# RESEARCH METHODS in I/O PSYCHOLOGY

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ÇAĞ UNIVERSITY
FACULTY of ARTS & SCIENCES
PSYCHOLOGY DEPARTMENT
PSY 470 INDUSTRIAL PSYCHOLOGY
WEEK 2

# INTRODUCTION

- Imagine that you want to find the answer to a work-related question, such as **what qualities make a person an effective manager**. How would you go about answering this question?
- You might **ask people** you know, but what if you get conflicting answers?
- You might then try another strategy: **observing some good managers** to see for yourself which qualities make someone an effective work group leader. But how do you know who is a "good" manager?
- First, to determine the most important characteristics of a successful work group manager, you would need to **define "success."**
- Is a successful manager one who **leads a productive work group**,
  - one who is **well liked and respected** by subordinates, or
  - one who **leads a work group that is both productive and satisfied**?

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# INTRODUCTION

- Once you have defined your criteria for managerial success, the **next step is to figure out how you will measure** such success.
- It is important that the **measurement be accurate and precise** so that **a clear distinction** between truly successful and unsuccessful managers can be made.
- Next, you must isolate the **specific characteristics** that you believe are related to success as a work group manager.
- You must test these ideas in some **systematic fashion**. This is the **purpose of research methods** in psychology.
- Research methodology is **a set of procedures** that allow us **to investigate the hows and whys** of human behavior and **to predict** when certain behavior will and will not occur.

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# SOCIAL SCIENCE RESEARCH METHODS

- One of the prime **purpose**s of the social science research methods is **to enable the researcher to step back** from any personal **feelings or biases** to study a specific issue **objectively**.
- **Objectivity** is the unbiased approach to observation and interpretations of behavior.
- Because I/O psychology is a science, it shares the same basic goals of any science: to **describe, explain, and predict** phenomena (Kaplan, 1964).
- Because I/O psychology is the science of behavior at work, its goals are to **describe, explain, and predict work behavior**.
- I/O psychology is also **an applied science** and, therefore, has the additional **goal of attempting to control or alter behavior** to obtain desired outcomes.
- Using the **results of previous research**, an I/O psychologist can attempt to alter some aspect of work behavior. For example, some long-standing evidence indicates **a connection between employee participation** in organizational decision making and **levels of job satisfaction** (Argyris, 1964).
- Knowing this, an I/O psychologist might **implement a program of increased employee participation** in company policy decision making in an effort to **improve levels of employee job satisfaction**.

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# SOCIAL SCIENCE RESEARCH METHODS

- For example, an I/O psychologist might attempt to satisfy the first goal by **describing the production levels of a company**, the **rates of employee absenteeism and turnover**, and the **number and types of interactions between supervisors and workers** for the purpose of arriving at a more accurate picture of the organization under study.
- The goal of **explaining phenomena** is achieved when the I/O psychologist attempts to discover **why certain work behaviors occur**. Finding out that a company's employee turnover rates are high because of employee dissatisfaction with the levels of pay and benefits would be one example.
- The goal of **prediction** would be addressed when a researcher attempts to **use the scores from certain psychological tests** to predict which employee would be the best candidate for a management position, or when a researcher uses **a theory of motivation** to predict how employees will respond to different types of incentive programs.

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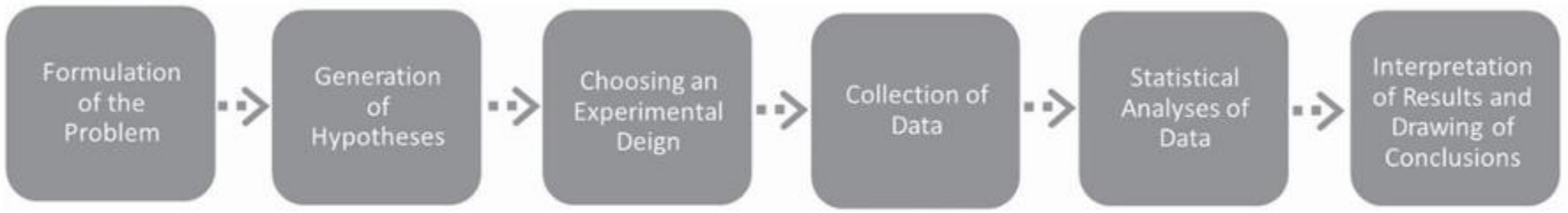


*Figure 2.1* Steps in the research process.

