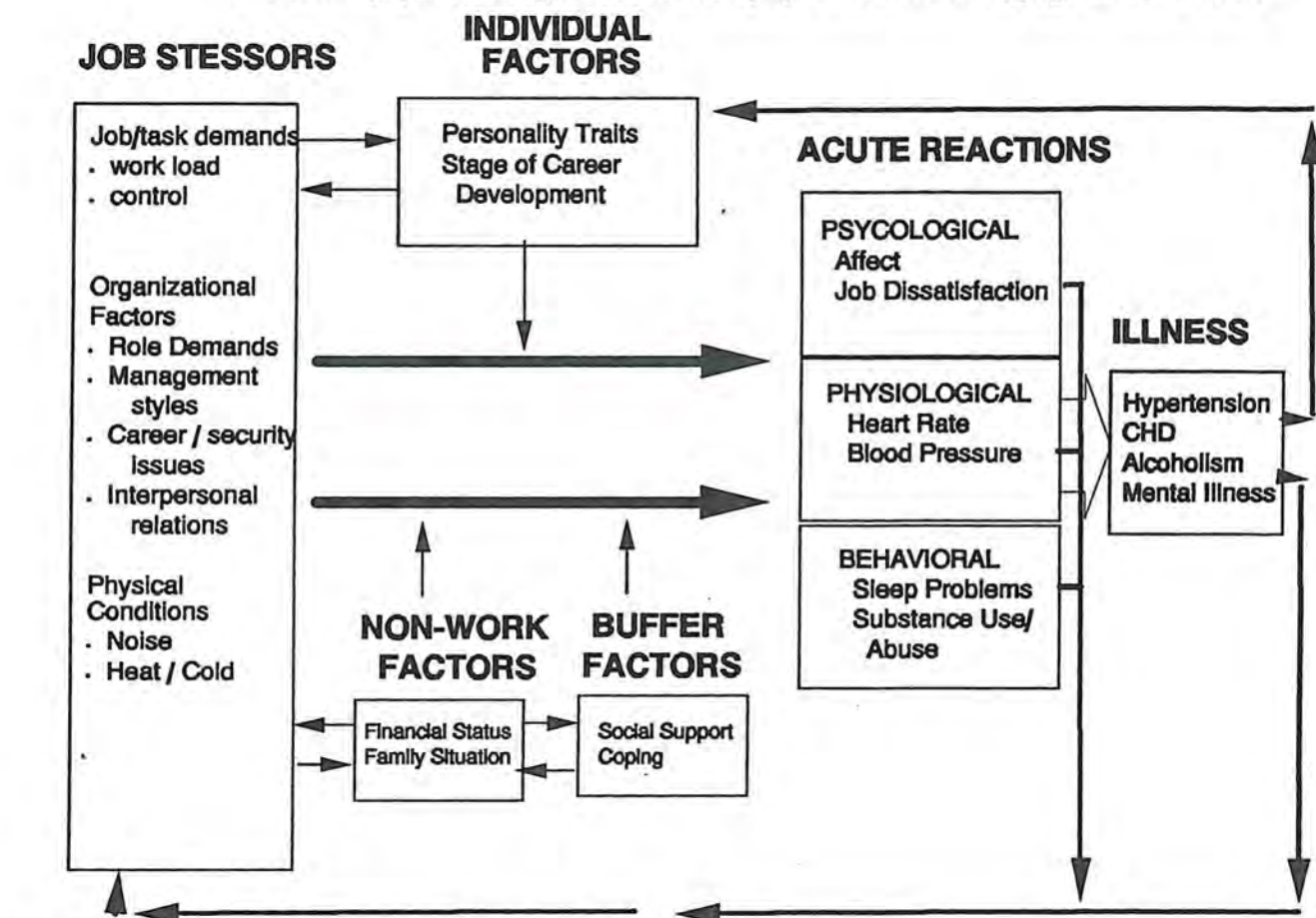The three key questions I want to address today are, first: "Is there something that we

Figure 1. Model of job stress and health relationships.

might call a stress process?"

