Today, what I’m going to try to do – and I will say this in the spirit of full disclosure – is to present to you a new talk that I haven’t given before, integrating work that I’ve been doing on two intervention projects: an ergonomics intervention and what can be seen as a health services or medical intervention. I really want to try to emphasize some fairly big issues in this talk.
Here are some of the key take-away messages for you:

• Theories of change not only tell us why and how, but allow us to educate consumers. I think this is an important message I’ll come back to multiple times.
• Stating primary hypotheses matter in intervention research.
• Productivity is a real outcome, not just reduced or lost productivity.
• Control groups are essential in workplace intervention studies.
• Work site health promotion intervention should be coupled with health protection interventions, and I think that Marilyn Fingerhut pointed this out last night.
Key Take Away Messages

- We need to think of new ways of quantifying intervention effectiveness to facilitate ‘real world’ adoption of new practices.
- Multi-level interventions require multi-level methodologies.
- Time matters in our research, yet we have few theories that incorporate time.
- We can do large scale field interventions and it’s time to scale up.
- Need to support large-scale multi-organization interventions.

• We need to think of new ways of quantifying intervention effectiveness to facilitate real-world adoption of practices.
• Multi-level interventions – it’s a big buzzword now, for those of you in science – require multi-level methodologies.
• Time matters in our research, yet we have few theories that incorporate time.
• We can do large-scale field intervention, and it’s time to scale up.
• We need to support large-scale multi-organization interventions.

So that’s a lot of points – take-away messages. Some of them I’ll emphasize more than others, and I’m pleased as punch to engage anybody in dialogue about this, as well.
To Support These Messages I Draw on Two Intervention Studies

- A large scale multi-site office ergonomics intervention involving training and a chair
- An study following workers electing to receive carpal tunnel release surgery

And to support them, I’m going to draw on two intervention studies, and I’m first going to talk about the Ergonomics Intervention Study and make a series of points, and then talk about the Carpal Tunnel Release Surgery Study.
This is the research team – a multi-disciplinary research team – it’s essential when you’re doing intervention research.
These are the different people that have supported this project. This is a very diverse group of agencies that have supported this work, and we appreciate all of their support.
The Ergonomic Interventions

- Highly-adjustable ergonomic chair:
  - Benefits come from chair adjustability and human engineering design features
- One time state-of-the-art ergonomic training with e-mail follow-ups:
  - Helps users get the most out of their chairs
  - Chair-with-Training and Training-only groups equally maximize the ergonomics of their overall work station
  - Based on instructional system design principles and adult learning theories

These are the interventions. There’s a highly ergonomic chair, and the benefits come from the chair adjustability and human engineering design features, and a one-time state-of-the-art ergonomics training with email follow-ups. I’m not going to go into that in more detail now, but if you have questions I can take them later.
Key Chair Design Features

- Height, width and pivot adjustable arm rests
- Chair height adjustments
- Flexible full back support
- Adjustable low back firmness with seat depth adjustment
- Gliding mechanism for the back support and seat pan

I'm not going to go into that in more detail now...
Training Design Objectives

- To recognize work-related musculoskeletal disorders and risk factors
- To understand the importance of varying postures
- To know how to rearrange the workstation to maximize the ‘comfort zone’
- To recognize and understand visual issues
- To reduce visual discomfort
- To understand rest breaks are necessary for healthy computing
- To know how to change work-rest patterns
- To be aware of companies existing health and ergonomic programs
- To know how to obtain ergonomic accessories through the companies program

…but if you have questions, I can take them later.
This was our theory-of-change, and I want to spend a little bit of time on theory-of-change. This is a very liberal use of the word “theory” but I think it’s important to describe that – we actually started this project by actually writing down in grotesque detail why we thought the interventions that we were doing would affect our primary outcomes, which were health and productivity, and how we thought they would affect them.

