

Meeting Summary

National Collaborative on Childhood Obesity Research (NCCOR)

Workshop on Deriving and Applying Behavioral Design Principles to Foster Active Living and Healthy Eating

March 7-8, 2016

Vista Room, FHI 360
Washington, DC

Participants: L. Ashton, R. Ballard, A. Barnhill, S. Dennis, M. Finn, R. Fisher, S. Fleischhacker, T. Huang, K. Janson, J. Kimmons, R. Moore, M. Trowbridge, M. Trujillo, N. Wells, F. Welty, M. Wentzel; FHI 360: E. Arkin, J. Broderick, L. Canady, Z. Oser, T. Phillips, A. Rodgers, N. Vaidya

MONDAY, MARCH 7

WELCOME AND INTRODUCTION

E. Arkin welcomed all the participants to the workshop and asked them to introduce themselves. Following the introductions, she stated the purpose of the workshop and reviewed the agenda. She then asked R. Ballard to provide an overview of NCCOR and its reasons for sponsoring this project and workshop.

OVERVIEW

R. Ballard provided a brief overview of NCCOR and background on the development of the workshop. In 2007, the Robert Wood Johnson Foundation (RWJF) committed \$500 million to efforts to address childhood obesity. At the same time, the National Institutes of Health (NIH), and the Centers for Disease Control and Prevention (CDC) were beginning to address this issue. NIH and CDC approached RWJF to discuss ways that the three groups could work together and determine where they could have the greatest effect.

They decided that research applications of the environmental context in which food and physical activity choices are made and of legislative and policy aspects of these areas were promising arenas for action. NCCOR was launched in 2009 as a partnership of NIH, CDC, and RWJF. The U.S. Department of Agriculture joined as a funding partner in 2010. Early NCCOR activities included developing several data resources and tools for researchers to help them find high-quality measures. Early on, NCCOR also recognized that solutions for childhood obesity do not come only from health fields, and that it would be beneficial to engage and learn the perspectives of other fields, including urban planning, transportation, and architecture. NCCOR's Green Health workshop and publication was an initial effort in this area.

In 2015, NCCOR began discussions about expanding this area of work, recognizing that some basic principles across relevant fields have been identified that are helpful in designing behavior change applications. However, most of them are focused on the individual level and it is clear that behavior is influenced by a multiplicity of factors, including environmental factors. The traditional 2X2 randomized control trial study design is not a good research model to study these effects. NCCOR's experience as a convener and accelerator provides an alternative method for examining these issues. The workshop is intentionally structured for open discussion and small group conversation, not for presentations. The focus group discussions held in October as part of the planning for the workshop and the draft of the white paper may help the participants' thinking during the workshop.

WORKSHOP GOALS

J. Kimmons described the goals of the workshop and discussed some of the key terms that would be discussed during the meeting. He noted that the planners intentionally included participants from a range of disciplines and domains because sharing across domains that do not necessarily overlap or commonly work together can lead to new insights and help people think in new and different ways.

He then provided some perspectives on the meaning of behavioral design:

- "Behavior" relates to human actions, whereas "design" relates to exposures, the environment, and internal and external forces. Behavioral design refers to how these two come together to be manifested in experience.
- The landscape of behavioral design is very broad; many things contribute to it, such as time, frequency (rate at which we experience things in the world), ritual, expectation, space, reach (accessibility by economics, other factors), economic factors (price, desirability, accessibility) psychology (priming, triggering), cognitive bandwidth (ability to understand, attention), sensory input (sound, vibration, light, imagery), information (how information is transmitted, not the content). People experience not each of these things, but the sum of all of them and their combined effects lead to choices and decisions.
- Behavioral design can influence decision-making by increasing a person's awareness that a decision needs to be made. The goal of behavioral design is to align the agent (i.e., the person) with the exposure in such a way that decisions are made for greater health and well-being.
- The target audience for behavioral design is broad and includes designers, scientists, policy makers, parents, researchers, and consumers.

Discussion

Workshop participants expressed a number of observations in the discussion that followed:

- Medical students are traditionally taught from a reductionist, empirical perspective. It would be good for the workshop to be able to acknowledge ambiguity and creativity and that proposed outcome measures may have distal outcomes different from expected. It is acceptable for creative processes to occur.
- We have learned a lot about emotional factors in decision making. If we know people factor emotion in their decision making, then we must learn how to incorporate that into design planning.
- Architects and designers inherently operate on intuition because of the lack of empirical data. This speaks to the complexity of the issue being addressed in the workshop. This will become

less and less of a hurdle as we improve our ability to collect large data (i.e., big data capabilities). We will develop the capacity to simultaneously evaluate multiple factors and results.