Listening to Dr. Larry Chapman you might wonder why are we here, what are we doing? We think there is some information but we need to work hard to be able to demonstrate that. So if there is a stress process, how can we show that what we are observing is reasonably attributable to stress and not to some other unobserved variable or process?

Second question, "How might we measure, and then demonstrate that this process, in fact, exists?"

Third, "How can such a demonstration serve as a basis for future research or prevention efforts?"

See Figure 2. The major components of the NIOSH stress model, from a methodological perspective, would be viewed this way. Components here -- when we talk about subject measures, we are talking about asking the workers what is going on in their lives at work. We also want to be concerned with cross validation, so that we have some idea that what we think we are measuring is, in fact, what we are measuring.

Model Components	Subject Measures	Cross-Validation
job stressors	independently verifiable judgement	research teams, independent investigators
acute reactions	reports of experiences e.g. frequency	physiological measures e.g. blood pressure, catecholamines, cortisol
illness / chronic strain	health / ill-health e.g. anxiety, depression	history of lost work time, physicians' reports, treatment

Figure 2. Major components of the Stress Model

When we talk about job stressors, these are the features of the environment. So we want an evaluation and assessment -- a dispassionate judgment about that feature in the environment. We want it to be independently verifiable, so that a co-worker can come in and make roughly the same kind of judgment, so that a research team member could come in, or some other independent investigator could come in and make roughly the same judgment of that stressor in the environment. The worker who is exposed to the stressor is in a very important position to evaluate it, because that person works with it every day. So that's, in a sense, the expert. But it is important to have the independent assessment as well -- that would be a measure that is independently verifiable.

Farm family studies are doing just that. The Ohio presentation, Phase Two -- Jay (Prof. J.R. Wilkins, III, OSU), you will have to correct me -- is modeling those components

of looking at the farmers but also their own research team is going in. And I believe some of the other presentations at this symposium are also arguing for this multi-method kind of assessment.

When we talk about acute reactions, these are personal experiences. So there is no right or wrong. Whatever the person says, that is it. However, we will try to get some cross-validation in terms of physiological changes. Some of the common validation methods are blood pressure, catecholamines, and cortisol.

Finally, we move on to chronic strain, that is general health or ill-health measures, anxiety, depression. The CES-D (1980. Center for Epidemiological Studies - Depression., N.C.H.S. series 11, no 216.) scale is being used in some of the farm family studies. That is a good example of a measure of chronic strain of depression. We might look at a history of lost work time, on physicians'
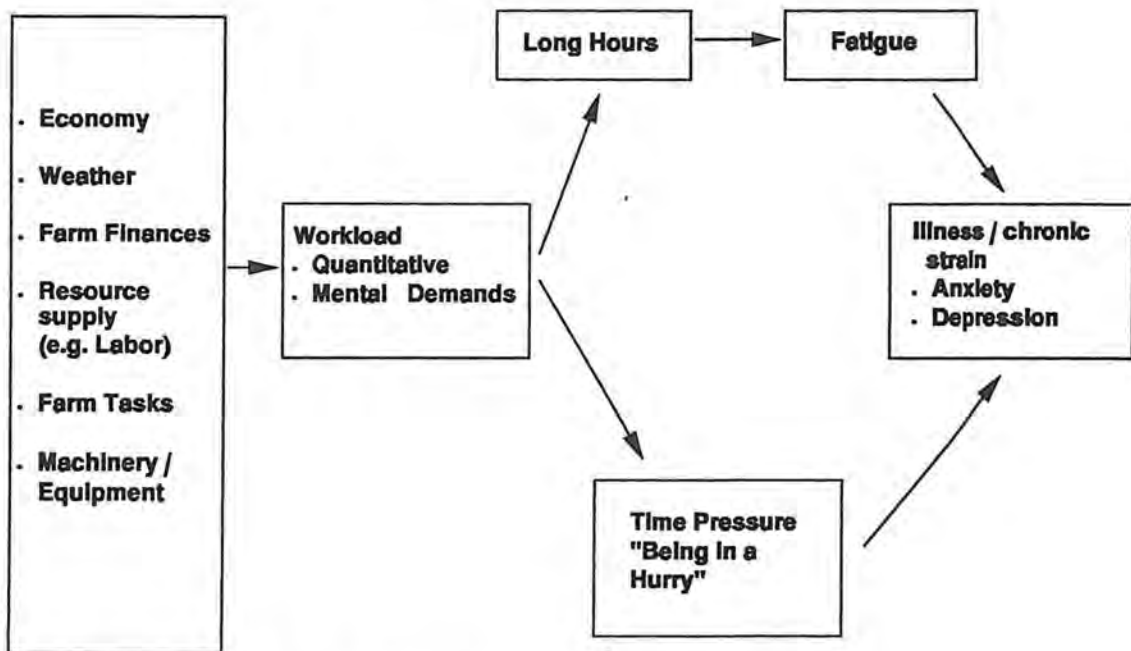
Figure 3. A preliminary model for understanding Farm Family Stress