What we ended up with was a fairly simple but important model, because typically what people will present to you is – they’ll do an ergonomics intervention, and then they’ll show you productivity, or lost productivity if they use Worker’s Compensation claim data, or they’ll show you a health outcome, or they may show you knowledge, or they may show you something about postures, or they may show you something about functional health, but we think there are a series of pathways here. Each of these pathways needs to be measured when you’re doing intervention research, because if you find differences here, you have to explain them based on the mechanisms that you think are operating.
Now, this is all good for science. Why do we care about this for consumers? Because I said one of the key take-home messages was it’s important for consumers. Because often, there are a lot of people that are doing different levels of scientific inquiry in ergonomics, and in particular, there’s a debate about the quality of the evidence, and still ongoing. And the consumers need to understand the models that are at work, and they should, in fact, be empowered when somebody presents. So, even when a business person comes to a company, they should say – they show you these big productivity benefits – you should be able to ask, well, what are your measures – in the intermediate measures – that show the effects? You can choose to believe the data. That’s one way to go. Or you can actually choose to ask what matters.

The other important reason here is, we want to educate consumers, because consumers are helping us advocate for science. And as you start to notice, as you start to do these bigger studies, it takes more money. That’s just the reality of doing big science.
This is reality science, when you're doing interventions — $1,000, $10,000, $100,000 — these aren’t going to get you the types of interventions that are going to answer the questions that we need answered.

This is reality science, folks, and we need to have the consumers understand this, and we need to have all the different stakeholders understand this, and theories-of-change are a way of doing this. They not only empower the consumers, but they also create an environment in which everybody is talking about the same thing. So when I give this slide to consumer groups, I say, “You should be able to ask anybody about all of these different things, and they should show you that, in fact, there are differences.”
Participating Site

- State Government Department of Revenue Services
- Offices located throughout state
- No standardized workstations or chairs, but most limited adjustability
- All participating employees involved in tax collection and individual productivity data available
- Strong management & union support
Training Implementation

- Two co-facilitators
- Conducted 22 classes for 188 employees (162 study participants)
- Group size ranged from 1-21, average size 9
- 100% of supervisors attended
- Chair group received new chair
- Training only group brought own chairs
- Training consistently delivered to all groups
So this is our study – quickly – we had two pre intervention measurement periods, two months and one month before intervention, and then we followed workers two, six, and twelve months post intervention. We had three groups. One group received a chair and training, another group received only training, and a third group that received training only at the end of the study.

I’m going to report the results from one of two sites that we’re at. These are the different types of data that we collected. We collected survey data, we did observations, we actually have direct measurement data, we have EMG data, we collected productivity and performance data from the participating works sites; so we have a lot of different types of data that we collected.
Study Implementation

- Had both union and management support
- Conducted multiple supervisor and manager trainings
- Multiple messages to workers including meetings with supervisors
- Participation on ‘company time’
- Study champion
- Gave surprises and awards to work groups
- 69.3% participation rate and 88% retention at 12 months

Study implementation is important. We had both union and management support; this is a unionized place. We spent a lot of time working with supervisors and managers up front. We trained them in the study. You really have to have supervisor buy-in to studies when you do them in work places. If you don’t, you’re just not going to succeed. We did multiple messages to workers, including meetings with supervisors talking about this. Participation was on company time.

We had an internal champion. We have internal champions at each company. We think internal champions are very important. We gave surprises and awards to groups – we gave them to everybody. We ended up with about a 70 percent participation rate, with an 88 percent retention rate at 12 months – which is, I think, acceptable. At our second site, we’re actually at a 96 percent participation rate and a 100 percent retention rate. We got better.
Primary Health Outcome Hypotheses

Over the work week and the work day...
- participants receiving office ergonomics training will have reduced MS symptom growth relative to control group
- participants receiving an ergonomic chair as well as ergonomic training will have reduced MS symptom growth relative to the training-only group and control group

So this is what our primary hypothesis was, and I’m going to just spend a little time on this. We actually measured musculoskeletal symptom growth over the day and over the week. We didn’t just measure average levels of symptoms because we hypothesized that an intervention reduces the growth of symptoms, not simply an average level. And so, we would expect the control group to look like this red line. We expect the intervention will flatten for the chair and training group, and that without the chair we felt the training group would have some benefit, but not as much as the chair and training group.
No MS Symptom Increase Over the Week Only The Day

- In each of the two baseline administrations of the diary, symptoms increased over the workday but not the workweek.

![Graph showing symptom score over the workweek](image)

(The letters B, E, and M refer to the beginning, middle, and end of the workday, respectively.)