- We need to go one step beyond merely developing outcomes measures (being able to correlate outcomes with design features) to begin to operationalize the process leading up the measures, to improve the whole system around design thinking. How can we measure the process of design thinking in community planning in a way that would converge empirical and creative worlds?
- The behavioral economics field is already deeply engaged in understanding how environmental factors influence decision making. Measuring individuals' preferences helps in designing environments that help individuals do what they want to do.

BEHAVIORAL DESIGN FRAMEWORK AND PRINCIPLES

J. Kimmons presented a series of slides for a proposed framework encompassing the range of internal and external factors that influence individuals' perceptions of their environment and the resulting decisions they make. The slides were a layered series, with an orienting structure presented first, followed by a descriptive geography and then principles that operate to govern decisions.

Workshop participants discussed the framework at some length in an attempt to understand the individual components as well as its application to work in their own disciplines. They agreed that it could be refined further. E. Arkin reminded participants that they needed to keep NCCOR's mission and activities in mind and determine how the framework elements fit. The purpose of the workshop was to assess how behavioral design principles can be used by researchers and practitioners to influence practical issues related to healthy eating and active living that are relevant to families and children.

ICEBREAKER PANEL

R. Ballard introduced this panel by stating that the framework discussion showed that abstract thinking is important but difficult. People in many disciplines are actively working in areas that influence human behavior. The panelists were asked to reflect on how behavioral design principles are applied in their own area of work, in an attempt to apply those insights to healthy eating and active living and to children and families and their communities.

Anne Barnhill – Philosophy and Ethics

The framework is a helpful way to think about what is happening in a single head and how dimensions of environments come together to produce experience. This can help explain how environments influence behavior by mediating many complex factors. However, environmental design also changes how people act and interact. The model currently focuses on how the social level affects the individual; we need to see social interaction as another mediator.

We also need to consider the output side. What do environmental designs produce? They produce experience. The model does not include outputs and it should. It might be helpful to see whether the framework can be modeled over time.

Matt Finn — Architecture

In trying to move behavior in a certain direction, we are trying to shift influencing factors different ways while a person is making a decision. Architecture is a physical manifestation of a culture's values and beliefs. When we consider changing the decision-making drivers in relation to a building, we must recognize that architecture has limitations. It is creating a finite solution to complex problems. We are discussing how to elevate the importance of design and architecture above any one building, but we have to acknowledge the constraints under which architecture works.

Nancy Wells – Environmental Psychology

Environmental psychology recognizes that the idea of habit is important to consider. We can think about habit as a well-worn neural pathway. How do these pathways correspond to the physical environment that is setting these habits in motion and reinforcing them? Habit and environment reinforce each other. The natural environment enables us to develop a broader bandwidth, as interactions with nature foster a person's ability to choose a healthy habit or be active. They connect what is happening in an individual's head with what is happening in the world.

Resilience and positive psychology is an important perspective to consider. It provides a shift to the positive from the problematic. Environmental psychology has gained from behavioral economics a translation of research to practice and policy. FUSE (fun, usable, simple, engaging) is part of the behavioral economics approach.

Robin Moore – Landscape Architecture

As someone interested in human development, urban planning, and design, R. Moore noted that he is interested in research. How can the framework be useful to the interface of design and behavior? We are designing environments to support intergenerational behavior. It is important to remember that ordinances and codes are a huge reality of the built environment and they are very difficult to change. Designers and architects spend most of their time struggling with codes. It will be important to come out with a clear message that codes need to be cognizant of health issues and specific aspects of codes must be addressed. The science base of design is weak; we have a long way to go.

Mark Wetzel – Art

Artists are at the opposite end of the spectrum from architects. Artists are not bound to be correct, only interesting, but what value does that bring to the field? M. Wetzel noted that the range of individual reactions to the environment is illustrated by one of his pieces, which was successfully shown to an adult audience in Washington DC. He then expanded the piece and showed it at the CDC Museum in Atlanta. Adults brought their children to see it and the children were climbing all over it. The piece had an effect on the children that did not occur with adults. Two successes but in very different ways. Artists do well with ambiguity and imagination. The challenge is how to turn a highly abstract effect into a sustainable concrete application. Using words and images can help, as can color.

Discussion

Workshop participants expressed a number of observations in the discussion that followed the panel presentations:

- Health is important to well-being, but people value health to different extents. Identifying the tradeoffs that people care about can be tricky. An ethical consideration is that we cannot assume that if we made people healthy we have made them better off. We need to consider what was required to get them to that healthy point.

