RU RMT 22 — Research & Regulations

Lecture 04 — Variables, Hypotheses and the Scientific Method

Independent and dependent variables · Confounders · Operational definitions · Hypotheses · Study designs · Validity and reliability

Course structure: Lectures 1–6 Research · Lectures 7–12 Regulation of Massage Therapy in Ontario · 8 instructional days · 56 contact hours · 7 contact hours per dayDelivered in person at Ruhani College and online via Zoom in the same live session, in alignment with CMTCA Accreditation Standards (2024) and the FOMTRAC Inter-Jurisdictional Practice Competencies and Performance Indicators (2016)Research strand, Lecture 4 of 6 — inside the methods section: how an experiment is built

Where We Are in the Cycle

Recap

Lecture 1: the hierarchy of evidence and what evidence-informed practice requiresLecture 2: building and running a search, and judging a sourceLecture 3: the seven parts of an article, and reading the methods before the discussion

Today

Variables: what a study manipulates, what it measures, and what it must controlOperational definitions: turning a clinical idea into something measurableHypotheses: how a testable prediction is writtenThe scientific method as an eight-step sequenceThe main study designs and what each can and cannot establishValidity and reliability of measurementLecture 5 then covers how a study protects itself: sampling, randomization, blinding and bias.

Learning Objectives — Lecture 4

You will be able to

Define a variable and identify the variables in a published studyDistinguish the independent (experimental) variable from the dependent (outcome) variableIdentify confounding, extraneous and control variables and explain why they matterWrite an operational definition for a clinical construct such as pain, tightness or range of motionDistinguish continuous, ordinal, nominal and dichotomous data

You will also be able to

State a hypothesis in terms of a relationship between variablesDistinguish the null hypothesis from the alternative hypothesis, and directional from non-directionalList and apply the eight steps of the scientific methodCreate a hypothesis that is neutral, testable and ethicalMatch a study design to a research questionExplain validity and reliability and identify threats to each

Competency and Accreditation Linkage

FOMTRAC Practice Competencies (2016)

1.2 n — Employ critical thinking1.2 s.3 and s.4 — Identify evidence relevant to a practice issue; evaluate evidence2.d — Select and perform assessments incorporating knowledge of client history, safety considerations and evidence2.r — Interpret findings and formulate a clinical impression3.1 a — Incorporate assessment data, research evidence and clinical experience into a treatment plan

CMTCA Accreditation Standards (2024)

2.4 — Teaching methods and materials promote critical thinking and problem-solving skills1.1 — Practice competencies taught to the designated level of complexity1.2 — Progress toward performance indicators assessed throughout the course of studyThis lecture also underpins outcome measurement in clinical practice, which is where the CMTO expectation of practice evaluation is met.

PART 1

Variables

Everything a study does is either changed, measured, or held constant. Knowing which is which is how you read a methods section.

What Is a Variable?

A variable is any characteristic, condition or quantity that can take more than one valueIf it cannot vary, it cannot be studied — it is a constantExamples in massage therapy research: pain intensity, range of motion, pressure applied, session duration, sleep quality, cortisol concentration, client age, time since injuryA study is essentially a structured statement about how one variable relates to anotherEvery variable in a study must be defined precisely enough that two different researchers would measure it the same wayA study that does not name its variables clearly cannot be replicated and cannot be appraisedExercise as you read: open your article’s methods section and list every variable it names. Most students find at least eight.

Independent and Dependent Variables

Independent variable (IV)

The variable the researcher manipulates, selects or assignsIt is the presumed cause — the thing being testedAlso called the experimental, predictor or explanatory variableIn a trial, it is usually group allocation: receiving massage or not receiving itIt can have more than two levels: no massage, 30-minute massage, 60-minute massageIt is independent because its value does not depend on the outcome

Dependent variable (DV)

The variable the researcher measuresIt is the presumed effect — the outcomeAlso called the outcome, response or criterion variableExamples: pain score on a numeric rating scale, Oswestry disability index, degrees of cervical rotation, minutes of sleepIt is dependent because its value is expected to depend on the independent variableMemory aid: the independent variable is what you DO; the dependent variable is what you SEE.