We had two primary hypotheses. One was symptom growth over the workweek, and the other symptom growth over the workday, and you can see – this is our pre-intervention data on the week, and we’ve got no symptom growth over the workweek. There’s no line. You would hope to see something like this, and it doesn’t. So, there’s no reason to test it any further. We reject our first primary hypothesis. There’s no symptom growth over the workweek. The human body is a wonderful thing. They recover every night. It’s a marvelous thing. We’re now looking at this with lots of data, but that’s the basic hypothesis.
But, interestingly, this is symptom growth over the workday. You can see these are the three groups pre intervention. This is the chair and training group, this is the control group, and this is the training-only group. What you can see after intervention is a modest change in the training group, and a huge effect for the chair with training group where, not only did we reduce the level, but we essentially flattened this slope.

I can go into great detail on the statistical analysis here. It’s multi-level modeling. But this is a robust difference. This difference is significant… this difference is significant… this difference is not significant. The conclusion is that the training group did not result in a significant reduction in symptom growth over the workday. Only the chair with training group did.

Interestingly, you should note that this is the control group. This is the control group. There was a change over time in control groups. I’m going to come back to this. Without the control group we might have concluded different findings.
The Chair with Training Improved Visual Health*

*Adjusted for lighting, time spent at the computer, general (poor) health, chair comfort, and type of glasses worn
Training Increases Ergonomic Knowledge

Results statistically significant at $p < 0.001$ for both groups.

Also, post hoc differences statistically significant ($p < 0.05$) for specific knowledge dimensions of body postures & workstation layout.

Now I said that the training didn’t result in reduced symptom growth, but I want to make sure I say – the training worked, from a training perspective. It increased knowledge – this is the pre/post knowledge test.
Training Increases ‘Appropriate Ergonomic Behavior’ TO

Differences between chair-with-training and control & training-only group and control statistically significant (p<.05)
And you can see this is a postural risk assessment, using the RULA, which is a very course measure of postural risk., and you can see that it dropped very significantly for the chair and training group for the left body and significantly for the right.

It dropped significantly for the training only group, so again training worked for both of these groups.

And you can see, in fact, that the control group, the risk went up nominally. That change isn’t statistically significant, but these two groups are different than this group.

So the training works in terms of reducing postural risk. It actually improved ergonomic behaviors, and it improved knowledge. It just didn’t translate into a health improvement.
Chair With Training Increases Satisfaction

Chair Satisfaction

CWT  TO  Control

Pre  Post

2.2  2.4  2.6  2.8  3.0  3.2  3.4  3.6  3.8  4.0
Again, let me just – I’m showing you that it also improved chair comfort. This is a usability issue. But I want to point out – we had a big improvement in chair comfort in the control group. We don’t know why that was. That could be a simple testing affect, but we can’t seem to explain it in any clear way. But you can see that there was a difference here, and I can tell you while that’s small, that statistically would be significant if we didn’t have the control group.

Again, without control groups, its very dangerous to draw conclusions in intervention studies. This is a very important finding, a very important statement. It’s a simple statement, but I think it’s really very important.
Productivity Improves Because?

- People become more efficient – employees generate more output per hour worked
- People can work more hours – employees have less health-related sick leave

Okay. As I said, our second primary outcome was productivity. Why do we think that productivity would improve? Well, people become more efficient. Employees generate more output per hour worked, or people can work more hours, they have less health-related sick leave – we think those are the two big paths.
Key Productivity Outcomes

Collections (in dollars) per effective work day (8 hours of work)

Productivity data collected 11 months pre- and 12 months post-intervention

Actual hours worked serves as denominator

Sick leave hours per month

SF-36 Pain measure used to assess health-mediated productivity improvement

This is our productivity data. This is an economists dream, I’m not an economist, but our colleague Kelly Durango is, and he gets real dollars per effective eight hours of workday. We have productivity data 11 months pre and 12 months post intervention, and because we have the actual hours worked, it’s the denominator. We’re not estimating the hours worked, so this is a very nice set of data to have.

We also actually had sick leave hours per month. We can break that down about 500 different ways, and I’m going to talk a little bit about this. We’re using the SF-36 pain measure to assess health-mediated productivity improvement.