- The consequence of this idea is that if we are able to create a built environment that permanently changes behavior in a healthy direction, then we need to be sure that healthy living is actually meaningful to people. We have been able to increase produce sales by putting fruits and vegetables in prominent locations in store, but we did not necessarily make healthy eating more important in people's lives.
- The issue of time must be considered. We know how to change behavior but cannot sustain it. If the behavior is meaningful on a social scale, then it is more likely to be sustainable. Without meaning, it is hard to transfer the healthy action from one environmental context to another. The baseline value of two behavioral endpoints may not be equal (e.g., soda versus vegetables and fruits).
- Culture plays an important role because it is an element that conveys meaning to a group. It is the lens through which people read signs and symbols in their environment and act on them. For example, studies show that people who live near a multiuse trail use it more than do people who live at a greater distance. However, in certain neighborhoods, Latinos will not use the trails because they see them as being for a different ethnic group. Without understanding that cultural context, researchers will not understand why an outcome occurs.
- One of the complex things about eating and physical activity is that they are repetitive, constant behaviors. Most winning behavior change strategies are for behaviors that are not this way.
- We want to identify a process and measure its effectiveness. The process could involve qualitative research at the beginning. It may not be possible to come up with generalizable variables, but a process to figure it out, such as participatory research, would help elucidate meaning.
- Scientists and designers' worlds have different mindsets in the way they approach process. The design world first has a visioning process to figure out problem and values, then starts designing solutions to answer them.
- These are potentially operationalizable constructs. The process could involve discrete steps that could be turned into survey questions or qualitative tracking tools that researchers could capture. This conversation is intended to create a convergence across domains so as to create a holistic framework to create new design science.
- Very little documentation exists to describe what goes on in design process. This is the difference between the design and public health sectors.

SMALL GROUP DISCUSSION – WITHIN FRAMEWORK DOMAINS

During this discussion session, participants divided into four domain-specific groups—design, natural and built environments, human behavior, philosophy and ethics—to discuss the framework from the perspective of their domain.

Reports from the Small Group Discussions

Group #1: Design

The design community could use the framework as scientific underpinning for a project but several practical issues need to be acknowledged:

- Within the multi-year timeframe for a project, designers have only a few short weeks at the beginning to influence the conceptual meaning of the project and to incorporate healthy living aspects.
- The framework would be useful if it had action as well as theoretical components. The framework must be more actionable and granular if it is to be useful at each step of the design development to contract documents to construction process.
- Once construction is complete and people occupy the building, the architecture firm leaves. There is no opportunity to formally cycle back and determine whether the design elements intended to encourage healthy living behaviors actually worked. We need a partnership between public health and design firms to harvest this information, but do it in a way that does not saddle firms with liability if the building does not change behavior in the ways or to the extent envisioned. The purpose is to learn from these exercises.
- People at various levels of the design and build process are tasked with different responsibilities in shaping the client's demands and carrying out those demand. Behavioral design can help them become aware they are in an architectural space that is improving their health and well-being. Everyone involved in the process (e.g., decision makers, parents) activates everyone else to be thinking about behavioral design and its impact.
- Throughout the process (idea to planning to schematic to documentation to construction), a translation occurs that results in the final product. Many variables come into play during that process to influence the final product. Behavioral design principles could be a nice checkpoint for everyone to check against at all steps of the process.

Comments from participants

- It is difficult to get different design disciplines to work collaboratively at the place where building and people meet. Landscape architecture also has developed frameworks, and they are important frames of reference in the industry.
- CDC has just released a document with parameters on whether a building promotes health; it will include a rating system. The Center for Active Design in New York also has checklists for building design and urban design.

Group #2 – Natural and Built Environment

The group discussed several issues, including:

- If we want to change behavior, we need to understand neural networks and connect the new behavior to things that people already know. Cognition and emotion are not separate but heavily interdependent.
- Discussions about the design world generally deal with specific local space and needs. It not always possible to generalize. The built environment is diverse and has limited generalizability. Things may work in one environment but not necessarily in another.
- We need to identify ways to integrate different perspectives into behavioral design activities. Options include using approaches like community-based participatory research or design programming, which involve community members. These would be ways to build both practice-based evidence and evidence-based practice. Evidence-informed practice is actually the better term because so little evidence is available about what works.
- Design guidelines are one way to translate evidence into practice.

Comments from participants

- T. Huang noted that it might be possible to converge evidence information and practice guidelines in a way that helps practitioners take their work to the next level. This could help agents of change communicate to others in their sector. That was an aim of the design guidelines that he and co-authors published in the [American Journal of Public Health paper](#), which was an evidence review on the influence of school architecture and design on healthy eating. The paper went a step further to define boundaries and interconnectivity and where design levers could be pulled to create downstream behavioral impacts. There are interesting illustrations of tools to apply this, and the process of conducting the review was very enlightening.