reports of this sort of thing.

A couple of important things here. One is to emphasize multi-method. I think I left it out of the references but Campbell and Fiske's multi-trait multi-method matrix (Psycholological Bulletin, 1959. v.56 pp. 81-105.) is a very important reference here. Also Spector[2] and others have looked at some of the stress research and have noted that sometimes in studies you can't tell the difference between a measure of chronic strain and acute stress reactions. So when we measure these things we want to know which we are measuring. They point out that sometimes somebody who is depressed might, in fact, respond that they are having more problems at work. But the causal direction has been reversed. And so if we are going to show a stress process from job stressors through acute reaction to chronic

strain, we have got to be able to show the whole process and validate it. That is some of the message coming from that research.

And then, once again, let me emphasize this is a cross-time issue.

See Figure 3. This is a very preliminary, very simple, overly simplified beginning model of how we might start to look at farm family stress. We have the job stressors on the left. Each box represents a concept, or set of concepts in this case, and each arrow represents a hypothesis. Where there are no arrows, that means we are hypothesizing no relationships, the null hypothesis. So we might imagine that some kind of farm task changed, or maybe equipment broke down, and that led to an increased work load. That meant the farmer might have felt he was under increased time pressure. Farmers say,

"I am in a hurry," it's "being in a hurry."

If that accumulates over a long term period of time, that might lead to anxiety. And this is how we are going about this kind of modeling process.

See Figure 4. We have talked, a bit, in this conference about the weather events in the Midwest and also in the southeast United States. This is -- I am almost embarrassed it's so simple but I made it extremely simple just on purpose, weather leads to no productivity, leads to poor farm family finances. So these are stressors that accumulated over the past few months and into the next few months, right now. That can lead to the build up of anxiety, possibly depression, and, as Paul Gunderson, who is in this audience, has been writing, in some cases to suicide. We are looking at an increased possibility of that in the coming months right now.

See Figure 5. As I said, this is very simple, it is not enough. What if we wanted to include pesticides. We would want to include multiple methods. So in the branch I am in, Applied Psychology and Ergonomics in DBBS, we have John Russo and others evaluating exposure to organophosphates in a multi-method fashion. And we would want to include their kinds of assessment tools along with looking at stress. So we are moving beyond just a simple stress model to a much more comprehensive approach.

See Figure 6. Similarly, Robert Dick, also in Applied Psychology and Ergonomics, is looking at new assessment methods for exposures to pesticides, solvents, and metals. Again a multi-method approach, and that is really important to emphasize.