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# FORMULATION OF THE PROBLEM OR ISSUE

- The first step in conducting research is to **specify the problem or issue** to be studied. Sometimes, a researcher develops an issue because of his or her interests in a particular area.
- For example, an I/O psychologist might be interested in the **relationships between worker job satisfaction and employee loyalty** to the organization, or between **worker productivity and the length of time** that employees stay with a particular organization.
- Often, the selection of a research problem is influenced by **previous research.**
- On the other hand, **a client company** that has a particular problem that needs to be alleviated, such as an **extraordinarily high level of employee absenteeism**, may provide the practicing I/O psychologist-consultant with an issue.
- Similarly, **large organizations** may have I/O psychologists on staff whose job is to **study problems** using social science methods to **better understand** the problems or to **help solve** them.

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# GENERATION OF HYPOTHESES

- The next step in the research process involves taking those **elements that the researcher intends to measure, known as variables**, and **generating statements** concerning the supposed relationships between variables. These statements are known as **hypotheses.**
- In the examples of research issues given earlier, **job satisfaction, worker productivity, employee loyalty, employment tenure, and absenteeism are all variables**.
- The **hypotheses will later be tested through the analysis of the collected systematic observations of variables**, better known as the **collection and analysis of research data** (see Table 2.1).
- By testing hypotheses through the collection of systematic observations of behavior, a researcher may eventually **develop a theory** or **model.**
- In social science, models are representations of the complexity of factors that affect behavior. In I/O psychology, models are representations of the factors that affect work behavior.

# GENERATION OF HYPOTHESES

- **Variables** are the elements measured in research investigations.
- **Hypotheses** are statements about the supposed relationships between variables.
- **Theory** is the organization of beliefs into a representation of the factors that affect behavior
- **Models** are the representations of the complexity of factors that affect behavior.

*Table 2.1* Examples of Hypotheses in I/O Psychology Research

- Engaging in ethical leadership behavior can cause leaders to become more abusive to their subordinates (Lin et al., 2016)
- Greater gender diversity is related to better company financial performance, particularly in countries with greater gender equality (Zhang, 2020)
- Taking breaks at work earlier in the day is associated with greater recovery than taking later breaks (Hunter & Wu, 2016)
- When customers see employees treated badly by other customers, they leave larger tips and treat the employee better (Hershcovis & Bhatnagar, 2017)
- Responding with anger to negotiation offers can lead to greater concessions (Hillebrandt & Barclay, 2017)
- Employees with high job demands and fewer resources to do their job are more likely to experience job burnout (Nahrgang et al., 2011)
- Asking employees to do illegitimate/non-work-related tasks lowers their self-esteem and well-being (Eatough et al., 2016)
- Confronting someone for prejudice can result in greater workplace belonging as long as you believe people can change (Rattan & Dweck, 2018).

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# SELECTING THE RESEARCH DESIGN

- Once hypotheses are generated, the researcher chooses **a research design that will guide the investigation**.
- The type of design selected depends on such things as the **research setting and the degree of control** that the researcher has over the research setting.
- For instance, a researcher may decide that he or she will conduct a study of **workers' task performance by observing workers in the actual work setting**, during normal working hours, in order to make the setting as "natural" as possible.
- Alternatively, the researcher may decide instead that it would be less disruptive to **bring workers into a laboratory room** where the work tasks could be simulated.
- Different settings may require different research designs.
- The **researcher may also be constrained** in the selection of a research design by the amount of control the researcher has over the work setting and the workers.
- The company may not allow the researcher to **interfere with normal work activities**, forcing the researcher to **use observational measurement** of behavior or to **use existing data** that the organization has already collected.