The productivity measure here is dollars. Actually these dollars are used in supervisor evaluation of workers. They’re used in management evaluation of supervisors. So this is a really meaningful productivity measure. They’re used to measure the productivity of the firm. So this is a nice, meaningful productivity measure.
And here’s the punch line… if you look at the chair with training group and you take the 11 months pre intervention and get an average revenues generated, and then look at the increase, it’s about an 18 percent increase in productivity. The training group is about 6-1/2 percent. This is not statistically significant. This is statistically significant and obviously very meaningful.
These are the same things I just showed you. And using the SF-36 pain scale as looking at health, we think that about 6 percent of this is health mediated in the chair and training group, and a modest amount is mediated in the training only group. Again, this is not statistically significant, and this is. So about a third of the productivity increase is related to improving or reducing pain.

You should be impressed with these numbers. We actually delayed publication of this paper by about 12 months because we didn’t believe the numbers.
Here’s an interesting phenomenon. Many of us are looking at absenteeism and sick hours, and we found nothing. There’s less than a half hour, say, per month per employee, and the results are not statistically significant. Yet we have strong and strong and strong productivity effect in a firm where the affect on absenteeism is essentially zero.
The Chair with Training Benefits are 25 Times Greater than the Costs in the First Year

- Costs are $800 per chair + $200 per person training + $32 salary per person or $1032
- Conservatively, benefit flow is $119.24 per worker per work day x 17.75 work days per month x 12 months per year or $25398.12
- Benefit-to-cost ratio 24.6:1

So, I’m going to go through this a little bit so you can get this. This is a very conservative set of estimates here. The chair cost $800 per chair. Actually, the cost of this chair is quite variable. For those of you who actually purchase chairs, you can know high-end highly adjustable chairs can be purchased for as little as $425 and as much as $1,500 – more if you want the fancy leather.

The training – again, this is a state-of-the-art training where we not only designed the training, but developed it specifically for the workplace, which means we have tailored pictures and everything. So that’s an expensive training. This is the cost of taking the worker away from their job so that they could participate in the training. So this is the cost.

Conservatively, we estimate the benefit flow at about $120 per worker per day. They work 17.75 workdays per month times 12 months for about $25,000 a year. We could have used – and this is the health benefit. The 18 percent is $325 per worker per day. So we’re just making a conservative estimate here.
The Chair with Training Benefits are 25 Times Greater than the Costs in the First Year

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This benefit-to-cost ratio is 25 to 1. You can do the math. The chair pays for itself in a little less than a month. We think that a safer statement is to say the chair and the training pay for themselves in somewhere between two and six months.

So the punch line to this study is that, in a well-designed intervention, we showed that you can improve health – that’s reduce musculoskeletal symptom growth over the day – and improve productivity. It’s a novel idea – health and productivity going together.

Earlier, I think, somebody from 3M was talking about these as investments in human capital. I think this is a really important study, because what it shows is that you can do both together.
Okay. Next I’d like to talk about an occupational health services research project that we’ve been involved in. It’s a different research team.
Our support is from the National Institute for Occupational Safety & Health and I didn’t have a logo for the Arthritis Foundation.
This was a very different study. We were following a group of workers who were going in for carpal tunnel release surgery, so this is a medical intervention. And our model was that – we had this multi-dimensional model of return to work, and so we thought that individual factors would be important, psychosocial factors would be important, clinical factors, economic, legal, and organizational, and job – and what you’ll notice is that we have two months, six months, and twelve months post surgery.

We thought that the individual factors would be most important in the immediate return, the clinical factors would be important in both of these, and that the psychosocial factors like the clinical factors would be important early, and that the job and the organizational factors would be important later, and that the economic and legal are important throughout.

And then we have two different types of outcomes we’re looking at. One is return to work – the fact of return to work. The other is work role functioning, and that’s actually returning to the job and functioning well in your job.
It’s a sample of about 200 workers. They were recruited through physician offices. They had to be working at the time of – they developed CTS – was documented with both nerve conduction and clinical confirmation. The nice thing about this is that it’s a homogeneous treatment. That was part of our intent. We didn’t want the medical – the treatment variability to overwhelm other effects, and we really wanted to look at a particular intervention.

Prior research had shown that carpal tunnel surgery does benefit the worker in terms of improved functioning.
We defined successful return to work as the ability of the worker to meet work demands given current physical and emotional health status. Poor success translates into lost productivity, ‘presenteeism’ for the business, and increased job insecurity for the worker. Debbie Lerner will talk a lot more about this. I think this is a very important innovation in our field. It’s this whole notion that you start to talk about how well the worker can perform to meet the demands of their job – this is a way of creating new measures that translate into opportunities for both business and labor to think about health and productivity.
And this is what we found. (Sorry, I thought I’d gotten rid of all of those.)