See Figure 7. What we are talking about is much more than just this small little model. We are talking about moving to a broader physical, ergonomic, and bio-behavioral model, of which this stress process is just one small part. And I am going to turn it back over to Pam who is going to fill in these boxes with some really exciting findings.

DR. KIDD: Alright. At least you are not asleep. In terms of the secondary analysis that we did I am going to have you turn off the overhead now, thank you. We had two aims in doing the secondary analysis. Number one, to find out what job stressors do farm families share with other occupational workers and what job stressors are unique. We are really still in the process of analyzing this data.

The impetus for the secondary analysis arose from the initial analysis of the focus group data. The participants didn't discuss mental health, specifically. But, there was a trend in the data that worrying about finances and getting the help in terms of extra labor or machinery parts, for example, increased your injury risk indirectly by increasing their fatigue. And it is the stress injury relationship that I am going to elaborate further upon.

How did we go about analyzing this focus group data? We did several things. First off, when you deal with stress and coping, it has been examined extensively in the literature, we were obligated to start with definitions in the literature of words that might be important to look for in the transcripts. So we had a seven page extensive coding dictionary. The coding dictionary was structured from the beginning.

Problem: Evaluation of organophosphate-poisoned workers and methyl bromide-exposed fumigators.

Methods: Neurobehavioral Evaluation System (Cognitive, Motor, Affective)

Postural Sway

Eye-Hand Coordination

Figure 4. Neurobehavioral Assessment of Pesticide Applicators
(John Russo, Ph.D., David Chrislip, W. Stephen Brightwell, Robert Dick, Ph.D.)

However, those definitions were modified after analyzing each transcript, based on the farmers interpretation of those terms. There were about 31 stressors in the literature that were not discussed spontaneously by the farmers in our study.

The dictionary went through five iterations. It was revised by the team after each transcript analysis. We had a total of 145 key words and 908 data entries, or discourse segments from those transcripts. We were dealing with 240 pages of transcripts.

Originally, the focus groups were audiotaped and transcribed verbatim. Once we transcribed the data and we coded it independently by two investigators for each transcript, we entered the data into **FYI3000**, which is a qualitative software data program.

We displayed the data in printouts based on every key word in the dictionary. Then we later obtained secondary printouts by collapsing key words and concepts together based on coding definitions and hypotheses that were emerging in the analysis.

We looked at the consistency of our coding among raters, for each county, and what are our Kappa coefficient were. We had a moderate to excellent agreement, 0.69 to 0.87. We also looked at the content validity of what we were doing. We matched the definitions in terms of the meaning of the definition and how well the definition matched with a piece of data. We completed this task independently and calculated a mean across the panel of three expert judges. We had a mean of 86, which is good agreement, good validity between definitions and data.