Identifying IV and DV — Worked Examples

Research question	Independent variable	Dependent variable
Does 30 minutes of Swedish massage reduce anxiety in adults before surgery?	Massage vs no massage	Anxiety score
Does deep pressure improve cervical rotation more than light pressure?	Pressure level (deep vs light)	Degrees of cervical rotation
Does weekly massage over eight weeks improve sleep quality in shift workers?	Weekly massage vs no massage	Sleep quality score
Does treatment frequency affect return to work after a soft tissue injury?	Sessions per week	Days to return to work
Is age associated with recovery time after acute low back pain?	Age (not manipulated — observational)	Recovery time in days

The last example has no manipulation: age is measured, not assigned. That makes it an observational study, and it can show association but not causationA useful check: if the researcher could not have assigned the value, the study cannot be an experiment

Confounding, Extraneous and Control Variables

Definitions

Extraneous variable: anything other than the IV that could affect the DVConfounding variable: an extraneous variable that is related to both the IV and the DV, and therefore offers an alternative explanation of the resultControl variable: an extraneous variable that the researcher holds constant to remove its influenceMediating variable: sits on the causal path between IV and DV and helps explain how the effect happensModerating variable: changes the strength of the relationship — the effect is larger in one subgroup than another

Why confounding matters

A confounder makes it impossible to say whether the IV caused the changeExample: a study finds massage clients report less pain. But massage clients in that clinic also received exercise advice. Advice is a confounderExample: participants who chose the massage group were younger and less severely affected at baselineControls: randomization, matching, restriction of eligibility, and statistical adjustmentRandomization is the only method that balances confounders nobody thought to measure. This is why it sits so high on the hierarchy.

Operational Definitions

A construct becomes a variable only when you say exactly how it will be measured.

An operational definition specifies the procedure used to measure or manipulate a variable"Pain" is a construct. "Pain intensity in the past 24 hours, self-reported on a 0–10 numeric rating scale" is an operational definition"Massage" is a construct. "Effleurage and petrissage to the lumbar and gluteal regions at moderate pressure for 30 minutes, twice weekly for six weeks, delivered by an RMT with at least two years of experience" is an operational definition"Muscle tightness" is notoriously hard to operationalize — palpation is not reliable between examiners, so studies often substitute pressure pain threshold measured with an algometerWithout operational definitions, studies cannot be compared, replicated, or pooled in a meta-analysisThe absence of clear operational definitions is one of the main reasons massage therapy trials are hard to synthesizeIn your own clinical charting, the same discipline applies: "client reports improvement" is weaker documentation than "pain 7/10 at intake, 4/10 post-treatment; cervical rotation right 45° to 62°."

Types of Data

The type of data determines which statistical tests are legitimate — a point we return to in Lecture 6.

Type	Description	Example	Summarized by
Nominal	Named categories with no order	Sex; injury site; treatment group	Counts and percentages
Ordinal	Ordered categories with unequal intervals	Pain: none, mild, moderate, severe; manual muscle test grades	Median and range
Interval	Ordered with equal intervals, no true zero	Temperature in Celsius	Mean and standard deviation
Ratio	Equal intervals with a true zero	Range of motion in degrees; time in seconds; grip strength	Mean and standard deviation
Dichotomous	Two categories only	Improved / not improved; returned to work / did not	Proportions and risk ratios

Interval and ratio data together are often called continuous dataA visual analogue scale is usually treated as continuous, although this is debatedReducing continuous data to categories — for example splitting pain scores into high and low — throws away information and is a common weakness

PART 2

Hypotheses and the Scientific Method

The prediction, stated in advance, that makes a study a test rather than a demonstration.