You’ll be surprised to know that, depending on how well you were functioning before you went in for carpal tunnel, release surgery predicts how well you’re functioning after you come out.

An important thing to put in there – that if you’re depressed at baseline, that in fact you’re less likely to be back at work at two months. And in fact, you’re less likely to be functioning well in your job if you’re a Worker’s Comp claimant. You’re less likely to be back at work and less likely to be functioning in your job.

At six months, the story changes. Again, if you’re functioning well at baseline before surgery, you’re more likely to be functioning well six months out.
## Predictors of Work Role Functioning Following Surgery

<table>
<thead>
<tr>
<th>At 2 Months (N=128)</th>
<th>At 6 Months (N=122)</th>
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</thead>
<tbody>
<tr>
<td>Work Role Functioning</td>
<td>Work Role Functioning</td>
</tr>
<tr>
<td>1.02 (1.01, 1.04)</td>
<td>1.04 (1.01, 1.04)</td>
</tr>
<tr>
<td>Depressed Mood</td>
<td>Change in Self-Efficacy</td>
</tr>
<tr>
<td>0.32 (0.14, 0.74)</td>
<td>7.11 (2.47, 20.46)</td>
</tr>
<tr>
<td>WC Claimant</td>
<td>Supportive Organization</td>
</tr>
<tr>
<td>0.30 (0.14, 0.66)</td>
<td>5.20 (1.68, 16.05)</td>
</tr>
</tbody>
</table>

Change and self-efficacy – this is a measure of two months self-efficacy minus baseline self-efficacy. And it’s a self-efficacy – it’s a context-specific self-efficacy. It’s the efficacy you believe in managing your pain and the return-to-work process. It’s very important because if we haven’t learned anything from the health promotion literature, the one thing we’ve learned is that generic self-efficacy meters are not very useful. You really have to have context-specific self-efficacy meters.

And so, this is a huge number. You’re at a seven-fold risk of functioning well if you have an improvement in self-efficacy. And we could talk a lot about this later, if you want. You can ask what predicts changes in self-efficacy. We actually know part of the answer to that.

Then the other thing was a supportive organization. And a supportive organization is an organization that has a strong, people-oriented culture. It has a strong disability management program. It has strong ergonomic policies and practices. And it has a strong safety climate. And if you’re in a supportive organization, you’re more likely to be functioning well at six months, than to not be functioning well or to be out of work.
So, you take a minute and look at that. There’s an important timing of events here, right? At two months, what matters is different than at six months.

Again, I had a multi-dimensional model, so I had multiple variables in each of those boxes, I had good clinical measures, I had good individual measures, I had good psychosocial measures, and we tried to do an analysis – it’s published in JOEM if you want to read it – where we lobby all these variables to contribute to the model, and this is what we find.
### Predictors of Work Absence and Work Role Functioning

<table>
<thead>
<tr>
<th>WA at 6 Months</th>
<th>WRF At 6 Months</th>
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<tbody>
<tr>
<td>Change in Self-Efficacy</td>
<td>Change in Self-Efficacy</td>
</tr>
<tr>
<td>4.4 (1.4, 14)</td>
<td>7.11 (2.47, 20.46)</td>
</tr>
<tr>
<td>More than 2 pain sites</td>
<td>Work Role Functioning</td>
</tr>
<tr>
<td>4.3 (1.2, 15)</td>
<td>1.04 (1.01, 1.04)</td>
</tr>
<tr>
<td>Attorney involved</td>
<td>Supportive Organization</td>
</tr>
<tr>
<td>8.8 (2.0, 38)</td>
<td>5.20 (1.68, 16.05)</td>
</tr>
<tr>
<td>Lower income</td>
<td></td>
</tr>
<tr>
<td>3.6 (1.5, 8.8)</td>
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</tbody>
</table>

So – *hot off the press* – these are results from a paper that’s under review with the American Journal of Industrial Medicine. I apologize for presenting unpublished results. This is work absence, right? So this is just being out of work. So if they’re out of work at six months – what predicts it? It’s change in self-efficacy. You can see it’s similar. Having more than two pain sites; oops, that’s not the same. Attorney involved; oops, that’s not the same. And having less income. So those are predictors of more likely to be out of work. Right? So increased odds means you’re more likely to not be at work.