# COLLECTION OF DATA

- The next step in the research process involves the testing of hypotheses through data collection. **The collection of data is governed by the particular research design used.**
- However, an important concern in data collection is **sampling**, or *selecting a representative group* from a larger population for study. The term **representative** is meant to imply that the sample accurately reflects the **characteristics of the larger groups**.
- Sampling is the selection of a representative group from a larger population for study .
- Researchers also need to decide whether they prefer to use **random** or **stratified sampling**.
- **Random Sampling** is the selection of research participants from a population so that each individual has an **equal probability of being chosen**.
- **Stratified Sampling** is the selection of research participants based on **categories** that represent important distinguishing characteristics of a population.

# ANALYSES OF RESEARCH DATA

- Once data are gathered, they are subjected to some form of **analysis for interpretation**.
- Most often, this involves statistical analysis of **quantitative data** (i.e., data with numerical values), although data can be analyzed using **qualitative data** analysis techniques (not based on the numerical values of the data).
- Statistical analysis of data requires that the **research observations be quantified** in some way.
- **Statistics** are simply tools used by the researcher to help make sense of the observations that have been collected.
- Some statistical analyses are **simple** and are used to help **describe and classify** the data.
- Other statistical techniques are quite **complex** and help the researcher **make detailed inferences**.
- For example, some statistics allow the researcher to determine the causes of certain observed outcomes.

# INTERPRETATION OF RESEARCH RESULTS

- The final step in the research process is interpretation of the results. Here, the researcher **draws conclusions** about the **meaning of the findings** and their **relevance to actual work behavior**, as well as their **possible limitations**.
- For example, imagine that a researcher decides to study the **effects on work group productivity of two managerial styles** in a factory:
- **a directive style**, whereby the manager closely supervises workers, telling them what they should be doing and how they should be doing it; and
- **a nondirective, participative style**, whereby the manager allows the workers a great deal of freedom in deciding how they will get the work task done.
- The **researcher might caution** that these results may **only apply to managers** who are **supervising factory work groups** and might **not pertain to managers of service organizations**, such as hospitals or restaurants, to more creative jobs, such as developing smartphone apps, or to managers of sales-persons.

# MAJOR RESEARCH DESIGNS

| ARAŞTIRMA TASARIMI | ÖZELLİKLERİ | YANIT ARANAN SORULAR |
|---|---|---|
| **DENEYSEL** | • Bağımsız değişken(ler)in manipülasyonu<br>• Katılımcıların koşullara seçkisiz atanması<br>• Ölçülen bağımlı değişken(ler) üzerinden grupların karşılaştırılması | • Bir değişken diğerini etkiliyor mu?<br>• Nedensellik gösterebilir |
| **YARI DENEYSEL** | • Bağımsız değişken(ler)in manipülasyonu ya da insan kategorileri arasında ayrım yapmak<br>• Seçkisiz atama yok<br>• Ölçülen değişken(ler) üzerinden grupların karşılaştırılması | • Eşdeğer olmayan gruplar bir değişken üzerinde farklılık gösteriyor mu?<br>• Manipülasyon kullanıldığında olası nedensellik önerebilir. |
| **KORELASYONEL** | • Manipülasyon olmadan değişkenlerin ölçümü<br>• Değişkenler arasındaki ilişkiyi incelemek | • Bir değişken diğeriyle ilişkili mi?<br>• (Nedensel olmayan) bir ilişki gösterir. |
| **BETİMSEL** | • Manipülasyon olmadan değişkenlerin ölçümü<br>• Değişkenlerin ölçümlerini özetlemek | • Belli değişkenler üzerinden bir olgu nasıl tanımlanır?<br>• Mevcut bilgiyi özetler. |

SCHNEIDER, F.W., GRUMAN, J.A., & COUTTS, L.M. (2012). APPLIED SOCIAL PSYCHOLOGY UNDERSTANDING AND ADDRESSING SOCIAL AND PRACTICAL PROBLEMS. SAGE PUBLICATIONS, INC.