We kept a diary of our coding decisions, relationships among key words, and questions that are not yet answered. It helps to clarify analysis techniques throughout, it also serves
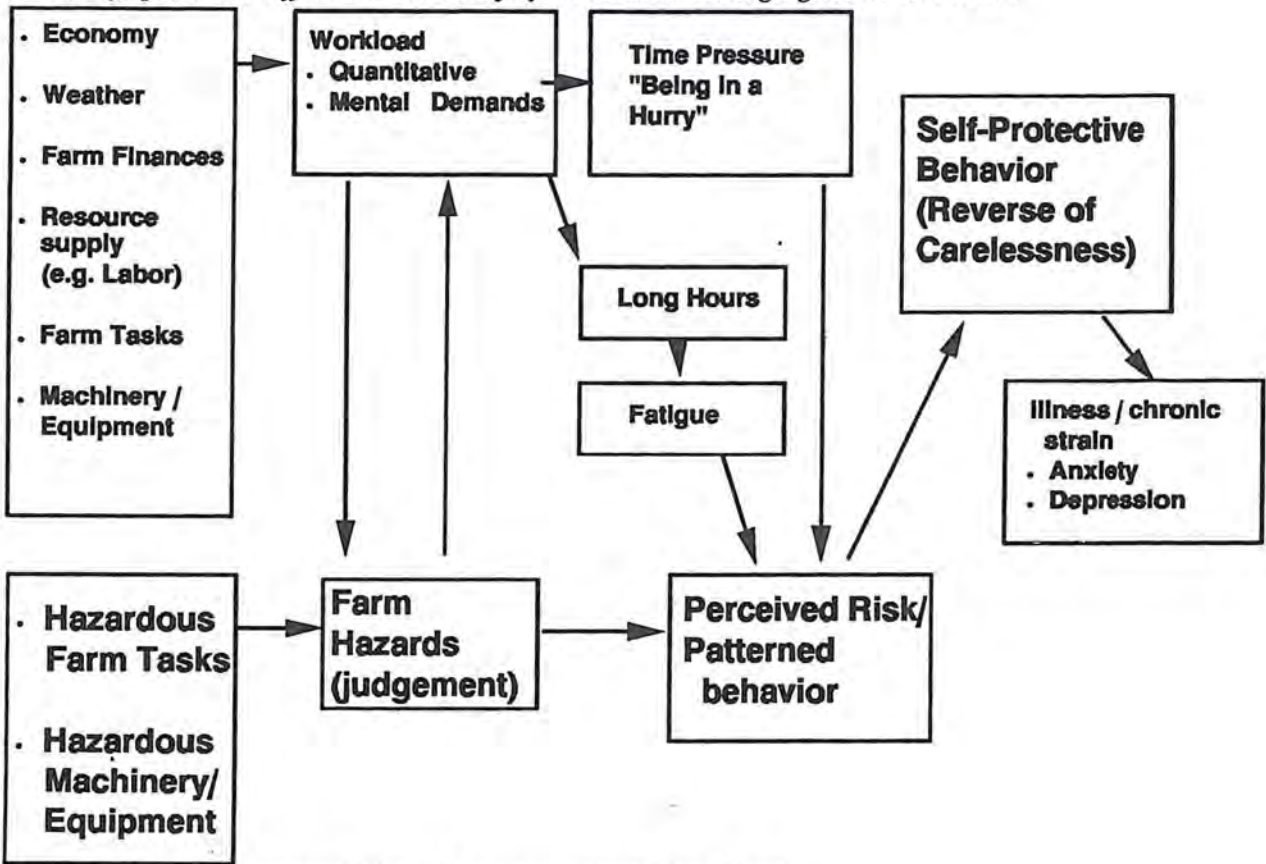
Figure 5. Possible Stress-Related Consequences of the Flood.

as an audit trail in case someone would like to look at the way you analyzed your data.

What did we find? Definitely, a greater clarification of the relationship between stress and injury. You saw the model that Ted put up, let's take that one box of farm stress. These were the most frequent stressors listed by farmers in our particular secondary analysis. This environment is very much a psycho-socio-physical environment. The important thing is that some farm tasks are viewed as hazardous and some are not, even though they will tell you that all farming is dangerous. When the farmers talk in the focus group, they give greater clarification regarding what types of equipment and tasks

are more dangerous.

This is showing moving a piece of equipment down a public highway since it was one of the most significantly rated, or frequently encountered, hazardous tasks.

Judgments about their workload and hazards. Well, their workload perception does come from the demands placed upon trying to complete these tasks with limited labor supply and limited equipment sometimes. A lot of times it increased their workload because they physically had to do something they didn't feel quite safe in delegating. And a lot of times it also influenced their perception of what they were doing at the time as being

more hazardous than what it would have been at another point in time.

This is showing the multiple work roles of the wife on the farm. And also the male farmer in dealing with animals. Mental demands of the simultaneous tasks of farming was frequently listed as requiring judgment that influenced some of their safety decision making.