These are the predictors of positive work role functioning, so the more increased odds here, the more likely you are to be functioning well. This is a bit of a puzzle we have to quandary over, but I just want to point that out to you.
Does WRF Add Value?

- RTW targets individual, legal and medical factors
- WRF targets medical care and organizational factors

So, the literature – and a lot of people think return to work is the outcome; so let’s ask the question, does work role functioning add value? This is an important question to ask. If you use return to work or work absence, what it targets is individual, legal, and medical factors in the return to work process. So if you’re going to intervene, that’s where you’d intervene. Work role functioning targets medical care and organizational factors.

Now let me just show you one other slide. This is a breakdown of our measure of work role functioning and the people that I call “the working well.” These are people who are functioning, almost all of the time, well on their job because of their health.

These are people that somewhere between 10 and 20 percent of the time are not functioning well on their job because of their health.
And these are people – the “working hurt” – and these are people that 25 percent or more of the time are not functioning well on their job because of their health. So that means a quarter of the workweek, these people aren’t functioning well on their job because of their health. You don’t have to be a rocket scientist to think that’s not healthy and not good for business.

But look what’s happening. This is baseline and this is six months. These people – you’re not getting a lot of effect here, right? There’s no difference. But look, you see a huge effect here. Ten points is huge in these measures. And this difference here is humongous. That’s 20-some points. That’s a-day-a-week improvement.

So does it add value? I think it not only adds value in telling us where we should intervene, but it also adds value in showing the relative impact. This is a measure that I think does make sense. This class of measures makes sense to, I think, a lot of different people.
Can Workers and Managers Agree on Organizational Policies and Practices

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<tr>
<td>People Oriented</td>
<td>3.7</td>
<td>3.2</td>
<td>.254</td>
<td>.012</td>
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(I have five minutes. Good. I’m in good shape.)

So, let me talk a little bit about organizational policies and practices, because you may be interested in those. We were certainly interested in them because we think that a lot of people are starting to do multi-level interventions. A lot of people are selling safety climate interventions. A lot of people are selling leadership training interventions as the be-all and the end-all to reduce accidents in the work place. A lot of people are selling integrated disability management programs, etc., etc.

And so what we did was, we actually went out and asked workers to describe a variety of policies and practices that are grouped to safety climate, ergonomic practices, disability management, and people-oriented culture (that should say). Safety climate is a combination of active safety leadership, safety diligence, and safety training. I can explain that more if people have questions.
### Can Workers and Managers Agree on Organizational Policies and Practices

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</table>

What you’ll notice is that if you ask workers and you ask managers the same questions, the only thing they agree on is people-oriented culture. My hope was that they would agree on everything, because it’s a lot more expensive to have to ask questions of different groups of people in research than to just ask them of workers, because we do a lot of worker surveys.

This makes sense from the perspective of people who think about culture. Culture isn’t something that’s unique to a particular individual in the organization; it’s something that’s a shared set of values by all in the organization. And so you would hope the managers and workers would agree on that, and they do.

These might be more unique to the particular place in the organization that the worker was, or in fact the particular person that we asked from management to report on it. And this is from a sample of about 80 workers and managers in the state of Maine.
My theory was that it would be employee-sized – firm-sized – just like the gentleman earlier asked about the fact that 3M is such a large company. I thought, well, large companies would be able to do things that small companies wouldn’t. So we looked at that and didn’t find anything.

So we thought that we would look at the union, because we thought that the notion of collective action within organizations might facilitate communication in different ways. And what you’ll notice here is that, in fact – and for union companies, there’s agreement across the board between workers and managers – I think a very provocative finding, a very interesting finding. It has, I think, real implications for how we think about moving forward with interventions.

Keep in mind this is a measure of organizational policies and practices. What was the significant predictor of successful work role functioning at six months? Organizational policies and practices, and change in self-efficacy.

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</table>
Key Take Away Messages

- Theories of change not only tell us why and how, but allow us to educate consumers
- Stating primary hypotheses matters
- Productivity is a ‘real’ outcome, not just reduced lost productivity
- Control groups are essential in workplace interventions
- Worksite health promotion interventions should be coupled with health protection interventions

So let me go back to this now. I’ve shown you a theory-of-change, and I’ve talked a little bit about how it allows us to educate consumers.