# THE EXPERIMENTAL METHOD

- The **Experimental Method** is a research design characterized by a **high degree of control** over the research setting to allow for the determination of **cause-and-effect** relationships among variables.
- In a **laboratory experiment**, the researcher has a **great deal of control**, which is a major advantage of conducting research in a laboratory.
- In a **field experiment**, the researcher typically has **less control** than in the laboratory, but the researcher must still maintain control over the situation in a field experiment to draw strong conclusions.
- To determine whether the manipulation of an independent variable produces any significant change in a dependent variable, following the experimental method, researchers often compare the results of two groups of participants.
- One group, called the **experimental group**, or **treatment group**, is subjected to the change in the independent variable.
- The second group, called the **control group**, receives no change. In other words, the second group is not subjected to the treatment.

# THE EXPERIMENTAL METHOD

- For example, imagine that a researcher wants to test the effectiveness of **a new training program for sales skills**.
- A number of salespersons are **randomly assigned to the treatment group** and **attend the training session**. Other salespersons are **randomly assigned to the control group** and do **not receive** the training content.
- A **comparison of** the subsequent sales records of the **two groups** allows the researcher to determine the **effectiveness** of the program.
- The experimental method is **not used only for comparing treatment and control groups**. Any variable that can be **broken into distinct categories** or levels can serve as an independent variable in an experimental design.
- For instance, we might examine **differences between male and female workers** or among "high-," "medium-," and "low-" producing workers.

# THE EXPERIMENTAL METHOD

- Aside from the specified independent variables, other variables that may be affecting the dependent variable are termed **extraneous variables**.
- **Extraneous Variables** are variables other than the independent variable that may influence the dependent variable.
- The key to the success of the experimental method is to **hold all extraneous variables constant**.
- For example, observing all research participants, treatment and control groups, at the **same time** of day, using the **same methods**, **same equipment**, and so forth.
- Sometimes, **extraneous variables result from systematic differences** in the individuals being studied.
- For example, if participants are given the opportunity to **volunteer to participate** in a particular treatment group (with the non-volunteers serving as a control group), there may be some **motivational differences** in the treatment volunteers that might act as a **moderating or confounding variable**, thus affecting the results.

# THE EXPERIMENTAL METHOD

- Many potential extraneous variables can be controlled through the **random assignment** of participants to the experimental and control groups.
- **Random Assignment** is a method of **assigning subjects** to groups **by chance** to control for the effects of extraneous variables.
- One of the **major drawbacks of the experimental method** is its **artificiality.**
- A researcher who controls the experimental setting may create a situation that is **quite different from the actual** work setting.
- In **field experiments**, there is **less concern about the generalizability of findings** because the participants and the setting are usually representative of those that can be affected by the results.

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# TWO EXAMPLES OF THE EXPERIMENTAL METHOD: a LABORATORY and a FIELD EXPERIMENT

# A LABORATORY EXPERIMENT

One experimental study was designed to determine which of two decision-making styles was most effective when individuals were working under high-stress conditions (Johnston et al., 1997). In this laboratory experiment, 90 U.S. Navy–enlisted personnel volunteered and were required to take part in a simulation where they would be working as a ship's radar screen operator. The participants were randomly assigned to one of two training groups. The first group learned a "vigilant" decision-making style. Vigilant decision making is where the decision maker scans and considers all information in an orderly, sequential fashion, taking into account all information and reviewing all alternatives before making a decision. Participants in the second group were trained in "hypervigilant" decision making. In hypervigilant decision making, the decision maker scans only the information that is needed in a particular circumstance, and scanning of information does not follow a systematic, ordered sequence. The type of training participants received constituted the independent variable. Stress was created by having distracting radio communications played and by an experimenter who told the participants to "hurry up" and "perform better" at regular intervals.