Acute reactions, what did we find in the secondary analysis? Time pressures, long hours, fatigue, and carelessness were frequently mentioned. I have to really focus in on carelessness because to me it says lack of self-protection, (how we are defining carelessness), is the key in injury control.

Several of these newspaper clippings show what farmers perceived increased their time pressures and long hours worked - weather, etcetera, were some of these stressors. So, again going back to the original column, these stressors impacted this stage in the process.

I am going to refer you now to your handouts. It is the page called "Relationship and Supporting Data." I want you to look at the very last entry on the handout which is bolded. I will read this, paraphrase it to you, because you can't read it on the slide. Basically, what they are saying here is that it is spring, it has rained and rained and rained. You can't get in the field and time to get the crop in order to have adequate growing time is getting so close and you have major breakdowns every day and your temper gets terrible. This represents anger as an acute strain. "I just don't say anything. I avoid contact with him, that is a coping strategy, but we

are not getting into that here. I will argue with him later. But I worry about him when he gets in this particular state and I tell our son to watch him real close because I know he gets careless and something happens." This data depicts the relationship between stress and the acute reaction of carelessness.

Other strains that we encountered in our data were anxiety, injury productivity, and anger. We have a frequency listing in one of those handouts for you. In other words, once they are careless, they may sustain an injury that requires medical and nursing treatment or it may result in mortality.

Let's turn off the slide projector and we will go back to the transparencies and show you the application of the model.

Kentucky farmers definitely identified certain tasks as being more hazardous using certain equipment. For example, the bush-hog and mowing on a hillside. That comes into the judgment of farm hazards. At the same time they will tell you they will delegate certain tasks to certain people but a lot of times figuring out who is able to perform a certain task increases their stress and their mental demands. Or it may add more work on them because they can't delegate it.

That then leads to the time pressures, the long hours, and the fatigue. The column I am really concerned about, or I am interested in that I am still trying to figure out, is the perceived risk and pattern behavior column or cell. At this point, it seems that at a time when they have multiple stressors affecting their decision making, instead of paying more attention to the cues regarding the hazard, they know it is a dangerous task, perhaps

Development of assessment methods for quantifying the adverse motor and sensory effects of chemicals commonly used in farm work. Current neurobehavioral test batteries do not contain a sufficient number and diversity of sensory and motor tests to adequately assess neurotoxicity from exposure to agricultural pesticides, solvents, and metals.

Sensory Funtion: **Olfaction**
Vision
Cutaneous sensation
Evoked sensory potentials

Motor Funtion: **Tremor**
Manual Dexterity
Postural Stability

Figure 6. **Neurobehavioral Health Risks in Farm Workers**
Robert Dick, Ph.D., Bobby Taylor, Paula Grubb, M.A.

they have already told someone of the danger. They may have cut themselves or before doing this task, the equipment is dangerous. However, they perceive or place greater attention on the other stressors that are in the box above that hazard box (e.g. economics, weather, labor, supply, etc.). Why? I don't know, except that they tell me it is related to productivity.

And a good example of trying to explain this to you is to go back to that very same handout that I just read from - the Relationship and Supporting Data handout. I believe that is number one, right at the top of your page. "Well, I am going to finish this task or this job because I have -- before I do anything about the tractor brakes, it is going to rain tomorrow, I have got to get this job done
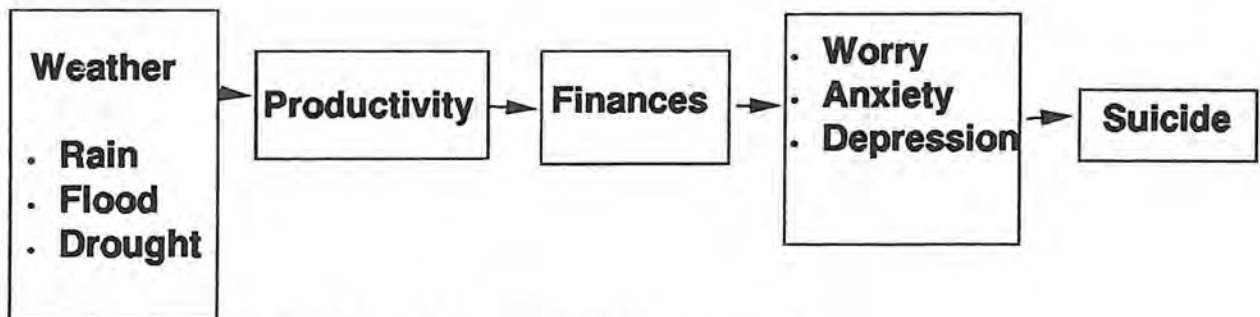