Group #3 – Human Behavior

The group discussed several issues, including:

- How dietary behaviors in children are built, how multiple factors influence them, and how behaviors develop into practices.
- How interactions around relationships influence behaviors. Relationships are part of a person's exposure to environmental forces.
- Children have different responses at different developmental stages. They are influenced by parent behaviors.
- The agent (person) and exposures influence each other over time.

Group #4 – Philosophy and Ethics

The group discussed a range of issues, including:

- Fairness, social justice, well-being, agency, power – all of these influence, positively or negatively, action to pursue certain outcomes. These forces vary according to population characteristics and environmental contexts.
- In certain culture, the way we measure health conflicts with values of communities (e.g., obesity is considered to have adverse health associations, yet it is highly regarded in some cultures). Communities and cultures may have diverse conceptions of health and well-being, and these priorities must be considered when making decisions about design or research issues.
- Social justice provides a catalyst for pursuing certain activities in communities. Do certain designs help some communities but not others to achieve social justice objectives? It is important to be sensitive to this as the means to achieve objectives may affect groups differently.
- Agency is a root motivation for nudge actions. Concern with agency drives choice architecture (i.e., nudging people to move in a more healthful direction rather than just removing things considered to be unhealthy). Concerns about controlling people and limiting the sense of agency may apply more to adults than to children as they have a less developed sense of agency. Parents and guardians make the decisions for children, so social justice issues may not be so important for children.
- Who actually has the power? Are we influencing a behavioral decision on the part of the agent or on someone who is influencing the agent? The ethics of a situation depends on who is in power. The ways in which ethics are viewed are influenced by population characteristics, such as race, class, and culture.

Comments from participants

- One participant asked whether the group discussed criteria for defining social good, and a group member responded that they did discuss it but did not come to a solution.
- S. Davis noted that in his lab, social justice revolves around proposals to address health disparities, and that it might be good to include this term. Once one begins to talk about social justice, a certain equity is implied.

SMALL GROUP DISCUSSION – ACROSS FRAMEWORK DOMAINS

During this discussion session, participants divided into four groups to discuss the framework, integrating perspectives across the domains. One person from each group presented key points that emerged from their discussions.

Reports from the Small Group Discussions

Group #1

- Behavioral design can be encouraged and facilitated in a variety of ways. It is context specific. One way is to address existing codes, zoning, and rules. Another might be to create a funding mechanism that would allow a different design and development process – a process of intervention design and research that has more of a front end process to conduct formative research. A different process might result in a better design. We could incentivize innovative design using something analogous the LEED certification.
- Areas that are ripe for innovation include transportation design (plenty of municipalities are trying to do that). Schools are another area where lots of work is being done.
- Many tools that were developed early on may now be restrictive in terms of helping to move the field forward. They may not be measuring what needs to be measured and they are cumbersome. A mixed methods approach would help us understand variables that could be translated into design guidelines or code changes. We first need to figure out what the desired changes are, though.
- We would not want to add a behavioral design certification and rating process to the existing LEED framework though, as that would bog down LEED. It would be more efficient to find places where they overlap.

Group #2

- We need to do better job of clarifying that behavioral design is more than nudging; it is holistically and comprehensively influencing human behavior for improved health.
- We need a more refined model of affordance. We have done a good job of mapping environmental issues, but have not talked enough about cost. Efforts to get economists and designers together would be useful.
- We need to develop a roadmap to guide implementation of the workshop’s output (an application piece). Creating an outline of what this would look like will help put the theoretical framework into something that can be adopted by different audiences. It will be necessary to refine translational tools for different audiences.
- It would be valuable to integrate what is developed into cross-disciplinary training and education tools.
- Consider adopting a common language for behavioral design, with clean definitions. A fair amount of commonality exists across the disciplines.
- Creating a uniform model would be valuable, and getting data is feasible. The gap is translating new knowledge into next generation of interventions to influence behavior.

- Traditional economists may have trouble relating to these issues. Economists rely on data, and data mining could be an opportunity for bridging traditional and behavioral economics.

Group #3

- This group focused on the boundaries and limitations of behavioral design theory and how they relate to application.
- In the past, theory-directed policies were not designed to recognize things like construction codes. It is important now that any behavioral design theory that used to guide policy recognize these types of issues.
- It would be useful to select types of applications, such as personal, social, clinical, and institutional applications and see how they might align with behavioral design theory. These ideas could be circulated.
- We should not forget about process in addition to principles. Could we put design through a behavior process and behavior through a design process?
- The key thing is how the theory is envisioned to be applied. We need to find ways to make both theory and application work to enhance our collective ability to influence human behavior.