Stating primary hypotheses matters. I was very clear on my primary hypotheses in the ergonomic intervention. I was actually not clear on my primary hypotheses in the carpal tunnel intervention.

We didn’t have a primary hypothesis. We were actually doing an intervention that was more observational. One of the problems with that study is that we do have a lot of multiple comparisons, and I think it needs to be replicated in other research that’s stronger and better intervention work.

I showed you that it’s not only lost productivity, but it’s real – productivity is a real outcome for us, and we can measure it, and we can talk about it, and it moves with health.
Control groups are essential in workplace interventions. Work site health promotion interventions should be coupled with health protection.

In the carpal tunnel study, we showed you that it’s not just organizational support. It’s changing self-efficacy that matters. Who changes self-efficacy for workers undergoing surgery? Who are the most important people that are going to help them? Maybe the clinical group that they’re engaged with?
We need to think of new ways of quantifying intervention effectiveness to facilitate ‘real world’ adoption of new practices. I’d suggest that these work role functioning measures, or this class of generic role functioning measures, is really important.

We not only have done this with work role. We’ve actually got a college student role functioning measure, household, and leisure time role functioning measures. These are important measures. They are different – they are a class of measures. What I mean by that is that, unlike a lot of measures that have been developed in health services research, these are measures that start with an a priori theoretical model of the role.

This is fundamentally different than just taking a bunch of items and finding the set of items that best predicts an outcome. It’s very different and it’s a very important way of thinking about things. Why is it important? From my perspective, it’s good science. But also, it seems to make sense to the consumers, because they look at it and – this is how they think of the world.
Key Take Away Messages

- We need to think of new ways of quantifying intervention effectiveness to facilitate ‘real world’ adoption of new practices
- Multi-level interventions require multi-level methodologies
- Time matters in our research, yet we have few theories that incorporate time
- We can do large scale field interventions and its time to scale up
- Need to support large-scale multi-organization interventions

Multi-level interventions require multi-level methodologies. This is a big issue. And we showed you the workers and managers don’t generally agree on a lot of things, so if you think you’re going to be intervening for both the leadership and management and the workers, you’re going to have to attend to both levels. You can’t just do one. So it was really exciting to see some of the 3M work that’s trying to incent managers.

Time matters in our research, yet we have few theories that incorporate time. I think this was very obvious in the carpal tunnel release surgery paper. We have very few models where time is an important variable. There’s the phase model of back disability that’s been developed by Frank and Krause and others. But we have very few time-dependent models. This is really critical in our research.
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We have very few time-dependent models even in our ergonomics research. I didn’t show you a slide, but if you follow our data over time from two months post intervention to six months post intervention to twelve months post intervention – I didn’t have a hypothesis about this, but in fact the difference between the chair and training group gets wider over time. Between the chair and training and the control group – it gets wider. It doesn’t get narrower, which is what a lot of us would hypothesize, if it was like an effect of just paying attention to workers. It gets wider.

If you provide people with knowledge of how to support their environments and give them the technology to support their environments, the benefits accrue over time. That’s an important finding. It’s not only an important finding from an etiological perspective, it’s a very important finding for our economic colleagues, who really need to have a better understanding of some of these issues as they start to develop these cost benefit models.
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We can do large-scale field interventions. There was a lot of debate, when I started doing the ergonomics study, that we couldn’t do the study – that employers wouldn’t participate, that you wouldn’t be able to succeed.

This is, in fact, an unfortunate mantra, in my opinion, in the ergonomics community. And I’m happy to hear that the musculoskeletal NORA team is now thinking they can. We CAN do them. We NEED to do them. It’s time to scale up.

These cost more money. We have to start demanding them, we have to start asking for them, and we have to support large-scale multi-organization interventions to really replicate this work in different businesses. If we don’t, then what we may be finding are unique facts in unique firms or unique businesses.
Key Take Away Messages

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And this is the reality of science. We’ve got to be doing the BIG science, the way it’s being done at the National Institutes of Health – where they would fund with $15 to $20 million dollars a multi-site, multi-interventions trial. And somehow, we have to communicate to our stakeholders that we CAN do it, and we SHOULD be doing it.

And this is the real world of science.

Thank you.