Figure 7. Possible Stress-Related Consequences of the Flood.

today. It is carelessness because you feel like you can complete the job without having an accident. But the carelessness is there because it is already a fact that it can cause an accident."

So at that point, they are paying a lot more attention on getting the task done and not necessarily the injury potential of the task.

The very next piece of data on that handout depicts how it leads from perceived risk to carelessness to injury. They say (this is related to productivity) why they may be paying more attention to the farm stressor cues in the top box than actually the hazardous task, (e.g. a piece that is torn off could be a protective item) is the cost of repair versus getting the job done without having to fix it at that time. The cost versus the amount of time and what you are going to save if you go on and get the job done. Especially if the needed repair doesn't hamper what you are doing. If you have a belt broken or a chain, that is a necessity, but a shield, probably, you could pick two or three acres of corn while you were getting the shield made. The cost of that shield will come out of the profit that is decreasing while you repair the equipment. They are making an actual decision to go for the productivity and take the injury risk.

So where do we go from here? Basically, for some reason, it appears they are paying attention to cues of farm stress but not necessarily to cues of the hazard at that time. Their focus is on maintaining productivity not preventing injury. But they are not making the link at that time by preventing injury you are maintaining productivity. And, perhaps, also familiarity with doing the task under less stressful conditions encourages

their lack of self-protection.

I think the key thing that I have learned from this point in the analysis is that unsafe behavior needs to be discussed in relation to economics, and their lifestyle, and even their farming management strategies or implications, and not just in terms of preventing injury and promoting health. I think it may have more meaning and make sense to them in their decision making process.

I will turn it back to Ted for one last comment.

MR. SCHARF: See Figure 7. Thank you very much, Pam. I can't tell you how exciting it was to be sitting there with the model and have Pam pull out the transcripts to fill in these boxes and make the connections across the model. It was so exciting when it happened and it is still exciting now to see it happening. But, what have we got?

If we follow the modeling techniques we need to follow the methodological requirements of this type of stress process. We are forced to take a more comprehensive and inclusive approach to modeling, not stress alone but this whole idea of a bio-behavioral model of farm family issues.

Second, by following this process within the limits of our methods, this is testable. These hypotheses are testable and we can compare them to other possible hypotheses.

Also, Mark Veazie has done some work on the safety and injury component of this. We just have a few boxes in the model that relate to the kinds of work you are doing in Morgantown. What we need is to take these

small boxes and explode them out into what processes are going on. That is where we need to develop better collaboration.

Finally, one of the most exciting things is it forces us to shift our focus and emphasis from just the immediate experiences. We get away from just what has been happening before a potential injury happens. It says, look back to the precursors. Interrupt this stress process early in the model. What the farmers have said is that they need a labor supply that knows how to work on the farm, one that they can count on to get the job done, when it comes time. They need better — we need better economic conditions so the farmers are not under such tremendous pressure to try and just work a little more and just cut that extra acre because that is where their profit is. We need to alleviate some of the pressures here. Those are a couple of the issues that this kind of modeling allows us to do as well as suggesting a more comprehensive and ecological approach to looking at issues with respect to farm families. That is all I have for now. Thank you very much.

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