

The Brookbush Institute Publishes a NEW Glossary Term: 'Case-control Study'

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NEW YORK, NY, UNITED STATES,
September 16, 2025 /

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Glossary Term: [Case-control Study](#)

- Additional Glossary Term: [Evidence-based Practice](#)

- Related Courses: [Physical Therapist and Physical Therapist Assistant](#)

DEFINITIONS

Case-Control Study: A case-control study is a retrospective observational research design in which participants are selected based on the presence (cases) or absence (controls) of a specific outcome, and their prior exposures (independent variables) are compared. This design works backward from outcome to exposure, making it especially useful for studying rare conditions, outcomes with long latency periods, or preliminary associations that may later be tested with prospective or experimental designs.



Case-control studies can be used to demonstrate correlations, but due to vulnerability to bias and error, they are weaker evidence for causation."

*Dr. Brent Brookbush, CEO of
Brookbush Institute*

SEMANTIC CLARIFICATION

- "Case" refers to participants who already have the outcome of interest (e.g., injury, disease, or dysfunction).
- "Control" refers to participants who do not have the outcome but are otherwise similar to the cases in relevant characteristics (e.g., age, sex, training background).
- "Study" emphasizes a systematic and replicable approach guided by predefined protocols, not anecdotal

comparisons.

Applied Example



- Research Question: Are specific hip morphology features (e.g., femoral/acetabular version, cam/pincer morphology) or clinical history factors (e.g., prior knee pain) associated with ultimately undergoing total hip arthroplasty (THA)?

APPLIED EXAMPLE

- Cases: Patients who underwent THA within the health system during the past 5–10 years and who had a preoperative hip MRI available.
Controls: Patients from the same imaging registry who had a hip MRI during the same period but did not undergo THA (frequency-matched to cases on age, sex, and BMI).
- Exposure Assessment: Blinded radiologists extract hip morphology measures from existing MRIs (e.g., femoral version, acetabular version, alpha angle for cam, crossover sign for pincer). Medical records provide historical variables (e.g., history of knee pain/diagnoses, activity level proxies, prior intra-articular injections).
- Comparison: Exposure prevalences and distributions are compared between cases and controls using odds ratios (unadjusted and adjusted). Multivariable logistic regression adjusts for potential confounders (e.g., age, sex, BMI, diabetes, activity proxies).
- Optional Nested Feature: A subset of controls who also had a second MRI in a non-hip region (e.g., shoulder or lumbar spine) can be used to test for imaging referral bias and to strengthen matching on healthcare-seeking behavior.

STRENGTHS AND LIMITATIONS OF CASE-CONTROL STUDIES

Strengths

- Efficient study design for rare outcomes and conditions with long latency periods. Requires fewer participants and less time than prospective studies.
- Can explore multiple exposures for a single outcome.
- Useful for generating hypotheses for further research.

Limitations

- Vulnerable to recall bias, since exposure data often relies on memory or incomplete records.
- Increased risk of selection bias when controls are not adequately matched to cases.
- Cannot directly establish temporal sequence (whether the exposure truly preceded the outcome).
- Provides weaker causal inference compared to cohort or experimental designs.

Types of Case Control Studies...

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