important evidence about the reading level (too low or too high), length of the instrument (too short or too long), directions (clear or not clear), response rate (the percent of potential subjects who return a completed scale), and the appropriateness of culture or context. The researcher also may administer a related instrument to see if the new instrument is sufficiently different from the older one (construct validity). Instrument development and testing is an important part of nursing science because our ability to evaluate evidence related to practice depends on measuring nursing phenomena in a clear, consistent, and reliable way.

APPRAISING THE EVIDENCE
DATA COLLECTION METHODS

Assessing the adequacy of data collection methods is an important part of evaluating the results of studies that provide evidence for clinical practice. The data collection procedures provide a snapshot of how the study was conducted. From an evidence-based practice perspective you can judge if the data collection procedures would fit within your clinical environment and with your patient population. The manner in which the data were collected affects the study's internal and external validity. A well-developed methods section of a study decreases bias in the findings. A key element for evidence-based practice is if the procedures were consistently completed. Also consider the following:

- If observation was used, was an observation guide developed, and were the observers trained and supervised until there was a high level of interrater reliability? How was the training confirmed periodically throughout the study to maintain fidelity and decrease bias?
- Was a data collection procedure manual developed and used during the study?
- If the study tested an intervention, was there interventionist and data collector training?
- If a physiological instrument was used, was the instrument properly calibrated throughout the study, and were the data collected in the same manner from each subject?
- If there were missing data, how were the data accounted for?

Some of these details may be difficult to discern in a research article due to space limitations imposed by the journal. Typically, the interview guide, questionnaires, or scales are not available for review. However, research articles should indicate the following:

- Type(s) of data collection method used (self-report, observation, physiological, or existing data)
- Evidence of training and supervision for the data collectors and interventionists
- Consistency with which data collection procedures were applied across subjects
- Any threats to internal validity or bias related to issues of instrumentation or testing
- Any sources of bias related to external validity issues, such as the Hawthorne effect
- Scale reliability and validity discussed
- Interrater reliability across data collectors and time points (if observation was used)

When you review the data collection methods section of a study, it is important to think about the data strength and quality of the evidence. You should have confidence in the following:

- An appropriate data collection method was used
- Data collectors were appropriately trained and supervised

- Data were collected consistently by all data collectors
- Respondent burden, reactivity, and social desirability was avoided

You can critically appraise a study in terms of data collection bias being minimized, thereby strengthening potential applicability of the evidence provided by the findings. Because a research article does not always provide all of the details, it is not uncommon to contact the researcher to obtain added information that may assist you in using results in practice. Some helpful questions to ask are listed in the Critiquing Criteria box.

CRITIQUING CRITERIA

Data Collection Methods

1. Are all of the data collection instruments clearly identified and described?
2. Are operational definitions provided and clear?
3. Is the rationale for their selection given?
4. Is the method used appropriate to the problem being studied?
5. Were the methods used appropriate to the clinical situation?
6. Was a standardized manual used to guide data collection?
7. Were all data collectors adequately trained and supervised?
8. Are the data collection procedures the same for all subjects?

Observational Methods

1. Who did the observing?
2. Were the observers trained to minimize bias?
3. Was there an observational guide?
4. Were the observers required to make inferences about what they saw?
5. Is there any reason to believe that the presence of the observers affected the behavior of the subjects?
6. Were the observations performed using the principles of informed consent?
7. Was interrater agreement between observers established?

Self-Report: Interviews

1. Is the interview schedule described adequately enough to know whether it covers the topic?
2. Is there clear indication that the subjects understood the task and the questions?
3. Who were the interviewers, and how were they trained?
4. Is there evidence of interviewer bias?

Self-Report: Questionnaires

1. Is the questionnaire described well enough to know whether it covers the topic?
2. Is there evidence that subjects were able to answer the questions?
3. Are the majority of the items appropriately closed-ended or open-ended?

Physiological Measurement

1. Is the instrument used appropriate to the research question or hypothesis?
2. Is a rationale given for why a particular instrument was selected?
3. Is there a provision for evaluating the accuracy of the instrument?

Existing Data: Records and Databases

1. Are the existing data used appropriately considering the research question and hypothesis being studied?
2. Are the data examined in such a way as to provide new information?
3. Is there any indication of selection bias in the available records?