What a Hypothesis Is

Requirements

A hypothesis is a testable statement predicting a relationship between two or more variablesIt must be stated before data are collectedIt must be falsifiable — it must be possible for the evidence to contradict itIt must be specific: which population, which intervention, which outcome, over what periodIt must be neutral in wording — it predicts a relationship, it does not advocate for oneIt must be ethical: it must be answerable without harming participants

Weak versus adequate

Weak: "Massage is good for people with back pain." Not falsifiable, no variables, no comparisonWeak: "Massage will prove that manual therapy works." Advocacy, not predictionAdequate: "In adults with chronic non-specific low back pain, six weeks of twice-weekly myofascial release will produce a greater reduction in numeric rating scale pain scores at twelve weeks than usual care."Notice that the adequate version contains the full PICO from Lecture 1. A hypothesis is a PICO question rewritten as a prediction.

Null and Alternative Hypotheses

The pair

Null hypothesis (H_0): there is no difference between the groups, or no relationship between the variablesAlternative hypothesis (H_1 or H_a): there is a difference or a relationshipStatistical testing works by assuming the null is true and asking how surprising the observed data would be under that assumptionA study never proves the alternative; it either rejects the null or fails to reject itFailing to reject the null is not the same as proving no difference exists — it may mean the study was too small to detect one

Directional and non-directional

Non-directional (two-tailed): predicts a difference without specifying which way — "pain scores will differ between groups"Directional (one-tailed): predicts the direction — "pain scores will be lower in the massage group"A directional hypothesis requires prior justification; using one simply to make significance easier to reach is a form of biasMost clinical research uses two-tailed tests as the conservative defaultLanguage discipline: researchers reject or fail to reject the null. They do not "accept" it, and they do not "prove" the alternative.

The Eight Steps of the Scientific Method

Step	Stage	What happens
1	Observation	Something in practice or in the literature raises a question — a pattern, an anomaly, a disagreement
2	Question	The observation is converted into a specific, answerable question, usually in PICO form
3	Background research	The existing literature is searched to establish what is already known and what remains unresolved
4	Hypothesis	A testable, falsifiable prediction is stated, together with the null hypothesis
5	Design and prediction	A design is chosen, variables are operationally defined, sample size is calculated and the protocol is registered
6	Experiment	Data are collected according to the protocol, with allocation, blinding and measurement as planned
7	Analysis	Data are analysed using the pre-specified tests; results are described with effect sizes and confidence intervals
8	Conclusion and communication	The hypothesis is rejected or retained, findings are reported honestly including negative results, and new questions are identi

Why Each Step Can Fail

Early steps

Observation: mistaking a coincidence for a pattern, or a personal preference for a clinical problemQuestion: too broad to answer, or so narrow it interests nobodyBackground research: an inadequate search that misses a study already answering the questionHypothesis: stated after the data are seen, which converts a confirmation into a discovery

Later steps

Design: a comparison group that cannot isolate the effect; an outcome that does not matter to clientsExperiment: protocol deviations, uneven dropout, unblinded assessmentAnalysis: choosing the test after seeing the data; reporting only the outcomes that reached significanceConclusion: spin; suppression of negative findings, which distorts the whole literature through publication biasLecture 5 gives each of these failure modes its proper name.

PART 3

Study Designs

Choosing a design is choosing what kind of claim you will be entitled to make at the end.

Experimental, Quasi-Experimental and Observational

The three families

Experimental: the researcher manipulates the independent variable AND allocates participants at random. Only this family supports a causal claimQuasi-experimental: the researcher manipulates the independent variable but does not randomize — for example, comparing two existing clinicsObservational: the researcher measures but does not manipulate anything — cohort, case-control, cross-sectionalQualitative: investigates experience and meaning rather than measured difference

What each supports

Experimental: this intervention caused this difference in this populationQuasi-experimental: this difference is associated with this intervention, with residual confounding possibleObservational: these variables are associated; the direction and cause are not establishedQualitative: this is how the experience is described and understood by those who had itThe single most common error in reading health research is treating an observational association as though it were an experimental result. Lecture 6 returns to this.