Group 4

- Discussion theory and application is interesting but it is a little too abstract to be applied; LEED is equally high level but it is tangible; LEED has defined performance-based objectives rather than prescriptive guidelines. This makes it effective. Can similar meta-level construction be applied to behavioral design?
- Another idea is to see whether other models, such as the social-ecological model, could be used to see how behavioral design could be applied in diff environments.

ADJOURNMENT FOR THE DAY

E. Arkin thanked all the workshop participants and adjourned the meeting for the day.

TUESDAY, MARCH 8

OPENING REMARKS

R. Ballard welcomed participants back to the workshop and noted that one of the goals for the day was to obtain additional comments on the framework and to discuss products that might emerge from the workshop. She also asked participants to provide comments on the white paper and thoughts about where best to publish it (the NCCOR website? In a journal?)

She then mentioned several themes that emerged from the previous day's discussions, including the many ways that information can be tailored to create more effective interventions, the emergence of analytics to help with tailoring, new thinking about data resources for research and methods to link and analyze data. Another frequent theme was that an important focus for NCCOR is populations who are at greatest obesity risk and who have most difficult access to healthy eating and active living.

J. Kimmons noted that M. Wentzel has developed a private web resource "Business Catalyst," to house materials from the workshop. He asked that workshop participants send him any papers or resources that were mentioned the previous day or any other materials they think might be useful.

J. Kimmons also thanked participants for their helpful suggestions on the framework. The framework is intended to be a foundation for research and theory and a mechanism for building connections across disciplines. He noted that he is happy to work with any participants to refine the framework.

FULL GROUP DISCUSSION

Participants had a wide-ranging discussion about the factors that influence individual decision making, drivers of behavior, the importance of cultural context in behavior, reconciling evidence and practice, and approaches for fostering collaboration among diverse fields. The following sections highlight comments and suggestions from participants on these topics.

Discussion about rationality and irrationality in behavior and decision making

- In behavioral economic terms, non-rational behavior can be considered a variance of rationality. In some scenarios, rational factors drive decisions, but the behavioral economic models help explain "error" in the rational model (behaviors that such a model cannot explain).
- We know that people consistently do "irrational" things. Using specific heuristics may be helpful in explaining them, as such an approach provides a way to get away from term "rationality."
- We are moving into a period of thinking where we are trying to be more precise and specific about behaviors. Previously, people used the term "error" to explain deviations from explanations of rational behavior, but that term is not correct because they are not random, they are consistent and predictable. It is important to not frame a theory to predict general response but to allow for specific responses to environmental responses. This reflects a shift in understanding in past 10 years; we can be much more specific than before.
- The ambition for behavior change should be broader than just changing "irrational" behaviors. Let's not limit our scope. By changing the environment, we can change what is considered rational behavior (e.g., installing a bike trail makes it rational to bike to work).
- Businesses have a variety of goals in wanting to change consumer behaviors. They may want people to choose their product to achieve social goals, not just for a profit motive.

- Decision making around behaviors should not have value judgments attached to them. People have reasons for doing what they do; to say that a behavior is irrational undermines the behavior. Behavior is reasoned and researchers just need to identify the factors that create those reasons.
- The terms “rational” and “irrational” are not meant to apply value judgment. Rather, they are useful to explain whether people are making decision that conform to their fundamental values, namely, decisions that get them where they want to go.
- Behavioral design can increase the likelihood of people making choices about which they later feel positively.
- “Rational” and “irrational” are economic terms with long traditions and specific meanings. They were coined at a time when rational behavior was an ideal. Rational behavior equated to behavior that is consistent with a person’s values. In traditional terms, rationality is a set of mathematical rules that govern behavior.
- The way people frame options and choices is really important in decision making, apart from rationality.

Discussion about mental models and design’s role in driving behavior

- To effect change, it is essential to understand mental models. Culture affects the mental models that people bring to their behaviors.
- When designing a space, a clear objective for the space must be defined – what behavior do we want to facilitate? How can the space be designed to allow that to happen? At each decision point in the design process, the designer is considering and discarding alternatives.
- Design is about facilitating behaviors, about getting people to behave in a certain way by creating a particular physical environment.
- In addition, the design process creates a perception around design features. This can create cultural norms that influence behavior.
- Designers develop and refine their intuition over time. They work with “precedent” and “concept” and “perception.”

