As a behavioral scientist working with environmental health (EH) programs on restaurant food safety projects, I am occasionally asked what behavioral science has to do with food safety. My answer is that restaurant food safety is very much dependent on human behavior. Indeed, research indicates that most food-service-establishment foodborne illness outbreaks can be attributed to food workers’ improper food handling practices (Bryan, 1988). Thus, human behavior is an important component of restaurant food safety.

As such, behavioral science can be an important tool in EH programs’ efforts to ensure that food workers handle food safely. In their development of food safety interventions, EH practitioners can use the substantial body of research on behavior change. Most food safety interventions provide knowledge to food workers with the expectation that workers will translate this knowledge into practice. Yet numerous studies on different types of behavior, including food safety, indicate that although knowledge may be a necessary component of behavior change, it is not always sufficient (Rennie, 1995). For example, Clayton, Griffith, Price and Peters (2002) found that 63% of food workers admitted they did not always carry out the food safety behaviors that they knew they should. In other studies, food workers reported engaging in food safety practices much more frequently than they were observed actually engaging in those practices (Manning & Snider, 1993; Oteri & Ekanem, 1989).

These findings are not surprising. Human behavior is complex, and multiple factors, not just knowledge, affect whether humans engage in any particular behavior. Several behavioral science theories have focused on identifying these factors, which include, in part, knowledge, attitudes, and beliefs about the behavior; intentions to engage in the behavior; perceived behavioral norms; and perceived barriers to engaging in the behavior (Ajzen, 1991; Glanz, Lewis, & Rimer, 2002; Triandis, 1980). Recently, several studies focused on identifying factors that affect whether food workers engage in specific food safety practices. For example, recent studies conducted by the Centers for Disease Control and Prevention’s Environmental Health Services Branch have identified factors affecting food workers’ implementation of cross-contamination prevention, proper hot and cold holding, and hand washing, among other safe food handling practices. For more information on these studies, visit www.cdc.gov/nceh/ehs/EHSNet/highlights.htm#Focus_Group_Study and www.cdc.gov/nceh/ehs/EHSNet/Docs/JFP_Food_Worker_Hand_Hygiene.pdf. The factors identified in one of those studies are listed in Table 1.

This behavioral science research highlights the need for food safety interventions that do more than provide food safety education. EH practitioners could respond to this need in several ways. They could encourage restaurant managers to engage in activities that address factors...
TABLE 1
Factors Impacting Safe Food Preparation Practices Identified by Food Workers and Managers

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hand Washing</th>
<th>Cross-Contamination Prevention</th>
<th>Glove Use</th>
<th>Adequate Food Doneness</th>
<th>Proper Holding</th>
<th>Proper Cooling</th>
<th>Proper Reheating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time pressure/high volume of business/staffing</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Structural environment, equipment, resources</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Management/coworker emphasis</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker characteristics</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative consequences</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education and training</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restaurant procedures</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloves and sanitizers</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. A check mark indicates that the factor was mentioned by participants in focus group discussions as something that impacted (either positively or negatively) their ability to engage in the practice. From “Factors impacting food workers’ and managers’ safe food preparation practices: A qualitative study,” by L. Green & C. Selman, 2005, Food Protection Trends 25, p.983.

(Other than knowledge) that impact safe food handling, such as modeling and supporting food safety and removing barriers to safe food handling, including inadequate staffing and inadequate equipment;
• conduct activities that would increase understanding of the factors that impact safe food handling in their jurisdiction; and
• develop and test strategies to address those factors, and incorporate successful strategies into their food safety activities.

Such activities should improve the effectiveness of food safety programs as well as contribute to our broader understanding of effective food safety strategies.

Another important behavioral science tool EH practitioners can use in their food safety efforts is the interview methods developed by behavioral scientists for gathering information from people about their behavior. Many EH activities—restaurant inspections, environmental assessments, and foodborne outbreak investigations—involves interviewing managers and workers about food handling practices, and there are often concerns about whether the information provided during these interviews is accurate. The use of behavioral science interviewing techniques can improve the quality of information collected in these situations.

In interviews, people are typically motivated to appear “good”: to engage in socially desirable behavior, to be helpful to the interviewer, and to provide the information they think the interviewer wants. Their responses in interviews are biased by these motivations. Such biases may be particularly strong when there are potential negative consequences for “wrong” answers, such as during inspections or outbreaks investigations. The influence of these biases can be minimized, if not eliminated, by using the following techniques (Bradburn, Sudman, & Wansink, 2004; Frey & Oishi, 1995).

• Establish rapport with interviewees by using their names, engaging in small talk, and appearing attentive to what they have to say. These behaviors should increase interviewees’ comfort and cooperation.
• Maintain neutrality and refrain from behaviors that communicate to interviewees what the “right” or “wrong” answers are. Such behaviors include interjecting opinions (e.g., “That’s a good answer!”); verbally or nonverbally communicating feelings about what the interviewee is saying (e.g., frowning); and suggesting answers to questions when interviewees hesitate to answer (e.g., “To what temperature do you cook your chicken?...165 degrees?”).
• Avoid questions that may suggest that one answer is preferable to another (e.g., “You washed your hands after you cut the meat, right?”).
• When asking about desirable behaviors, avoid questions that assume the behavior, as those assumptions can suggest the “right” answer (e.g., “How many employees have received food safety training?” vs. “Do any employees receive any food safety training?”).
• When asking questions about particularly undesirable behaviors, consider asking “loaded” questions, which increase the probability of obtaining accurate answers. Two ways to do this are 1) assume the behavior in the question (e.g., “When [as opposed to if] you are unable to wash your hands, what prevents you...”)

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Did You Know

The Environmental Public Health Leadership Institute is Accepting Applications

From August 15 through October 31, 2008, CDC’s Environmental Public Health Leadership Institute (EPHLI) will accept applications for the class of 2009–2010. Each year, approximately 30 practicing environmental public health professionals are admitted to the program. EPHLI strengthens the country’s environmental public health system by enhancing the leadership capabilities of state and local environmental public health professionals.

Application instructions are posted at www.cdc.gov/nceh/ehs/EPHLI/application.htm. For more information about EPHLI, please contact CAPT John Sarisky at jsarisky@cdc.gov.

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