Trial Architectures

Architecture	How it works	Strengths and limits
Parallel group	Participants are randomized to one group and stay there	Simple and standard; needs more participants
Crossover	Each participant receives both conditions in a randomized order	Each participant is their own control; vulnerable to carryover effects
Cluster randomized	Whole clinics or classes are randomized, not individuals	Practical for service-level questions; requires special analysis
Factorial	Two interventions tested simultaneously in a 2 × 2 design	Efficient; can detect interaction between treatments
Pragmatic trial	Run in real clinical settings with usual-care comparison	High applicability; less control over delivery
Explanatory trial	Run under tightly controlled conditions	High internal validity; may not reflect real practice
Single-case experimental (n-of-1)	Repeated alternating phases within one participant	Feasible for a clinician; limited generalizability

Cross-Sectional, Longitudinal and Time

Time in study design

Cross-sectional: measured at one point in time — a snapshotLongitudinal: measured repeatedly over timeProspective: participants are identified first and followed forwardRetrospective: outcomes have already occurred and the researcher looks back through recordsBaseline, post-intervention and follow-up are the three measurement points most trials use

Why the timing matters

Cross-sectional data cannot establish which variable came first, so it cannot support a causal claimMassage therapy effects often diminish; a trial measuring only immediately post-treatment may report an effect that vanishes at four weeksLonger follow-up increases dropout, which increases attrition biasAlways check when the primary outcome was measured, not just what it wasWhen you read "significant improvement", ask immediately: measured when, and did it last?

Validity — Internal and External

Internal validity

The extent to which the study design supports the claim that the IV caused the change in the DVThreatened by: confounding, selection bias, dropout, lack of blinding, measurement error, regression to the mean, natural historyProtected by: randomization, allocation concealment, blinding, standardized protocols, intention-to-treat analysisWithout internal validity, external validity is meaningless — a result that is not true internally cannot generalize

External validity

The extent to which the findings apply beyond the study sample: other people, other settings, other therapistsThreatened by: narrow eligibility criteria, volunteer samples, highly trained study therapists, ideal conditions, short follow-upThe pragmatic–explanatory tension: the more tightly you control a trial, the less it resembles your clinicYour appraisal question is always the same: is this client like those participants, in a setting like mine, receiving a treatment I can actually deliver?

Reliability and Validity of Measurement

Reliability — is it consistent?

Test–retest reliability: the same measure repeated on the same stable person gives the same valueIntra-rater reliability: the same examiner gets the same result twiceInter-rater reliability: two examiners get the same result — the weak point of palpation-based assessmentInternal consistency: items within a questionnaire measure the same constructReported using correlation coefficients, intraclass correlation, or Cohen's kappa for categorical judgements

Validity — does it measure the right thing?

Face validity: it looks like it measures the constructContent validity: it covers the whole construct, not one corner of itConstruct validity: it behaves as theory predicts it shouldCriterion validity: it agrees with an established reference measureResponsiveness: it detects real change when change occursA measure can be highly reliable and entirely invalid: a tape measure applied to the wrong landmark gives the same wrong answer every time.

From Research Measurement to Clinical Measurement

These concepts are not academic. They govern how you assess and chart.

The FOMTRAC competencies require you to perform postural, palpatory, gait, range of motion, muscle length, muscle strength, joint play and neurological assessment, and to differentiate normal from abnormal findingsEvery one of those is a measurement, subject to the same reliability and validity questionsA goniometric measurement is more reliable than a visual estimate; a validated questionnaire is more reliable than "how are you feeling today?"Using the same tool, in the same position, at the same point in the session is what makes your reassessment meaningfulCMTO record keeping requires information on every examination performed and every clinical finding — measured findings are far more defensible than impressionsPractice evaluation, named in the Standard of Practice: Client-centred Care, means reviewing your own measured outcomes over timeRattray and Ludwig models this discipline: assessment findings are recorded specifically so that treatment can be evaluated against them

In-Class Activity 1 — Name the Variables

The task (25 minutes, pairs)

Using your own article from Lecture 3, identify the independent variable and every level it hasIdentify the primary dependent variable and the tool used to measure itList every secondary dependent variableIdentify at least three potential confounders and state how the study controlled eachWrite out the operational definition the study used for the intervention — or note that it did not give one

Debrief prompts

How many articles gave a reproducible operational definition of the massage protocol?How many named the therapists' training and experience?Which confounders were left uncontrolled?Under-specification of the intervention is the defining methodological weakness of the manual therapy literature. This activity makes that visible.