Discussion about the importance of cultural context in behavior

- People apply very different meanings to the same objects or terms. S. Davis recounted a story of Latino adolescents in Milwaukee and Menominee adolescents on a rural Indian reservation. The two groups of adolescents interacted very differently with their food environment. The Menominee adolescents hoard their junk food. It is an important symbol of control and independence because they have little control over other parts of their lives. In contrast, junk food for the Latino adolescents is all about sharing and spending social time together with friends. Knowing the meanings that adolescents from different areas and cultural contexts place on important elements of their lives is essential to designing effective interventions.
- Groups share an interpretive framework of what they see and do and what others do. This is how cultural geographers work.

Discussion about reconciling evidence and practice

- R. Moore noted that he works in a design office within a university and frequently works within a public health context. He does not use “intuition,” but rather “evidence-based design” to the extent possible. He tries to generate evidence to support his work.
- Behavioral science has a lot of evidence that could justify what architects do. Architecture and design generate a lot of practice-based evidence.

- Design as a field is trying to be scientific in a traditional sense, but this may not be the right approach. We should do science and evidence in a new way.
- We are at a time where many fields, such as public health, health services research, and genetics, are trying to study “real world circumstances” to see how to gather information to study the reasons why things happen the way they do. This provides an impetus for researchers to work with practitioners who have practical experience. This is why we need groups to come together to create common understanding and develop common language.

Discussion about creating a process to help design use behavioral evidence

- Systems are organizations of movement and materials. It is possible to foster change on a larger geographic scale. Designers follow a professional fee-for-service model but some are following other models, such as outcomes research, post-occupancy evaluations, and disseminating that information. “Evidence-informed design” may be a better term.
- Both “evidence-informed” and “evidence-based” are used and they have different meanings.
- The design world cannot do this research on its own. Designers are approaching public health practitioners to get advice. The issue is how to change social norms to get a mandate for incorporating research into this work.
- As yet, there is no recognition for behavioral health work. How can we collect the practices that are being done?
- One participant asked whether designers are really “behaviorizing” their practices? Have they thought about social norms and how that influences behavior? K. Jansen replied that considerable research is ongoing about how design and environments influence learning methods in schools and on design in workplace strategies. However, no language or metrics have been developed to say why design approaches may be working. J. Kimmons added that federal agencies do work with designers and architects to build evidence, but no repositories for this information exist.
- **SUGGESTION:** Would it be possible to work backwards, by look at existing projects and see what is working and not working? This might involve a survey. The challenge would be to get architects and designers to participate. We could create an award for participation, which would provide an incentive. It would also be a way to get traction and press. We could create an event to make people want to participation. An educational component to help people do it right would also be needed.
- **SUGGESTION:** The bigger issue is who will pay for evaluation. The financial aspect may be difficult. Could it be done if bigger firms collaborate to create a pool of resources and projects and do this assessment through a common protocol?
- Comments:
 - LEED is a model. It is a wonderful motivator for firms and clients to work on sustainability issues. It is successful with different motivations, too, as firms participate because they want to doing good for the environment or they may just want recognition. The design world needs tools to help it do the right thing.
 - Case studies to detail a process is one thing, but a serious effort to do post-occupancy evaluation is a much bigger effort.
 - We need to be careful about making assumptions about whether we think we know what is happening in the field. We need to know what is already going on. We could check with schools of architecture.

- We would need to clarify what we are incentivizing. We do not know what features across contexts incentivize behavior. We would need to figure out how to incentivize a certain set of behaviors.
- One way to go about this is to incentivize the process. We could develop a behavioral design process where designers would think about the behavioral implications of design decisions. This might be sufficient for the time being to get us to a later stage of post-occupancy evaluations.
- How about a hybrid model consisting of design guidelines that could help architects be aware of existing evidence? However, architecture firms actually aren't using research. Interior design firms are more likely to see the connection between research and design.
- NIH has a group that engages architecture and design groups in building design around health aspects. During this process it became evident that people want to include a wide variety of issues under health. NCCOR wants to focus on certain health issues, not entire spectrum. (The participants were comfortable with this.)
- Design teams need clients who care about these things and steer the project in that direction. We need to go to schools, school boards, food service providers, and also need to gather information and evidence and give it to firms.

Discussion about approaches to produce healthy actions

A. Barnhill described three approaches for generating healthy actions and noted that the ethical burden increases with each succeeding approach:

1. Correct irrationality: Make people do the behavior that is rational in light of a person's preferences, goals, and values (e.g., posting calorie information)
2. Change what is "rational": Change the costs and benefits of different behaviors so that some behaviors are now rationale in light of people's goals, values, culture (e.g., creating walking trails, making fruits more accessible, make elevator doors slow)
3. Changing people's values, goals, and culture.