The participants were seated at a computer screen that presented a simulation of a ship's radar screen that systematically presented images representing approaching ships, submarines, and aircraft. Participants had to identify each object, determine if it was a "friendly" or enemy craft, and engage enemy craft. The dependent variable in this study consisted of the number of objects that were correctly identified and dealt with appropriately. The results of the study confirmed the researchers' hypothesis that hypervigilant decision making was best under high-stress conditions, primarily because it is quicker and more efficient and provides less of a cognitive "load" on the radar operator.

# A FIELD EXPERIMENT

Our second example of the experimental method is a field experiment designed to test the effects on safe driving behavior of worker participation in setting safety-related goals (Ludwig & Geller, 1997). The study participants were 324 college-aged pizza deliverers from three pizza stores. Observation of the drivers showed that they often did not stop completely at a stop sign as they headed out on deliveries. Pizza deliverers were randomly assigned to one of two types of safety meetings focusing on the importance of making a full and safe stop. In one condition, driving-related safety goals were set by store managers. In the other condition, the deliverers participated in setting their own driving safety goals. The type of goal setting constituted the independent variable. At certain intervals, the managers observed stopping behaviors as the drivers exited the stores' parking lots and headed down the road on their deliveries. During the posttraining period, managers posted the rates of safe stopping for the drivers to see. Also recorded were other safety behaviors, such as whether or not the drivers wore their seat belts and used their turn signals when turning onto the highway. Each of these safe driving behaviors constituted the study's dependent variables.

The results showed that both groups, those who helped set their own safety goals and those whose goals were set by managers, engaged in safer stopping behavior during the time period when their managers were watching and providing feedback. But only the group who had set their own stopping safety goals showed increased use of turn signals and seat belt use. In other words, the safe stopping behavior "generalized" to other safety behaviors, but only for the group that participated in setting its own goals.

# TWO EXAMPLES OF THE EXPERIMENTAL METHOD

- Both of these studies have **limitations**.
  - The laboratory investigation used Navy-enlisted personnel, not actual ship radar operators, which raises the question of whether the results would generalize to actual radar operators or to other similar workers, such as air traffic controllers.
  - Although the safety study found that drivers increased seat belt usage and the use of their turn signals, we don't know if other driving behaviors (e.g., speeding) were similarly affected.
- Although the results of studies such as these may answer some questions, **additional ones might arise**.
- **This is the research process**. Results of one study may **stimulate subsequent research** in the same area. Scientific research **builds on the results of previous studies**, **adding** and **refining**, to increase our knowledge of the behavior in question.

# QUASI-EXPERIMENTS

- In many cases, a researcher does **not have the control** over the situation needed to run a true experiment. As a result, a quasi-experiment is used.
- **Quasi-experiment** follows the experimental design but **lacks random assignment** and/or **manipulation of an independent variable**.
- For example, a researcher might **compare one group of workers who have undergone a particular training program** with **another group of workers who will not receive** the training.
- But, because they were not randomly assigned to the groups, the **groups are not equivalent**.
- As a result, **cause-and-effect** relationships **cannot be determined**.
- ➢ For example, one study examined the effectiveness of a management coaching program and compared managers in the coaching programs to other managers who did not receive coaching, but who were matched on age, years of experience, and salary (Evers *et al.*, 2006).

# QUASI-EXPERIMENTS

- Quasi-experiments are quite common in I/O psychology because of the **difficulties in controlling extraneous variables**, and, often, the unit of **analysis is groups or organizations, rather than individuals**.
- Quasi-experiments can be used, for example, to **compare departments** or **organizations** on some variables of interest.
- It is important in making these comparisons, however, that the groups be **as equivalent as possible**.
- Moreover, in quasi-experimental designs, researchers often try to **measure as many possible extraneous variables** as they can in order to **statistically control for their effects**.
- This helps **strengthen the results** obtained in quasi-experiments.