Levels of an Independent Variable and Dose

Levels

An independent variable can have two levels (massage or no massage) or several (0, 30, 45 or 60 minutes)More levels allow a dose–response relationship to be detectedA dose–response relationship — more of the intervention producing more of the effect — is one of the strongest arguments for causationTwo-level designs are cheaper and answer only whether the treatment does anything at all

Dose in massage therapy

Dose has several dimensions: pressure, depth, duration per region, total session length, frequency, and total number of sessionsAlmost no trials manipulate dose systematically, so the profession has very little evidence about optimal doseThis is a genuine and important gap, and it is the sort of question an RMT is well placed to raiseWhen you read a trial, record its dose precisely — it is the element you will need in order to reproduce the intervention clinicallyA trial that shows benefit at six weekly 60-minute sessions has told you nothing about four biweekly 30-minute sessions.

Between-Subject and Within-Subject Designs

Between-subject

Different participants are in different groups; each person experiences one conditionThe parallel-group randomized trial is the standard exampleAdvantage: no carryover between conditionsDisadvantage: individual differences add noise, so more participants are neededRandomization is what makes the groups comparable

Within-subject

The same participants experience every condition; each person is their own controlCrossover trials and repeated-measures designs are the standard examplesAdvantage: individual differences are removed, so fewer participants are neededDisadvantage: carryover effects, order effects and learning effectsManaged by randomizing the order and by allowing a washout period between conditionsCrossover designs suit stable chronic conditions. They are unsuitable where the intervention could produce lasting change — which is often exactly what massage aims to produce.

Sample Size and Statistical Power

A preview of Lecture 6, introduced here because it belongs to design.

Power is the probability that a study will detect an effect of a specified size if that effect really existsConventionally, studies are designed to have at least 80% powerA sample size calculation is performed before recruitment and requires four inputs: the expected effect size, the variability of the outcome, the chosen significance level and the desired powerAn underpowered study that reports "no significant difference" has not shown that there is no difference — it has shown that it could not detect oneVery large studies can detect differences far too small to matter clinicallyA trial reporting no sample size calculation should be read with the possibility of underpowering in mindPilot and feasibility studies are deliberately small; their job is to test procedures, not to answer the clinical question, and they should not report efficacy conclusionsSample sizes in published massage therapy trials are frequently under fifty. Read their negative results accordingly.

Measurement Error

Two kinds

Random error: scatter around the true value in both directions. It reduces precision but does not shift the averageSystematic error: a consistent shift in one direction. It moves the average, and more data will not fix itRandom error is reduced by taking repeated measurements and averagingSystematic error is reduced by calibrating instruments and standardizing procedure

In clinical measurement

A goniometer read from a slightly different angle each time produces random errorA goniometer aligned to the wrong bony landmark every time produces systematic errorStandardize position, instruction, landmark and timing, and you remove most systematic errorFloor effect: the measure cannot register further improvement because participants are already at the bottom of the scaleCeiling effect: the measure cannot register further improvement because participants are already at the topA pain scale has a floor at zero. A study recruiting people with mild pain may find no improvement simply because there was little room to improve.