Participants had a number of comments:

- Is the difficulty of #3 a correct assumption? Will it really be hard to change values, goals, culture? Maybe this will be easier than we think.
- When people recognize an area is a clear crisis, it is easier to get people to change. For example, LEED is successful because people recognize climate change is a problem. Physical activity is increasingly connected to climate change and urban renewal. We need to think about where the connections are and exploit them. There is a societal willingness to be concerned about children, and therefore a willingness to change behaviors to address childhood obesity. That is our entry into this space.
- **SUGGESTION:** We have an opportunity to think about the practice of architecture. The ways in which that group thinks are critical in this process. We already have some preliminary tools (such as active design guidelines and healthy eating guidelines). Could NCCOR evaluate these tools as a way forward? Engaging schools of design and national associations might be one way to start this process.

SMALL GROUP DISCUSSION – MOVING FROM FRAMEWORK TO APPLICATION

During this discussion session, participants divided into four groups to discuss applications of the framework to public health strategies. One person from each group then presented key points that emerged from their discussions.

Reports from the Small Group Discussions

Group #1

- The group identified a number of potentially promising areas for research, including the field of family youth and community sciences and the local food and organic movement. The associated action is to identify universities that already have transdisciplinary research groups.
- The process of translating behavioral research to design involves engaging the design community. Public health research is trying to move into design; let's help them become more aware of their need to engage the design community.
- We need a process for engaging design community. The LEED approach is a good model. How to position it as an issue that the design community needs to address; pick win win strategies. We need to make the financial case, think about how to engage early adopters, and define a timeline.
- Identify big insights:
 - Understand the capacity of big data/analysis to capture context.
 - Articulate how people, community's values "social or personal brand."
 - Describe how neural/sensory architecture captures responses to environments.
 - Avoid prescriptive requirements.
 - Give performance goals.
 - Capitalize on smart buildings, new technologies.
 - Remember that all design is local; do assessments locally to modify applications.

Group #2

- The discussion focused on the usefulness of building on activities that are already underway by translating research findings into goals and behavioral strategies that can be incorporated into existing frameworks. The next step would be to expand the scope of design practices to better encompass the complexity of human behavior. Many additional areas of behavioral research can be incorporated into standards of practice. This would present an opportunity to include other fields so that the considered context can be richer, thereby creating a tighter linkage between the design project and the community. One area of expertise that public health can bring to the table is knowledge about how to manage complex systems and dissemination science. This will help public health educate their own colleagues and create linkages to outside communities.
- **SUGGESTION:** The group discussed developing a registry of existing and upcoming design projects. Awards could be used to incentivize participation by the design community. It then would be useful to have metrics and lists of evaluation tools that could be used to begin capturing data. The Institute of Medicine report, [Bridging the Evidence Gap in Obesity Prevention; A Framework to Inform Decision Making](#) describes the L.E.A.D. framework (Locate evidence, Evaluate it, Assemble it, Inform decisions). This framework could be a useful model for how to use a diverse array of evidence to inform decision making.
- **SUGGESTION:** Other ideas for application include possibly creating a modular curriculum around design thinking that could be used in a variety of disciplines. Another option is adapting

employer rating systems (e.g., FitWell). This kind of an index could be adapted for our purposes and it would add to arsenal of tools to advance the agenda.

Group #3

- An important issue is how to communicate expertise across disciplines. People do not necessarily follow guidelines, so strong heuristics are needed to guide research and design. **SUGGESTION:** It might be possible to develop a behavioral design checklist that could be used when a policy is being developed to ensure that behavioral science is integrated as appropriate.
- RWJF is working with the Commonwealth Fund on approaches to change physical behaviors. Commonwealth convened leading behavioral science experts to develop 10 principles to change physical behaviors. RWJF worked with insurers to apply them. They are now being applied to systems and are being evaluated. **SUGGESTION:** Could a similar process be applied to this field: Give designers 10 behavioral principles or levers. We would have to determine how to translate and incentivize through an award or certification. We could define a certain number of behavioral settings and set midrange hurdles for the guidelines. In many cases, the components already exist. The next step is to find the settings.
- The American Institute of Architects is redefining its curriculum. We should share our ideas with them.
- In addition to awards, consider “BrightSpotting” – sharing success stories; do it before the awards to generate interest.

Group 4

- The Christopher Alexander book “Pattern Language” is a classic because of how it is organized and useful to broad array of designers. It is a nice example of guidelines, and represents intuition/expertise in design guidelines. Can we do something similar?
- **SUGGESTION:** Develop such a book that is organized by scale and zones, with a “star” system of confidence rating. This would be a toolkit of design guidelines that captures empirical evidence and practice experiences. It should be explicitly linked to design process. The information would need to be actionable and intelligible to designers (simple and quick information), giving rules of thumb. It would show how to insert feedback loops into the process so that the rules of thumb could be constantly revisited. Part 1 of the tool would provide the framework and generic information so that it could be applied to other fields. Part 2 would drill down more specifically to all users to choose strategies that have greatest immediacy and transparency and would meet multiple goals simultaneously. Content would allow users to consider unintended consequences, and would strike a balance between efficiency (being able to use a solution in lots of different places) and diversity (provide a variety of behavior change mechanisms).