# THE CORRELATIONAL METHOD

- The **correlational method** (also referred to as the *observational method*) is a research design that examines the **relationship between variables** as they naturally occur.
- There is **no manipulation of variables** by the experimenter.
- Because the correlational method does **not require the rigid control** over variables associated with the experimental method, it is **easy to use in actual work settings**.
- In addition, correlational research **can be conducted with archival data** (data that an organization has already collected).
  - For example, an organization might use data on employee absenteeism and look at the relationship between number of sick days and ratings on a job satisfaction survey that was administered to employees.
- The **major drawback** of this method is that we **cannot determine cause-and-effect** relationships.
- Considerable **caution** must be exercised **when interpreting the results** of correlational research.

# THE CORRELATIONAL METHOD

- For example, suppose that a researcher finds a **relationship between workers' attitudes** to their employer and the **amount of money they invest** in a company stock program.
- Employees with very **positive attitudes** tend to use a greater portion of their **income to purchase** stock. It could be that their **favorable attitudes cause** them to demonstrate their support for (and faith in) the company by buying stock, but the cause-and-effect relationship could also go the other way:

1. employees who purchase stock at bargain prices may **develop more positive attitudes** about the company because they now **have an investment** in it.
2. a third variable (an extraneous variable), such as **the length of time employees have worked** for the company, may actually be the **cause of the observed correlation** between employee attitudes and stock purchases. Employees with a **long tenure** may generally have **more favorable attitudes** about the company than newcomers (over time, those with negative attitudes usually leave the organization).
3. These employees are also **older** and may be able to **invest a larger proportion of their incomes** in stock options than younger workers, who may be raising families and purchasing first homes.

- **Length of time on the job** may thus influence both of the other two variables. The simple correlation between employee attitudes and stock purchases, therefore, does **not lead us to any firm cause-and-effect conclusions**.

# AN EXAMPLE OF THE CORRELATIONAL METHOD

In a study of secretaries and managers in seven German companies, researchers examined the relationship between the time it took for these office workers to deal with computer errors and the workers' "negative emotional reactions," such as voicing frustration or outbursts of anger (Brodbeck et al., 1993). This study was an observational field study, because the researchers observed the workers as they went through their normal daily routine at work. The observers merely recorded the errors workers made while working at computers, noted the time that it took workers to deal with the computer errors, and noted their emotional reactions. As you might expect, there was a significant positive relationship (a positive correlation) between the length of time workers spent trying to solve computer errors and their reactions of frustration and anger. In other words, the more time the workers spent trying to solve computer errors, the more angry and frustrated they became.

# COMPLEX CORRELATIONAL DESIGNS

- **Simple correlational** designs do **not allow the determination of cause-and effect** relationships.
- Most correlational designs in modern I/O psychology research involve **complex statistical analyses** that allow for combining **predictor variables** and statistically controlling for possible **extraneous variables**, and methods that allow for **inferring the likelihood** of cause and effect.
- A **multiple regression design** allows a researcher to examine the **relationship between a particular outcome variable and multiple predictors**.
  - For example, a study of nurses might use a measure of **technical nursing skills and motivation** to predict the nurses' **on-the-job performance** evaluations. The **simple correlations** between technical skills and performance and between motivation and performance can be examined, but, through **multiple regression**, the researcher can see **how skills and motivation in combination predict performance** and understand the **relative contribution** each of the variables makes in **predicting job performance**.

# MULTIPLE REGRESSION DESIGN

- The multiple regression design also allows a researcher to **control for possible extraneous variables** and examine the **effect of one variable on another** after controlling for (or "*holding constant*") the effects of extraneous variables.
- In the study of nurses, for example, the researcher might measure and control for possible extraneous variables, such as the **age and years of experience** of the nurses, in examining **how skills and motivation affect performance**.
- Certain **complex designs** can also be used to **infer causality**. One example that is quite common in the I/O psychology literature is the use of a **mediation model**.
- In a mediation model, the relationship between two variables is hypothesized to be explained by, or mediated by, a third variable—the mediator variable (see Figure 2.3).
- For example, the **relationship between job satisfaction and employee turnover** (assuming that less satisfied employees are more likely to quit their jobs) is **mediated by** a third variable—**the intention to quit**.