Outcome Measures Used in Massage Therapy Research

Domain	Common measures	Notes
Pain intensity	Visual analogue scale; numeric rating scale; McGill Pain Questionnaire	Subjective; sensitive to expectation; usually treated as continuous
Back-related disability	Oswestry Disability Index; Roland-Morris Disability Questionnaire	Validated, widely used, and comparable across studies
Neck-related disability	Neck Disability Index	Validated for neck pain populations
Range of motion	Goniometry; inclinometry	Objective but sensitive to positioning and landmarking
Pressure sensitivity	Pressure pain threshold by algometry	More reliable than palpation for tissue tenderness
Sleep	Pittsburgh Sleep Quality Index; actigraphy	Self-report and objective versions differ
Anxiety and mood	State-Trait Anxiety Inventory; Hospital Anxiety and Depression Scale	Validated instruments; not diagnostic tools
Function and quality of life	SF-36; Patient-Specific Functional Scale	Broad; often more meaningful to clients than a pain score

Constructs That Are Hard to Measure

The problem cases

Muscle tightness — no agreed definition and poor inter-rater reliability on palpationTrigger points — inter-examiner agreement on location is weak in the published literatureFascial restriction — difficult to define operationally and difficult to measure directlyTissue texture change — described richly in clinical teaching and rarely quantifiedRelaxation — measurable several ways, none of which agree closely

What follows from this

Researchers substitute measurable proxies: pressure pain threshold, range of motion, self-reported symptomsA proxy is not the construct, and the substitution should be acknowledgedA construct that cannot be measured reliably cannot be studied rigorously — which is not the same as saying it does not existIt does mean that claims built on it should be made cautiously to clientsThis is one of the genuine frontiers of massage therapy research, and one where careful clinicians can contribute.

Matching the Design to the Question

Question type	Example	Best design
Effectiveness of treatment	Does technique X reduce pain more than usual care?	Randomized controlled trial; systematic review of RCTs
Harm	Does technique X cause adverse events?	Cohort study; case-control; case reports for rare events
Prognosis	How long does recovery usually take?	Prospective cohort study
Diagnostic accuracy	How well does this special test identify the condition?	Cross-sectional study against a reference standard
Prevalence	How common is this presentation?	Cross-sectional survey
Experience and meaning	How do clients experience touch after trauma?	Qualitative study
Feasibility	Can this protocol be delivered in a busy clinic?	Pilot or feasibility study

Reading a study is easier once you have asked what question it was trying to answer and whether the design could answer itA design mismatch is one of the fastest disqualifying faults you can identify

Ethics in Design

Design choices with ethical weight

Choosing a no-treatment control when an effective treatment existsUsing a sham that requires deceiving participantsRecruiting your own clients, which creates a dual relationship and a power imbalanceRecruiting your own students, who may not feel free to declineCollecting more personal information than the question requiresContinuing a study after harm has become apparent

How they are addressed

Waitlist and usual-care controls preserve access to treatmentDeception requires strong justification, ethics approval and full debriefingRecruitment should be by someone with no authority over the participantData minimization: collect only what the protocol requires, and de-identify earlyStopping rules are written into the protocol in advanceThese are the research forms of the same obligations you will meet clinically in Lectures 9 to 11: consent, boundaries, privacy and the management of power.

From Hypothesis to Protocol

What a researcher writes down before collecting a single data point.

Background and rationale, with the gap the study addressesThe research question and the hypotheses, null and alternativeDesign, including allocation method and blindingEligibility criteria, recruitment strategy and settingSample size calculation with its assumptions statedOperational definitions of the intervention and the comparison, in reproducible detailThe primary outcome, named as primary, with its measurement tool and time pointsThe statistical analysis plan, including how missing data will be handledEthics approval and the consent processRegistration in a public trial registry before recruitment beginsEverything on this list exists to prevent decisions being made after the results are seen. That is the whole purpose of a protocol.