Discussion

- Unintended consequences are not always bad, both positive and negative should be considered.
- R. Ballard suggested trying a process in which each group pulls together a set of principles that it feels the other group would find useful for their work. M. Finn responded that a group would not necessarily know when and how to apply the principles from the other group. By putting both sets together in one place, greater clarity on when and how to use it is provided.

SMALL GROUP DISCUSSIONS – APPLICATION TO HEALTHY EATING AND ACTIVE LIVING

During this discussion session, participants divided into two groups to discuss applications of the framework to healthy eating and active living. One person from each group then presented key points that emerged from their discussions.

Reports from the Small Group Discussions

Healthy Eating

- The primary targets should be settings in which children eat, and accreditation groups that have influence over the design of such settings.
- Consider ways to provide guidance by piggybacking on existing program and authoritative guidance.
- Consider ways to reach parents through school principals, active parent groups, student groups, design groups in high schools, food service providers who are already demanding that schools have gardens, and master gardeners and chefs who are working with schools.
- Features of schools that influence eating include the design of cafeteria, sensory environment, and time available to eat.
- Identify the proximate goals: serve more vegetables and fruits, engage children, develop and carry out innovative curricula and activities.
- Many people care about food and like to talk about it. This presents a big opportunity for us.
- Consider ways to develop “shared use” food-related facilities, similar to “shared use” physical activity facilities.

Physical Activity

- This group discussed many of the same things as the Healthy Eating group, but their landscape was broader, encompassing buildings, schools, transit, communities, and parks.
- We know now much more about the associations of physical activity and cognitive development but there is not much intersection with the school community.
- **SUGGESTION:** Consider a system mapping exercise, which would go beyond what has already been done. Take a value chain approach and map actors’ values and how they flow through the system. Take a modular approach – start with the public sector and do schools as well. Then link the modules together. This will help us identify additional useful players.
- Look at existing guidelines on school design and physical activity; consider adding additional layers.
- There is great value in having examples of success, such as the Healthy Schools awards.
- We can build on earlier work on COCOMO (CDC healthy community measures).
- Incorporating health has to be an element of design and build contracts.

FULL GROUP DISCUSSION OF RESEARCH GAPS

- R. Ballard noted that research gaps can be described by either the state of the field in terms of investigators and needed tools or by specific research questions.
- R. Moore described Design Thinking (see the Wikipedia article on it). This movement began in the 1960s, characterizing design as a way of thinking, creativity, scientific thinking. R. Moore noted that in his work, Design Thinking is an intentional participatory process of intervening in continuum of urban evolution and the biosphere in order to expose children kids to natural worlds.
- Design Thinking is a good way to think about tackling tough public health problems. It has a 40-year history and incorporates a teachable and reproducible process. One of its most influential

lessons for designers and planners is to better understand the actual problem before coming up with a solution.

- Design Thinking is a systematized process that encompasses a journey of deep need-finding and rapid iteration of ideas and testing of potential solutions. It presents a very different approach from a public health approach, as it involves iterative, hands-on experimentation to solve problem. It does not rely on empirical evidence but practical experience. The Stanford Design School has developed tools and exercises that help people use the Design Thinking method. It facilitates introspective and heightened sensory experience; as people become more in touch with themselves and their environment they become more creative, so possibility for innovation expands. One of the keys is an openness to failure. The notion of prototyping, iteration, and testing is to have many versions of possible options. Some may lead to failure but others to innovation and success.
- We are thinking about an iterative process that improves over time. Some application of Design Thinking may be useful as it embodies an openness to new ideas.

NEXT STEPS

R. Ballard summarized next steps and requests for workshop participants. She noted that a summary of the workshop would be developed to guide future activities by the NCCOR Behavioral Design workgroup and that the workgroup would be making decisions about additional development of the white paper. She also asked that workshop participants think about potential partners to involve as this activity develops over time.

She made several other announcements as well:

- The NCCOR Coordinating Center will send out a contact list so that all workshop participants have information on everyone who participated.
- NIH is funding a project on methods and approaches for natural experiments in areas like this. They are holding a workshop in late 2017, and it may be useful to think about including a speaker on behavioral design in that workshop.

ADJOURNMENT

E. Arkin thanked all those at the workshop for their thoughtful and stimulating participation and adjourned the meeting.