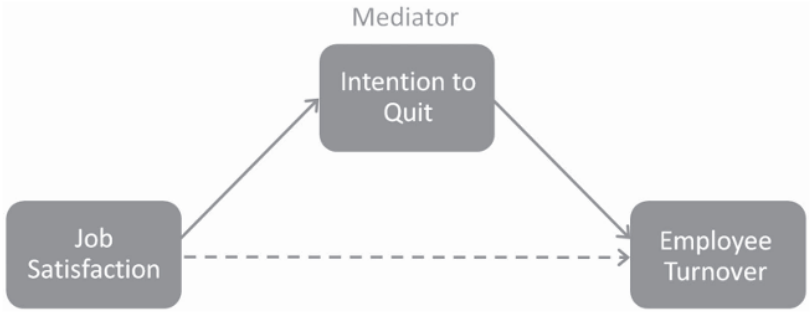


*Figure 2.3* A mediation model for the job satisfaction–employee turnover relationship.

# META-ANALYSIS

- Different research investigations of the same topic or issue may reach **inconsistent**, and sometimes totally **contradictory** conclusions.
- **Meta-Analysis** is a technique that allows results from **several different research studies** to be combined and summarized.
- Meta-analyses are usually conducted when there are **20 or more separate studies** of a given hypothesis or topic.
- Meta-analysis may be used for several purposes, including **summarizing the relationship between variables** examined in each of a set of studies and **determining other factors** that are associated with increases or decreases in the magnitude of relationships between variables of interest (these "other factors" are often referred to as *moderating variables*).

# META-ANALYSIS

- One meta-analysis confirmed the widely held view that more physically demanding jobs, such as hazardous jobs with high risk for injury, were related to workers becoming stressed and "burned out" (Nahrgang et al., 2011).
- In another meta-analysis of 55 studies investigating the relationship between workers' personalities, positive job attitudes, and organizational citizenship behaviors—pro-company behaviors exhibited by employees. (It was found that positive job attitudes were a better predictor of organizational citizenship behaviors than were workers' personalities (Organ & Ryan, 1995).

# THE CASE STUDY METHOD

- **Case Study** is a research investigation involving a **one-time assessment** of behavior.
- The study may involve a one-time-only **assessment** of behavior **or the application of an intervention** to only a **single** group, department, or organization.
- The results of a single case study do **not allow** us to **draw** any firm **conclusions**.
- A case study is really little more than a descriptive investigation.
- We are **unable to test hypotheses** or to **determine cause-and-effect** relationships from a case study because it is **like** conducting research with **only one participant**.

# MEASUREMENT

- An important part of the research process involves the **measurement of variables**.
- The term **operationalization** refers to the process of defining variables so that they can be measured for research purposes.
- I/O psychology researchers use a **variety of measurement techniques**.
- Researchers may measure variables through the direct obtrusive or unobtrusive observation of behavior.
- In **obtrusive observation**, the researcher is visible to the research participants, who know that they are being studied.
- **Unobtrusive observation** involves observing participants' behavior without their knowledge.
- Another measurement strategy is **self-report techniques**, which yield information about participants' behavior from their own reports.
- One of the most widely used **self-report** techniques is the survey.

# INTERPRETING and USING RESEARCH RESULTS

- When interpreting research results, attention must be given to **internal validity** (whether **extraneous variables have been accounted** for in the research) as well as the
- **external validity** of the findings (that is, whether they will **generalize to other settings**).
- A critical concern for I/O psychologists is the **interrelation of the science and practice** of industrial/organizational psychology and **adhering to ethical principles and guidelines** that govern research and practice in I/O psychology.