Bringing It Back to the Treatment Room

The parallels

Your assessment findings are the baseline measurementYour treatment is the independent variable, and it needs an operational definition in your chartYour reassessment is the dependent variable measured againYour clinical impression is a hypothesis about this clientConfounders exist here too: the client also started sleeping better, changed jobs, or began exercising

What good practice looks like

Chart what you did specifically enough that another RMT could repeat it — this is also a record keeping requirementUse the same measure, in the same position, at the same point in the sessionRecord both the pre- and the post-treatment valueHold your clinical impression loosely and revise it against the findingsRecognize that you cannot attribute change to your treatment with certainty in a single case, and describe it to the client honestlyResearch literacy is not a separate subject from clinical competence. It is the same reasoning, applied to one person instead of a hundred.

In-Class Activity 2 — Write a Testable Hypothesis

The task (25 minutes, small groups)

Choose a clinical belief you hold about massage therapyWrite the null and the alternative hypothesis for itOperationally define both the independent and the dependent variableChoose a design and justify it against the question typeName three confounders and state how you would control eachIdentify one ethical obstacle to running the study, and how you would address it

Assessment criteria

Is the hypothesis falsifiable?Is the wording neutral, or does it advocate?Could two researchers measure the DV the same way from your definition alone?Does the design match the question type?Is the study ethical as described — would a Research Ethics Board approve it?Bring this hypothesis to Lecture 5; you will build its sampling, randomization and blinding.

Summary — Lecture 4

Variables

A variable is anything that can take more than one valueThe independent variable is manipulated; the dependent variable is measuredConfounders relate to both and offer an alternative explanation; randomization is the only defence against unmeasured onesAn operational definition states exactly how a variable will be measuredData type — nominal, ordinal, interval, ratio, dichotomous — determines what analysis is legitimate

Hypotheses and design

A hypothesis is a testable, falsifiable, neutral, ethical prediction stated in advanceStudies reject or fail to reject the null; they never prove the alternativeThe scientific method runs from observation to communication in eight steps, and can fail at eachExperimental designs support causal claims; observational designs support associationsInternal validity concerns the causal claim; external validity concerns whether it applies to your clientReliability is consistency; validity is measuring the right thing. Both are needed

Assessment, Preparation and Homework

How this lecture is assessed

Lecture 4 is examinable on the second course quiz and on the final examinationExpect items requiring you to identify the IV and DV in a described study, to spot a confounder, to correct a badly written hypothesis, and to match a design to a questionApproved assessment scheme: Quiz 1 20%, Quiz 2 20%, Assignment 1 10%, Assignment 2 10%, the Final Examination 30% and Professional Practice and Participation 10%. Pass: 70% overall.

Before Lecture 5

Bring the hypothesis your group wrote in Activity 2From your article, note how participants were allocated to groups and whether anyone was blindedNote whether a sample size calculation was reportedRead your article’s limitations paragraph and list every source of error the authors admit to

References and Further Reading

Rattray, F., & Ludwig, L. (2000). Clinical Massage Therapy: Understanding, Assessing and Treating Over 70 Conditions. Toronto: Talus Incorporated.Sackett, D. L., Rosenberg, W. M. C., Gray, J. A. M., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine: what it is and what it isn't. BMJ, 312(7023), 71–72.Straus, S. E., Glasziou, P., Richardson, W. S., & Haynes, R. B. (2019). Evidence-Based Medicine: How to Practice and Teach It (5th ed.). Elsevier.Andrade, C., & Clifford, P. (2008). Outcome-Based Massage: From Evidence to Practice (2nd ed.). Lippincott Williams & Wilkins.Fritz, S. (2021). Mosby's Fundamentals of Therapeutic Massage (7th ed.). Elsevier.Salvo, S. G. (2023). Massage Therapy: Principles and Practice (7th ed.). Elsevier.Higgins, J. P. T., et al. (Eds.). (2023). Cochrane Handbook for Systematic Reviews of Interventions (Version 6.4). Cochrane.Federation of Massage Therapy Regulatory Authorities of Canada. (2016). Inter-Jurisdictional Practice Competencies and Performance Indicators for Massage Therapists at Entry-to-Practice.Canadian Massage Therapy Council for Accreditation. (2024). CMTCA Accreditation Standards for Massage Therapy Education Programs in Canada.